rijksuniversiteit groningen

Examining the Effectiveness of a Meaning in Life Intervention on Women's Eating Disorder Symptoms, Life Satisfaction, and Meaning in Life: An Experimental Study

Lena Sophie Rose

Master Thesis – Clinical Psychology

s3590976
May 2023
Department of Psychology
University of Groningen
Examiner/Daily supervisor:
Prof. Dr. Peter de Jong,
Dr. Mirjam Frey,
Franziska Schutzeichel

Abstract

Eating disorders are a major mental health concern, marked by a lengthy treatment process, drop-out, and relapse. Prior research examined the efficacy of a meaning intervention in increasing meaning in life (MiL) and life satisfaction (LS) and reducing eating disorder symptoms (EDS) among young females. Results showed a reverse relationship between MiL and EDS and a partial decrease in certain domains of LS at post-measurement. To test the robustness of these earlier findings, this study employed a randomized controlled trial design with participants allocated to either the experimental condition (MiL intervention; n = 38) or a waiting-list control condition (n = 47). The study's sample size resulted in limited statistical power to effectively detect small- and medium-sized effects. The MiL intervention was delivered by master students over six weeks, with individual one-hour sessions per week. The Data collection was done via questionnaires at baseline and post-assessment. ANCOVA was used as a method of analysis. Results indicated a significant increase in MiL for the intervention group compared to the control group as well as a reduction in EDS. However, the MiL intervention had no overall significant impact on LS. The failure to find a significant increase in overall LS might be due to limited power. The results of the study support the efficacy of the MiL intervention in increasing MiL and reducing EDS in young females with weight and shape concerns. Accordingly, it can be considered as a new and effective research approach. Future research and implications are discussed.

Keywords: Meaning in Life, Eating Disorder Symptoms, Life Satisfaction, Intervention

Examining the Effectiveness of a Meaning in Life Intervention on Women's Eating Disorder Symptoms, Life Satisfaction, and Meaning in Life: An Experimental Study

Eating disorders (EDs) are widespread among adolescents and young adults (Góngora, 2014), especially females (Matthews et al., 2012). They have a serious effect on the patient's life, resulting in an energy-sapping, long treatment process, and an expensive course for the healthcare system. Accordingly, EDs and distorted eating behaviour in general are major public health concerns (Góngora, 2014; Schmidt et al., 2016). Therefore, it is important to explore possible interventions that prevent and/or treat the development of EDs (Stice 2007, cited in Stice et al., 2011). The effectiveness of existing treatments for EDs is often limited due to patient non-responsiveness, relapse, or dropout (Berends et al., 2018; Stice et al., 2013). Hence, new approaches targeting factors that are common in people with disordered eating behaviour should be investigated, such as a generally low perceived level of meaning in life (MiL; Marco et al., 2017). Several studies found support that MiL might play a role in the ED recovery process (de Vos et al., 2017). This study aimed to replicate the positive effects a MiL Intervention had on MiL, eating disorder symptoms (EDS), and life satisfaction (LS) in individuals with high weight and shape concerns in non-lockdown times. The study hypothesized that increasing participants' MiL levels through the intervention would result in a simultaneous decrease in EDS and an increase in LS.

Meaning in Life

Although there is no precise definition of MiL (Steger et al., 2006), it is generally conceptualized as a subjective construct that is shaped by an individual's personality, life experiences, and cultural background. It influences the individuals' life goals and decision-making processes (Jaarsma et al., 2007) and can change throughout a lifetime (Yalom, 1980, cited in Zika & Chamberlain, 1992). Recently, three primary dimensions of MiL were identified

that contain most of the variance found in previous definitions. These dimensions are comprehension, purpose, and mattering (George & Park, 2017). A psychiatrist and Holocaust survivor who saw meaning as a driving force in life is Victor E. Frankl. He described a love that transcends oneself, cognitive freedom that is given to everyone, and suffering that is inseparable from the human experience as important aspects of experiencing life as meaningful. He hypothesized that MiL is mainly found or created when individuals proactively engage with life and seek solutions to potential obstacles, which enables them to better cope with adversity and find meaning in their experiences (Frankl, 2017). His view was supported by research that found a positive association between MiL and overall psychological well-being (Zika & Chamberlain, 1992). Further, a positive association was found between the search for, and the presence of meaning, indicating that people who engage in the search for meaning are likely to experience meaning in their lives (Brassai et al., 2012). This might hint that using an intervention which actively encourages participants to look for meaning in their lives might also lead to a greater experience of MiL. Based on research showing that low MiL is associated with several mental disorders (Harlow et al., 1986; Hedayati & Khazaei, 2014) and a higher risk of suicide (Marco et al., 2017), it was considered a transdiagnostic treatment approach for mental health concerns (Brown et al., 2008). Research showing a strong relationship between MiL and psychological well-being encourages an investigation of MiL as a treatment for EDS and EDs (Zika & Chamberlain, 1992).

Eating Disorder Symptoms

EDS refer to specific individual behaviours, such as restrictive eating, fear of gaining weight, compensatory behaviours, and body/weight distortion that are part of an ED (American Psychiatric Association, 2022; Grieve et al., 2006). Common risk factors for the development of an eating disorder found in a sample of female adolescents are body dissatisfaction, depressive

symptoms, and high dieting behaviour (Stice et al., 2011). Risk factors like body dissatisfaction get enhanced, maintained, and triggered through sociocultural influences (Levine & Smolak, 2020), which might be partly explainable by the social learning theory (Bandura, 1977). This theory states that individuals learn through reward and punishment by observing and imitating others‘ behaviour and interpreting the observed content (Levine & Smolak, 2020). For example, regular exposure to thin-ideal media and weight-related comments from significant others can serve as forms of social learning that shape individuals' attitudes, beliefs, and behaviours surrounding food, weight, and body image. Accordingly, it can potentially contribute to the development or maintenance of disordered eating behaviours. While most studies focus on clinically diagnosable eating disorders (Shisslak et al., 1995), our study more broadly includes EDS, which consists of disordered eating behaviour that does not necessarily fulfil the criteria for a clinical diagnosis. Targeting individuals with a subthreshold and partial eating disorder is relevant since these are more common in the population than diagnosable eating disorders (Favaro et al., 2003) and therefore represent a suitable sample for preventative interventions. To comprehensively counteract the development of an ED, it is most effective to design interventions that aim to reduce EDS present in several EDs (whether subthreshold or threshold), rather than just a specific one (Stice et al., 2011).

The Relation between Meaning in Life and Disordered Eating Behaviