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The Effects of a Meaning-Centered Intervention on Meaning in Life and Eating Disorder Symptoms in Undergraduate Women with High Weight and Shape Concerns: a Randomized Controlled Trial

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Low meaning in life has been proposed as an important factor in the maintenance of eating disorders and previous findings suggest that targeting meaning might optimize treatment effectiveness. The current randomized controlled trial aimed to investigate the efficacy of meaning-centered psychotherapy adjusted for eating disorders (MCP-ED) to improve meaning in women with high weight and shape concerns. Female students with high weight and shape concerns ($N = 134$) were randomly assigned to the waiting-list control condition or the experimental condition, in which they followed six weekly individual sessions of MCP-ED. Self-report measures of meaning, eating disorder symptoms, general distress, psychological well-being, and satisfaction with meaningful life domains were completed at baseline, after the final session of MCP-ED or a seven-week waiting period, and at four week follow-up. Participants in the experimental condition showed a stronger increase in meaning than participants in the waiting-list condition after the intervention and at follow-up. The intervention also resulted in lower eating disorder symptoms and general distress, and higher psychological well-being and satisfaction with meaningful life domains. Findings support the efficacy of MCP-ED as an intervention to increase meaning and point to the relevance of examining whether adding MCP-ED to regular treatment might increase treatment effectiveness in individuals with eating disorders.

Keywords: Eating disorders, meaning in life, intervention, randomized controlled trial

Highlights:

- We developed meaning-centered psychotherapy for eating disorders (MCP-ED)
- The efficacy of MCP-ED was tested in women with high weight and shape concerns
- After MCP-ED and at follow-up, participants reported higher levels of life meaning
- MCP-ED also resulted in lower levels of eating disorder symptoms
- Future studies should test the effectiveness of MCP-ED in a clinical sample

Eating disorders are severe mental disorders that are often associated with impairments in physical health, psychosocial functioning, and emotional well-being (Van Hoeken & Hoek, 2020). As eating disorders are known to have a great impact on the health and quality of life of affected individuals and their relatives (Dakanalis et al., 2017), eating disorders are associated with enormous public health care and burden of disease costs (Schmidt et al., 2016). Cognitive Behaviour Therapy – Enhanced (CBT-E; Fairburn, 2008) is currently considered the leading evidence-based therapy, especially for bulimia nervosa (Hay, 2009), binge-eating disorder (Hilbert et al., 2019), transdiagnostic samples (De Jong et al., 2018), and to a lesser extent for anorexia nervosa (Hay 2015). Despite the growing evidence base for current treatments, many individuals with eating disorders fail to access treatment (Hay, 2019), drop-out during treatment (De Jong et al., 2018), or relapse after successful treatment (Berends et al., 2018). Therefore, it is important to develop new treatment options focusing on factors that contribute to eating disorders. One factor that has been proposed to be relevant in the development and refractoriness of eating disorders is reduced meaning in life (Marco et al., 2021a). In the present randomized controlled trial we therefore examined the efficacy of a meaning-centered psychotherapy protocol that was tailored to eating disorder problems.

One of the first therapists to propose that meaning in life is a protective transdiagnostic factor against psychopathology was Viktor Frankl (1959). Since then, empirical research has consistently shown that experiencing meaning in life is related to greater well-being and psychological functioning, while low meaning in life is associated with higher levels of psychopathology and suicide risk (e.g., Glaw et al., 2017). Although research on the relationship between meaning in life and eating disorders is limited, studies have shown that individuals with an eating disorder report lower meaning in life (Marco et al., 2017), lower satisfaction with meaningful life domains (Van Doornik et al., 2021), and lower existential well-being (Fox & Leung, 2009) than individuals without an eating disorder. Furthermore,

meaning in life was found to be inversely related to eating disorder psychopathology in individuals with eating disorders (Marco et al., 2019) and to moderate the relationship between eating disorder psychopathology and suicidal ideation (Marco et al., 2020). Finally, although no data are available on the predictive value of life meaning on the longitudinal development of eating disorders, a recent longitudinal study focusing on individuals with anorexia nervosa showed that an improvement in eating disorder symptoms over time was related to an increase in satisfaction with meaningful life domains (Van Doornik et al., 2022).

Several authors have therefore suggested that it could be beneficial to add a treatment component focusing on life meaning to current psychotherapies for eating disorders (Marco et al., 2020; Van Doornik et al., 2021). This view is in line with a meta-analysis suggesting that life meaning is a core aspect of recovery from eating disorders and should therefore be targeted during treatment (de Vos et al., 2017). Increasing engagement with intrinsically valued life goals during treatment could reduce the motivational spur to engage in behaviours that are aligned to satisfy eating disorder related goals and values (cf. Williamson et al., 2004). The experience of emotional satisfaction from meaningful goals and values, may further decrease the (relative) incentive value of eating disorder related goals and values (cf. Cox et al., 2015), which may help individuals to redirect their focus to more adaptive sources of life meaning. Furthermore, the pursuit of meaningful goals might increase the experience of positive emotions (Klug & Maier, 2015), which has been suggested to have an inhibitory influence on eating disorder symptoms (Selby & Coniglio, 2020).

Over the years, a number of therapeutic approaches focusing on meaning in life has shown to be effective in improving quality of life and reducing psychological distress (Vos & Vitali, 2018). One of these therapies is meaning-centered psychotherapy (MCP), developed by Breitbart and colleagues (2015). MCP was originally designed as a group-based intervention for individuals with advanced cancer, aiming to help these individuals enhance or sustain a

sense of meaning by identifying and pursuing sources of meaning. Two randomized controlled trials demonstrated the effectiveness of MCP in improving meaning in life, quality of life, and psychological well-being, while reducing symptoms of depression and hopelessness (Breitbart et al., 2010, 2015). Since then, several research groups around the world have adopted MCP, examining and demonstrating its effectiveness in a variety of countries and populations (e.g., cancer survivors and cancer caregivers; Applebaum, 2017; Van der Spek et al., 2017a).

On the basis of the promising evidence for MCP as a meaning-centered therapy, we developed a therapeutical protocol for Meaning-Centered Psychotherapy that was adjusted for individuals with eating disorder symptoms (MCP-ED). This newly developed protocol was based on and adapted from the Dutch (Van der Spek et al., 2017b) and individualized (Breitbart et al., 2018) MCP manuals. MCP-ED consists of 6 weekly, individual treatment sessions. The current study was a first attempt to investigate the effectiveness of MCP-ED. Therefore, we designed a randomized controlled trial in which a large sample of women with high weight and shape concerns was included. As a primary aim, we wanted to examine whether MCP-ED was effective in increasing meaning in life. Furthermore, recent theorizing suggests that an overall sense of life meaning consists of the extent to which one's life is experienced as making sense (comprehension), as being directed by one's valued goals (purpose), and as mattering in the world (mattering; George & Park, 2016). As MCP-ED was designed to address all relevant aspects of life meaning, we examined as a secondary aim whether the impact of MCP-ED on life meaning would indeed be evident for each of the three components of life meaning. Based on previous research (e.g., Breitbart et al., 2018; Marco et al., 2021b; Van der Spek et al., 2017a; Vos & Vitali, 2018), we further expected a positive effect of MCP-ED on eating disorder symptoms, general distress, psychological well-being, and satisfaction with normative life domains.

Method

Participants

The study protocol of the present study was approved by the Ethical Committee Psychology of the University of Groningen (PSY-2021-S-0030) and the trial was preregistered the Dutch Trial Register (NL9457). During the study, there were no deviations from the preregistered protocol. Furthermore, the study design, hypotheses, and analysis plan were preregistered; see https://aspredicted.org/tn2sz.pdf. Finally, CONSORT guidelines were followed during the preparation of this article.

An online screening survey including the Weight Concern Scale (WCS; Killen et al., 1994) was completed by 467 first-year female students from the University of Groningen between September 2020 and February 2021. Individuals scoring ≥ 47 or answering 'Often' or 'Always' to the question 'Do you ever feel fat?', indicative of high shape and weight concerns (Jacobi et al., 2004), were invited to participate in the current study (in line with Jacobi et al., 2004, each of the five items of the WCS were adjusted to equal a maximum score of 20: total range 0 – 100). Individuals who were currently in treatment for an eating disorder or who indicated not being fluent in Dutch, English, or German were excluded. Of the 162 eligible individuals, 134 (82.7%, age M = 19.72, SD = 2.14, n scoring ≥ 47 on the WCS = 98 (73.1%)) participated in the current study, in the academic year between October 2020 and May 2021. Most participants reported to be either Dutch (n = 70, 52.2%) or German (n = 38, 28.4%). The remaining participants reported to have a different European nationality (n = 17, 12.7%) or a non-European nationality (n = 9, 6.7%). Participants were randomly assigned to the experimental (n = 67) or waiting-list control condition (n = 67), and completed the questionnaires in Dutch (n = 67) or English (n = 67). Participants in the experimental condition followed the therapy sessions in Dutch (n = 34), English (n = 21), or German (n =

12). Although mean Body Mass Index (BMI; calculated based on self-reported height and weight, as kg/m^2) for the total sample (M = 23.86, SD = 5.51) fell within the range indicative for a healthy body weight (Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults, 1998), seven individuals classified as being underweight, 19 individuals were overweight, five individuals had obesity class I, two individuals had obesity class II, and three individuals had obesity class III. Of the 134 individuals who completed baseline measures, 93.3% completed post assessment (n = 125, experimental condition n = 61, 91.0%, waiting-list control condition n = 64, 95.5%), and 92.5% completed follow-up assessment (n = 124, experimental condition n = 61, 91.0%, waiting-list control condition n = 63, 94.0%). In return for their participation, participants received course credits.

The CONSORT flow diagram depicts enrolment and participation flow in the current study. The required sample size was estimated on the basis of an a priori conducted power analysis for the main research question. The anticipated effect size was based on Breitbart et al. (2018) and Van der Spek et al. (2017), who reported large post intervention effect sizes of MCP on the primary outcome measure of personal meaning. However, as both studies examined a different patient group compared to the current study, we wanted to be cautious and therefore use a medium effect size in the power analysis. Thus, given an α level of 0.05, a power of β = 0.80, an effect size of f = 0.25, number of groups = 2, number of covariates = 1, and numerator df = 1, the required sample size was N = 128.

Measurements

Primary outcome measure.

Meaning in life. Life meaning was assessed with the Meaning in Life Questionnaire (Steger et al., 2006). The MLQ consists of two subscales measuring the presence (MLQ-P) and the search for life meaning (MLQ-S). In the present study the MLQ-P scale was used as a primary outcome measure of life meaning, while, for exploratory purposes, the MLQ-S scale

was used to index the search for meaning. Since MCP-ED was not designed to specifically target individuals' search for meaning, we had no straightforward predictions about the impact of MCP-ED on the search for meaning. Both subscales consist of five items that are rated on a seven-point Likert scale from 1 (Absolutely untrue) to 7 (Absolutely true). For each subscale responses are summed, with higher scores indicating higher meaning in life or higher search for meaning. The Cronbach's alphas of the MLQ varied between .90 and .92 (MLQ-P) and between .86 and .90 (MLQ-S) at baseline, post assessment, and follow-up.

Secondary outcome measures.

Components of meaning in life. The Multidimensional Existential Meaning Scale (MEMS; George & Park, 2017) contains three subscales to index each of the three components of the tripartite model of life meaning: comprehension, purpose, and mattering. Each subscale consists of five items, which are rated on a seven-point Likert scale from 1 (Very strongly disagree) to 7 (Very strongly agree) and summed for each scale separately to create a subscale score. In the current study the Cronbach's alphas of the MEMS subscales were considered to be good, varying between .84 and .93 at all assessment points.

Eating disorder symptoms. Eating disorder symptoms were indexed by the Eating Disorder Examination Questionnaire 6.0 (EDE-Q; Fairburn & Beglin, 2008). The EDE-Q is the questionnaire version of the EDE interview and provides a global measure of the severity of eating disorder pathology over the last 28 days. Items are scored from 0 (No days/Not at all) to 6 (Every day/Markedly). Responses on the 22 items are averaged, with higher scores indicating more eating disorder symptoms (cf. Aardoom et al., 2012). The present Cronbach's alphas of the EDE-Q were excellent, varying between .94 and .96 at all assessment points.

General distress. The 21-item Depression, Anxiety, and Stress Scales (DASS-21; Lovibond & Lovibond, 1995) was used to assess general distress. The DASS-21 is comprised of three subscales measuring depression, anxiety, and stress. Items are scored from 0 (Did not

apply to me at all) to 3 (Applied to me very much, or most of the time). Seven items correspond to each subscale and are summed to create a subscore (range 0-21). A total score is computed by summing all items (range 0-63). As the DASS-21 is the short version of the 42-item DASS (Lovibond & Lovibond, 1995), the subscores and total score are multiplied by two (subscore range 0-42; total score range 0-126), to facilitate comparison with scores based on the original DASS. The Cronbach's alphas of the DASS subscales and total score varied between .79 and .94 at all assessment points.

Psychological well-being. Psychological well-being was indexed by the Ryff's Psychological Well-Being Scales (PWB; Ryff, 1989). The PWB consists of six subscales: autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance. Each subscale consists of seven items that are rated on a six-point Likert scale from 1 (Strongly disagree) to 6 (Strongly agree). An overall score was calculated by summing all items and dividing this score by the number of items in the scale (cf. Kertzner et al., 2009). Thus, higher overall scores indicate greater psychological well-being. Across assessment points, the Cronbach's alphas of the overall score varied between .89 and .91 in the current study.

Satisfaction with normative life domains. The Brief Multidimensional Students' Life Satisfaction Scale-College version (BMSLSS-C; Zullig et al., 2009), was used to assess satisfaction with normative life domains. The BMSLSS-C covers seven life domains (i.e., family, friendships, school experience, self, living location, romantic relationships, and physical appearance), and participants rate how satisfied they are with each domain on a scale ranging from 1 (Very dissatisfied) to 5 (Very satisfied). One additional item assesses satisfaction with life in general. Responses on the eight items were averaged, with higher scores indicating higher satisfaction with normative life domains (cf. Athay et al., 2012). As scoring can be done by computing the mean of the completed items if at least 85% of the

items are answered (Bickman et al., 2010), the three participants in the current study who had one datapoint missing were not removed from the analyses. The Cronbach's alphas of the BMSLSS-C across assessment points were acceptable (varying between .76 and .79).

Meaning Centered Psychotherapy for Eating Disorders (MCP-ED)

The aim of MCP-ED is to sustain or enhance a sense of meaning in order to facilitate the process of overcoming weight and shape concerns. MCP-ED is a manualized 6-week intervention that makes use of theory, discussions, exercises, and homework assignments that focus on themes related to life meaning and eating disorders. MCP-ED is an adaptation of the Dutch MCP manual for cancer survivors (Van der Spek et al., 2017b) and the individualized MCP manual (Breitbart et al., 2018). Adaptations included a reduction in the number of sessions from eight to six and the use of terminologies, topics, and exercises that are more relevant for the current age group and type of complaints. For example, to make meaning more appealing for young individuals, emphasis is placed on looking at life meaning as a toolbox, with different tools or instruments that can help participants experience a sense of meaning in their lives. Therefore, the four sources of meaning that are central in MCP, originally described by Frankl (1959), are referred to as 'tools' in MCP-ED. In MCP-ED these sources are described as (1) your personal life story, (2) dealing with life's limitations, (3) creating your own life, (4) and meaningful experiences. During each session, one of the four sources is discussed (Table 1). MCP-ED was developed in close collaboration with several experienced eating disorder therapists and young individuals (i.e., two adolescents with an eating disorder and three master students provided their feedback on the layout and helped adapt the language for their generation). The weekly MCP-ED sessions were provided individually via videoconferencing and lasted one hour. Participants used a paper workbook that they received by regular mail. Sessions were provided in Dutch, English, or German, and

led by one of eight psychologists or master students who were trained in MCP-ED and supervised on a weekly basis (by the first author). For a detailed description of the original MCP, see Breitbart et al. (2015).

Table 1
Session topics covered in MCP-ED.

Session	MCP-ED	Assignments	Homework
1.	Introduction, theory on the concept and sources of meaning, and its relationship with eating disorders	Defining meaning in life, writing down meaningful experiences during the past week, watching a video on meaning in life and eating disorders	Each day, write down at least one experience that was meaningful to you
2.	Personal life story (1): environmental influences	Writing down positive and negative life experiences and life lessons, writing down memories that come to mind for the emotions of joy, sadness, and regret, writing down important people in your life, creating a word web with answers on the question 'Who am I'	Make an overview of the most important experiences, memories, people, relationships, and habits that made you become the person you are today
3.	Personal life story (2): personal influences	Creating a timeline of your past, creating a timeline of your future	Discuss the created timelines with one or more important persons
4.	Dealing with life's limitations	Writing down limitations you are currently facing and how you deal with them, writing down tops (tools you already use well) and tips (tools you want to use more often), creating a list of five goals that you want to achieve in the near future	Choosing a goal from the list, creating a step-by-step plan to achieve the goal, taking the first step
5.	Creating your own life and meaningful experiences	Writing down experiences in which you showed courage, took responsibility, and were committed to something, discuss experiences that have been meaningful in your life in a creative way (make a drawing, show pictures, search for a related item)	Creating an overview of the things you have learned during MCP-ED, taking the next step towards the goal you choose last week
6.	Presenting life lessons and reflecting on MCP-ED	Presenting and discussing the overview/life lessons, answering questions as a reflection on MCP-ED	

Note. MCP-ED, Meaning-centered psychotherapy for individuals with eating disorders.

Procedure

After the online screening including the WCS, participants who met inclusion criteria were invited to participate in the current study. Participants willing to participate signed online informed consent and completed (online) baseline measures, which took approximately 30 minutes, in the following order: demographics, MLQ, MEMS, PWB, DASS, EDE-Q, BMSLSS-C (the Intolerance of Uncertainty Scale – Short form (Carleton et al., 2007) was also administered to test the preregistered hypothesis that the impact of the intervention on

general distress would be mediated by an increased tolerance of uncertainty; this will however be addressed in a separate manuscript to provide an appropriate context for presenting and testing this hypothesis, and is therefore not included in the current manuscript). Afterwards, participants were randomly allocated by the main researcher to the experimental or waiting-list control condition (parallel design), using a block size of ten and an allocation ratio of 1:1. The block randomization list was generated by an online program (Sealed Envelope, 2020), no stratification strategies were used. Participants in the experimental condition were assigned to a personal therapist by the main researcher and followed six individual, weekly sessions of MCP-ED. After the final session, participants were invited to complete the post assessment (online, with the same measures and order as during baseline). Participants in the waiting-list control condition did not receive an intervention. Seven weeks after completing baseline measures, participants in the waiting-list control condition were invited to complete the post assessment (online). Four weeks after the post assessment, both groups were invited to complete the follow-up assessment (online, with the same measures and order as during baseline). Participants received automatic invitations for the questionnaires via e-mail, and reminders were sent when someone did not complete the assessment. If a participant did not respond, she was contacted via e-mail or phone. After the data collection was completed, participants in the waiting-list control condition had the possibility to follow MCP-ED. The entire study took place online.

Statistical Analyses

To test the short-term effects of MCP-ED on meaning in life an ANCOVA was conducted with Condition (experimental, waiting-list control) as a between-subjects factor and post assessment score on the MLQ-P as dependent variable. The baseline score of the MLQ-P was included as a covariate. Furthermore, a second ANCOVA was performed to test

the longer-term effects of MCP-ED on meaning in life, this time using the follow-up assessment score on the MLQ-P as dependent variable.

These analyses were repeated to test the short-term and long-term effects of MCP-ED on the secondary outcome measures: comprehension, purpose, mattering, eating disorder symptoms, general distress, depression, anxiety, stress, psychological well-being, satisfaction with life domains, and the search for meaning. In all analyses, the baseline score of each dependent variable was included as a covariate. Bonferroni-Holm corrections were applied to correct for familywise error rate. Therefore, the smallest *p* value was tested against an alpha of .0045, the *p* values following against .005, .0056, .0063, .0071, .0083, .01, .0125, .0167, .025, and .05. All assumptions were checked (please see the supplementary material).

Finally, after the preregistered analyses were completed, two post hoc analyses were conducted. First, to explore whether a change in eating disorder symptoms could be possibly (partly) attributed to a change in life meaning, bivariate correlations between change in eating disorder symptoms and change in meaning in life were computed (as indexed by the MLQ-P and the MEMS scales). Second, to explore which specific life domains of the BMSLSS-C would be affected by MCP-ED, we conducted eight separate ANCOVAs twice (for each of the domains, once for post assessment and once for follow-up) with Condition as a between-subjects factor and including baseline assessment score of each domain as a covariate. To correct for familywise error rate, a Bonferroni-Holm correction was applied. Please see the supplementary material for a detailed description of the assumption checks and analyses.

Results

Drop-outs and Missing Data.

During the course of this study, nine participants dropped out before the post assessment (6.7%, experimental condition $n = 6$, waiting-list control condition $n = 3$) and one more participant (in the waiting-list control condition) dropped out before the follow-up

assessment (total dropout = 7.5%). Dropouts did not differ significantly from those who completed the current study on the baseline scores of the primary outcome measure. However, regarding the secondary outcome measures, dropouts did score significantly worse on the DASS anxiety subscale (dropouts $M = 16.80$, $SD = 11.00$; completers $M = 10.95$, $SD = 8.61$; $t(132) = 2.02$, $p = .045$, $d = 0.59$), stress subscale (dropouts $M = 22.40$, $SD = 9.61$; completers $M = 16.00$, $SD = 8.50$; $t(132) = 2.27$, $p = .025$, $d = 0.71$), and total scale (dropouts $M = 56.80$, $SD = 29.76$; completers $M = 40.16$, $SD = 23.31$; $t(132) = 2.13$, $p = .035$, $d = 0.62$). After consulting a statistician, we decided not to impute missing data as the total dropout rate was very low and there were only three missing datapoints (on the BMSLSS-C) in the complete dataset. Thus, the conducted analyses can be considered completer analyses. All data have been made publicly available at the DANS data base and can be accessed at https://doi.org/10.17026/dans-x33-2jzr.

Descriptives

To facilitate the interpretation of the findings, Table 2 shows the bivariate correlations between the MLQ-P and the subscales of the MEMS.

Table 2
Correlation matrix for the indices of meaning in life.

Variable	1	2	3	4
1. MLQ-P		.77	.76	.64
2. MEMS Comprehension			.67	.67
3. MEMS Purpose				.53
4. MEMS Mattering				

Note. MLQ-P = Meaning in Life Questionnaire, Presence subscale; MEMS = Multidimensional Existential Meaning Scale, subscales Comprehension, Purpose, Mattering. All p values $\leq .01$.

Primary Outcome Measure

Table 3 provides an overview of means and standard deviations for the primary and secondary outcome measures at all assessment points. The ANCOVA including post assessment MLQ-P showed a large effect of condition ($F(1, 122) = 40.23$, $p < .001$, $\eta_p^2 = .25$). Likewise, the ANCOVA including follow-up MLQ-P also showed a significant effect of condition, with a large effect size ($F(1, 121) = 14.97$, $p < .001$, $\eta_p^2 = .11$). Thus, participants in the experimental condition reported significantly higher levels of life meaning immediately after the intervention and at follow-up than participants in the waiting-list control condition.

Table 3
Means and standard deviations of primary and secondary outcome measures at all assessments points per group.

	Experimental Condition			Waiting-list Control Condition		
	Pre intervention (n = 67)	Post intervention (n = 61)	Follow-up (n = 61)	Pre intervention (n = 67)	Post intervention (n = 64)	Follow-up (n = 63)
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
MLQ-P	19.88 (6.89)	25.64 (5.45)	25.02 (6.14)	20.93 (6.60)	21.95 (6.23)	22.43 (6.63)
MEMS						
Comprehension	19.85 (5.36)	24.26 (5.14)	23.64 (5.27)	20.57 (5.39)	21.67 (5.21)	21.35 (5.79)
Purpose	24.22 (4.95)	27.79 (4.15)	27.05 (4.59)	24.01 (5.05)	25.39 (4.81)	25.49 (5.08)
Mattering	16.93 (6.44)	20.54 (5.93)	20.30 (6.12)	18.24 (6.40)	18.75 (6.05)	18.83 (6.71)
EDE-Q	2.73 (1.20)	1.66 (1.05)	1.77 (1.13)	2.54 (1.17)	2.43 (1.27)	2.38 (1.36)
DASS						
Total	45.97 (25.70)	29.38 (22.18)	33.70 (25.34)	36.84 (21.66)	39.13 (24.04)	37.37 (26.57)
Depression	15.34 (10.98)	8.72 (8.56)	11.48 (10.61)	11.73 (9.60)	12.94 (10.52)	12.10 (11.13)
Anxiety	12.57 (9.71)	7.67 (7.40)	9.18 (8.24)	10.21 (7.89)	10.06 (8.28)	10.29 (8.94)
Stress	18.06 (8.94)	12.98 (8.28)	13.05 (9.66)	14.90 (8.25)	16.13 (9.28)	14.98 (9.15)
PWB	3.90 (0.52)	4.26 (0.54)	4.20 (0.55)	3.95 (0.52)	4.03 (0.50)	4.02 (0.53)
BMSLSS-C	3.38 (0.74)	3.73 (0.77)	3.69 (0.72)	3.49 (0.67)	3.52 (0.66)	3.45 (0.69)
MLQ-S	24.22 (6.54)	24.56 (5.78)	24.08 (6.47)	23.88 (5.47)	25.16 (4.74)	24.59 (5.13)

Note. MLQ-P = Meaning in Life Questionnaire (MLQ), Presence subscale (range 5-35; higher scores indicate higher presence of meaning); MEMS = Multidimensional Existential

Meaning Scale, subscales Comprehension, Purpose, Mattering (range 5-35; higher scores indicate more meaning); EDE-Q = Eating Disorder Examination Questionnaire (range 0-6; higher scores indicate greater eating disorder psychopathology, scores ≥ 4 are considered clinically significant; Carter et al., 2001); DASS = Depression, Anxiety, and Stress Scales, Total score (range 0-126; higher scores indicate more general distress) and subscales Depression, Anxiety, Stress (0-42; higher scores indicate more symptoms of depression, anxiety, or stress); PWB = Ryff's Psychological Well-Being Scales, Total score (range 1-6; higher scores indicate greater psychological well-being); BMSLSS-C = the Brief Multidimensional Students' Life Satisfaction Scale-College version (range 1-5; higher scores indicate higher satisfaction with normative life domains); MLQ-S = MLQ, Search subscale (range 5-35; higher scores indicate higher search for meaning in life).

Secondary Outcome Measures

Table 4 provides an overview of the ANCOVAs including post intervention and follow-up secondary outcome measures. After the Bonferroni-Holm correction was applied, the ANCOVAs including post-assessment MEMS comprehension, MEMS purpose, MEMS mattering, EDE-Q, DASS total, DASS depression, DASS anxiety, DASS stress, PWB, and BMSLSS-C all showed a significant effect of condition. In addition, no significant effect of condition was found for MLQ-S.

Regarding the follow-up, the ANCOVAs including follow-up MEMS comprehension, MEMS mattering, EDE-Q, DASS, DASS stress, PWB total, and BMSLSS-C showed a significant effect of condition after applying the Bonferroni-Holm correction. No significant effects were found for MLQ-S and for the DASS-subscales depression and anxiety. Moreover, no significant effect of condition was found for MEMS purpose. This was the case when the two outliers were deleted from the analyses ($F(1, 119) = 2.88$, $p = .092$, $\eta_p^2 = .02$), as well as when all participants were included (reported in Table 4).

Table 4
ANCOVAs including post intervention and follow-up secondary outcome measures.

	ANCOVA					
	Post intervention (N = 125)			Follow-up (N = 124)		
	F	p	η_p^2	F	p	η_p^2
MEMS						
Comprehension	26.98	< .001	.18	15.74	< .001	.12
Purpose	15.36	< .001	.11	4.32	.040*	.04
Mattering	14.28	< .001	.11	8.59	.004	.06
EDE-Q	40.80	< .001	.25	19.49	< .001	.14
DASS						
Total	26.49	< .001	.18	6.90	.010	.05
Depression	18.38	< .001	.13	2.22	.139	.02
Anxiety	12.50	.001	.09	4.46	.037*	.04
Stress	20.80	< .001	.15	7.72	.006	.06
PWB	24.25	< .001	.17	12.92	< .001	.10
BMSLSS-C	7.41	.007	.06	13.63	< .001	.10
MLQ-S	1.26	.265	.01	0.51	.478	.00

Note. MEMS = Multidimensional Existential Meaning Scale, subscales Comprehension, Purpose, Mattering; EDE-Q = Eating Disorder Examination Questionnaire; DASS = Depression, Anxiety, and Stress Scales, Total score and subscales Depression, Anxiety, Stress; PWB = Ryff's Psychological Well-Being Scales, Total score; BMSLSS-C = the Brief Multidimensional Students' Life Satisfaction Scale-College version; MLQ-S = MLQ, Search subscale. * Not considered significant after the Bonferroni-Holm correction was applied.

Post-hoc analyses (not preregistered)

Table 5 shows bivariate correlations between change in eating disorder symptoms and change in life meaning. Increased meaning in life was associated with improvement in eating disorder symptoms, both at post assessment and at follow-up. Likewise, increases in comprehension, purpose, and mattering were associated with improvement in eating disorder symptoms, at both time points.

Table 5

Bivariate correlations between change in eating disorder symptoms, meaning in life, and its three components.

Variable	1	2	3	4	5	6	7	8	9	10
1. Change in EDE-Q post		.43	.42	.32	.44	.82	.38	.36	.28	.48
2. Change in MLQ-P post			.52	.46	.41	.41	.81	.52	.43	.38
3. Change in Comprehension post				.34	.53	.41	.56	.71	.26	.47
4. Change in Purpose post					.39	.36	.38	.31	.66	.29
5. Change in Mattering post						.32	.45	.47	.38	.82
6. Change in EDE-Q follow-up							.40	.44	.37	.41
7. Change in MLQ-P follow-up								.67	.51	.46
8. Change in Comprehension follow-up									.52	.50
9. Change in Purpose follow-up										.37
10. Change in Mattering follow-up										

Note. Change in EDE-Q post = baseline minus post score on the Eating Disorder Examination Questionnaire (EDE-Q), Change in EDE-Q follow-up = baseline minus follow-up EDE-Q score, Change in MLQ-P post = post minus baseline score on the Meaning in Life Questionnaire (MLQ) Presence scale, Change in MLQ-P follow-up = follow-up minus baseline MLQ-P score, Change in Comprehension, Purpose, Mattering post = post minus baseline score on the subscale Comprehension, Purpose, Mattering of the Multidimensional Existential Meaning Scale (MEMS), Change in Comprehension, Purpose, Mattering follow-up = follow-up minus baseline score on the subscale Comprehension, Purpose, Mattering of the MEMS. Positive change scores indicate improvement. All p values ≤ .01.

Table 6 provides an overview of the means and standard deviations for each of the normative life domains of the BMSLSS-C, at all assessment points. After applying the Bonferroni-Holm correction, the ANCOVAs including post assessment domains of the self ($F(1, 122) = 20.62$, $p < .001$, $\eta_p^2 = .15$) and physical appearance ($F(1, 122) = 12.50$, $p = .001$, $\eta_p^2 = .09$) showed a significant effect of condition. Regarding the follow-up, only the ANCOVA including the domain of the self, showed a significant effect of condition ($F(1, 121) = 11.48$, $p = .001$, $\eta_p^2 = .09$).

Table 6

Means and standard deviations of BMSLSS-C domains at all assessments points per group.

	Experimental Condition			Waiting-list Control Condition		
	Pre intervention (N = 67)	Post intervention (N = 61)	Follow-up (N = 61)	Pre intervention (N = 67)	Post intervention (N = 64)	Follow-up (N = 63)
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
Family	4.09 (1.28)	4.11 (1.25)	4.23 (1.18)	4.13 (1.21)	4.20 (1.09)	4.29 (1.02)
Friends	4.21 (0.96)	4.34 (0.95)	4.38 (0.82)	4.12 (0.91)	4.25 (0.78)	4.19 (0.98)
School experience	3.18 (1.01)	3.46 (1.15)	3.38 (1.13)	3.25 (1.13)	3.06 (1.19)	3.08 (1.20)
Self	2.96 (1.20)	3.70 (1.05)	3.46 (1.06)	3.06 (1.11)	3.11 (1.06)	3.00 (1.19)
Living location	3.79 (1.30)	4.07 (1.17)	4.05 (1.18)	4.18 (0.98)	4.02 (1.06)	3.87 (1.11)
Romantic relationships	2.85 (1.48)	3.08 (1.48)	3.18 (1.39)	3.03 (1.36)	3.02 (1.46)	2.98 (1.41)
Physical appearance	2.67 (1.24)	3.38 (1.13)	3.02 (1.27)	2.61 (1.10)	2.77 (1.19)	2.62 (1.13)
Life in general	3.33 (1.16)	3.72 (1.00)	3.85 (1.01)	3.52 (1.04)	3.72 (0.92)	3.57 (0.96)

Note. BMSLSS-C = the Brief Multidimensional Students' Life Satisfaction Scale-College version (range 1-5; higher scores indicate higher satisfaction with the domain).

Discussion

The present randomized controlled trial investigated the efficacy of MCP-ED to increase meaning in life among women with high weight and shape concerns. In line with our hypotheses, the intervention showed to be effective in increasing meaning in life directly after the intervention and at one month follow-up, with large effect sizes. With respect to the secondary outcomes, evidence was found that MCP-ED also reduced eating disorder symptoms and general distress, whereas it increased the meaning in life components of comprehension and mattering, psychological well-being, and satisfaction with meaningful life domains, with medium to large effect sizes. The effects on the secondary outcome measures were still evident at one month follow-up. For the purpose component of life meaning, however, significant effects were only found directly after the intervention. Finally, exploratory analyses showed no significant effect of MCP-ED on the search for meaning.

These findings support the efficacy of the MCP-ED as an intervention to increase meaning in life. This is in line with previous research showing a positive effect of MCP on life meaning in individuals with advanced cancer (Breitbart et al., 2010, 2015) and in cancer survivors (Van der Spek et al., 2017a). The present findings add to this literature by showing that MCP tailored to eating disorder symptoms can also be beneficial for individuals with high weight and shape concerns. Findings further showed that the intervention was effective with regard to improving each of the three components of meaning that are distinguished in the tripartite model (i.e., comprehension, mattering, purpose). Comprehension showed both an immediate and longer-term increase. Thus, after MCP-ED, participants reported a greater sense of coherence and understanding regarding their experiences and lives (George & Park, 2016). According to the narrative identity literature (McLean, 2008), life stories enhance a sense of understanding by actively creating coherence between events and the self. Therefore, the increase in comprehension might be due to a better understanding of the individual's 'personal life story', the first of the four sources of meaning covered in MCP-ED (Table 1). Mattering also showed a large sized increase that was evident directly after the intervention and at follow-up. Thus, following MCP-ED, participants experienced their life as being of more significance and value in the world (George & Park, 2016). This increase might be due to the emphasis that is put on the experiences that made the participant's life meaningful (fourth source, 'meaningful experiences'). According to George and Park (2016), having a sense of mattering is considered to be adaptive, especially during difficult times. Finally, in contrast to the other two components, for the purpose component significant effects were only found immediately after MCP-ED. Thus, directly after MCP-ED, participants experienced their lives as being more directed and motivated by valued life goals (George & Park, 2016). It has been argued that specifically high-level goals that are central to the individual's identity and reflective of the individual's core values contribute to experiencing a sense of purpose

(George & Park, 2016). Previous studies showed that having highly valued higher order goals is important to health and well-being (Ryff, 1989). Therefore, it might be beneficial to put more emphasis during MCP-ED on understanding one's personal, higher order goals and to think about which lower-level goals and behaviours can be derived from these higher goals and be applied in daily life. However, future research is needed to support these claims.

Relevant for the current context, the results also showed that MCP-ED was effective in decreasing eating disorder symptoms in women with high weight and shape concerns as indexed by the EDE-Q. This effect was retained at four-week follow-up. Since the EDE-Q asks for the severity of symptoms over the last 28 days (Fairburn & Beglin, 2008), the post-intervention ratings cover the last four weeks of the six-week intervention period. It seems therefore reasonable to assume that the large sized decrease in EDE-Q scores from baseline to post-intervention reflects even an underestimation of the true immediate effect of the intervention. Nevertheless, MCP-ED clearly resulted in a robust and substantial decrease in eating disorder symptoms in women with high weight and shape concerns, which seems to support the notion that it might be beneficial to add a meaning in life treatment component to current psychotherapies for eating disorders (Marco et al., 2020; Van Doornik et al., 2022).

Consistent with the view that the reduction in eating disorder symptoms could at least partly be attributed to an increase in life meaning, post hoc correlational analyses showed that a relatively strong reduction in eating disorder symptoms was related to a relatively strong increase in life meaning (with correlations around .40). These preliminary yet promising findings add to previous results from cross-sectional research indicating that individuals with eating disorders show an inverse relationship between meaning in life and eating disorder psychopathology (Marco et al., 2019) and to findings of an earlier longitudinal study showing that an increase in satisfaction with normative life domains over time was paralleled by improvement in eating disorder symptoms (Van Doornik et al., 2022). Perhaps, then, MCP-

ED promoted participants to increase their engagement in meaningful goals and values, which in turn might have reduced attentional resources available to engage in eating disorder related behaviour (cf. Williamson et al., 2004) and/or decreased the incentive value of eating disorder related goals and values (cf. Cox et al., 2015), thereby facilitating engagement in behaviours that are aligned to more adaptive sources of life meaning. More generally, the increased engagement in highly valued life goals may have detracted from the motivational relevance of goals and values related to weight and shape, which, in turn, may also decrease individuals' weight and shape related preoccupations and (eating) behaviours. However, research on mediating factors is necessary to arrive at more solid conclusions about whether the reduction in eating disorder symptoms can indeed be attributed to an increase in life meaning.

With respect to the other secondary outcome measures, we found positive effects of MCP-ED on general distress, psychological well-being, and satisfaction with normative life domains. These findings are largely in line with previous studies on MCP (Breitbart et al., 2010, 2015; Van der Spek et al., 2017a). However, it should be noted that the effects with respect to symptoms of depression and anxiety decayed at follow-up. Regarding the post-hoc analyses, we found that participants reported higher satisfaction with the self and their physical appearance directly after MCP-ED. At follow-up, only the effect on satisfaction with the self remained significant. The post-hoc finding that participants are more satisfied with themselves after MCP-ED seems to be relevant, as previous research showed that adolescents with anorexia nervosa specifically reported lower satisfaction with the self (next to school and life in general), compared to adolescents without eating disorders (Van Doornik et al., 2021).

Finally, of the outcome variables included in this study, only the search for meaning in life failed to demonstrate a significant difference after the intervention. Thus, although MCP-ED supported participants in finding meaning in their lives, MCP-ED did not significantly enhance or reduce participants' drive and orientation toward searching for meaning in one's

life. These results seem to be in line with the idea that the presence and search for meaning are two distinct and at least partly independent concepts (Steger et al., 2006). However, in the field of meaning in life research, there is still an ongoing debate about the role of searching for meaning and how it relates to the presence of meaning and well-being (Damásio & Koller, 2015). For example, some theorists view the search for meaning as a natural and healthy part of life (Frankl, 1959), while others approach it as a dysfunctional process which only occurs when the individual's needs for meaning have been frustrated (Baumeister, 1991). Empirical findings also show a complex pattern, with a number of studies showing that higher levels of searching for meaning are related to lower levels of psychological well-being (e.g., higher levels of depression and fear; Steger et al., 2006), while other studies showed the search for meaning to be positively related to psychological well-being for those individuals who already have higher levels of meaning (e.g., Cohen & Cairns, 2012). Thus, further research is necessary to provide more insight into the interplay between the presence and search for life meaning and the role that meaning interventions can play.

Although MCP-ED was originally designed to be a treatment program, it may also be useful as a preventive intervention. Due to the great impact of eating disorders on affected individuals, their relatives, and society (Schmidt et al., 2016), it is highly relevant to develop and disseminate effective prevention programs (Stice et al., 2013). For example, a meta-analytic review by Stice et al. (2021) showed life style modification and dissonance-based prevention programs to be effective in reducing future onset of eating disorders. In this light, the reduction in eating disorder symptoms found after the final session of MCP-ED and at four-week follow-up, might be promising. However, caution is required as the current follow-up was relatively short and we have no data on the reduction in future eating disorder onset.

Strengths of the current study were using a randomized controlled trial design to examine a meaning in life intervention, including a large sample of women with high weight and shape

concerns, and a relatively low drop-out rate. However, there are also limitations that should be taken into account. First of all, as MCP-ED was compared to a waiting-list control condition and a sample of women with high weight and shape concerns was used in the current study, the question remains whether MCP-ED adds additional value to standard eating disorder treatments. This should be tested in future studies, in which MCP-ED is used as an add-on intervention to treatment as usual and compared to an active control condition. Second, the final sample (*N* post assessment = 125, *N* follow-up = 124) was slightly smaller than that required sample according to the power analyses (*N* = 128). Third, as a relatively short follow-up period of four weeks was used, we are unable to draw conclusions about the long-term effects of MCP-ED. Previous research in cancer survivors showed that MCP had positive long-term effects (six months after the intervention) on symptoms of depression and distress (Van der Spek et al., 2017a). Thus, future studies would benefit from adding a longer-term follow-up assessment to examine the long-term efficacy of MCP-ED. Fourth, the design of the current study does not allow us to examine the specificity of MCP-ED. Therefore, we are unable to make inferences about which separate or combined treatment elements, sources of life meaning, or sessions might have contributed most to the increase in life meaning seen in participants after receiving MCP-ED. Fifth, an overestimation of treatment effects might have occurred due the fact that the data was collected during the COVID-19 pandemic. As participants were hardly allowed to go to university, they might have felt more miserable than usual. Since their human interaction was limited, they might have benefitted even more from MCP-ED than in the absence of the pandemic related concerns and restrictions. Therefore, replication of the present study post COVID-19 is recommended. Finally, as only women were included, this limits the extent to which our findings can be generalized to males.

To conclude, the present study provides some first evidence that MCP-ED is an effective intervention for improving life meaning in women with high weight and shape concerns.

Promising, MCP-ED also proved to be effective in decreasing eating disorder symptoms directly after the intervention and at one-month follow-up. Therefore, an important next step would be to test the effectiveness of MCP-ED to improve meaning in life in a clinical sample of individuals with an eating disorder, and also test whether MCP-ED could serve to improve eating disorder symptoms among these individuals. If this is the case, MCP-ED could potentially be an important add-on intervention to the treatment of eating disorders.

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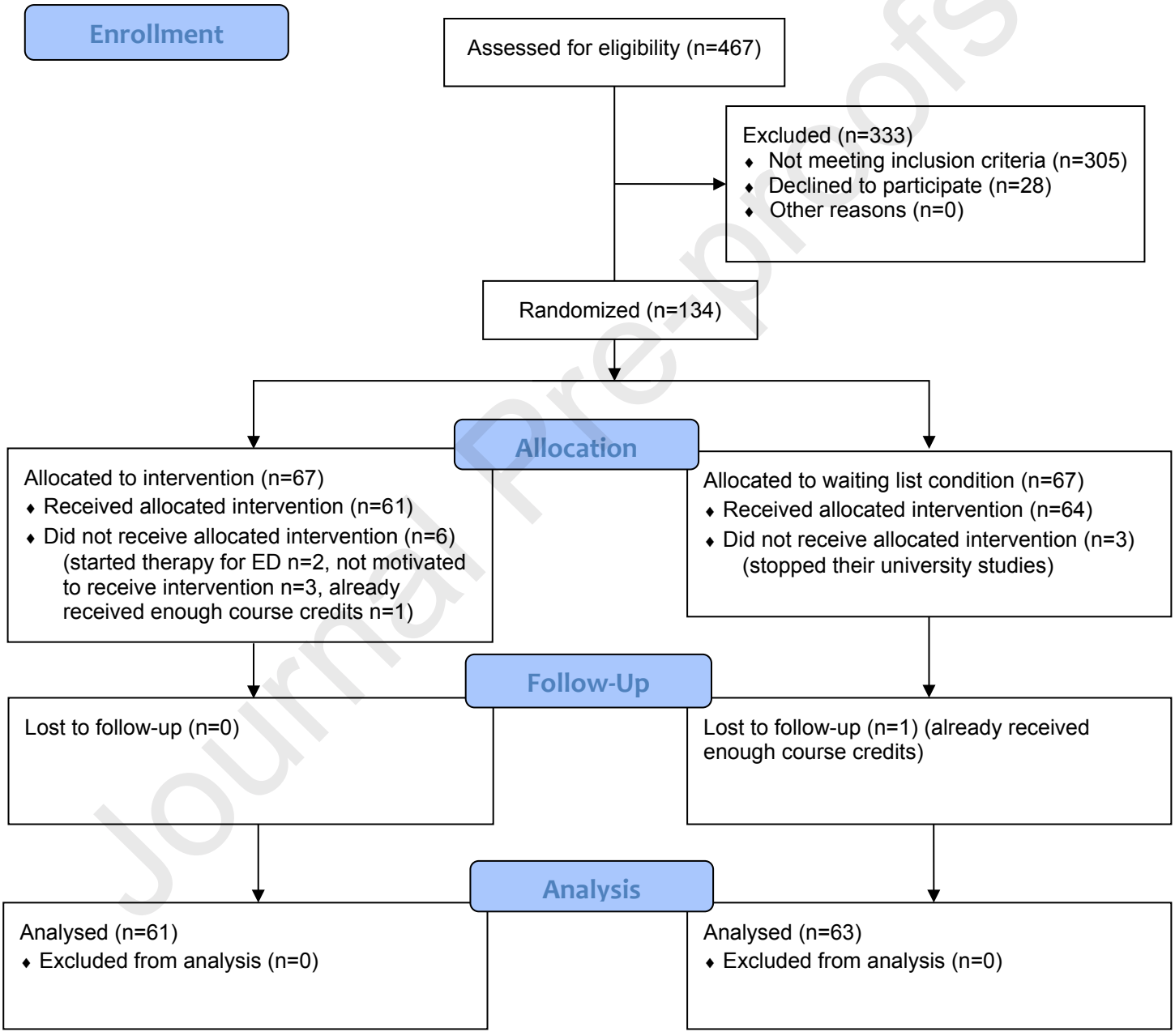
CONSORT
TRANSPARENT REPORTING of TRIALS

CONSORT 2010 Flow Diagram



CONSORT 2010 checklist of information to include when reporting a randomised trial*

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	2
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	3-6
	2b	Specific objectives or hypotheses	6-7
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	13
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N.A.
Participants	4a	Eligibility criteria for participants	7-8
	4b	Settings and locations where the data were collected	13-14
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	11-13
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	9-11, 13
	6b	Any changes to trial outcomes after the trial commenced, with reasons	13
Sample size	7a	How sample size was determined	8
	7b	When applicable, explanation of any interim analyses and stopping guidelines	N.A.
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	13
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	13
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	13
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	13

Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	N.A.
	11b	If relevant, description of the similarity of interventions	N.A.
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	14
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	14, 18-19
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	8, 14-15, 36
	13b	For each group, losses and exclusions after randomisation, together with reasons	8, 14-15, 36
Recruitment	14a	Dates defining the periods of recruitment and follow-up	8
	14b	Why the trial ended or was stopped	8
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	16
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	14-19
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	16-18
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N.A.
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	18-20
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	N.A.
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	25
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	25-26
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	20-24
Other information			
Registration	23	Registration number and name of trial registry	7
Protocol	24	Where the full trial protocol can be accessed, if available	7
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	1

*We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. Additional extensions are forthcoming: for those and for up to date references relevant to this checklist, see www.consort-statement.org.

Highlights:

- We developed meaning-centered psychotherapy for eating disorders (MCP-ED)
- The efficacy of MCP-ED was tested in women with high weight and shape concerns
- After MCP-ED and at follow-up, participants reported higher levels of life meaning
- MCP-ED also resulted in lower levels of eating disorder symptoms
- Future studies should test the effectiveness of MCP-ED in a clinical sample

Conflict of Interest
Declaration of interest: none.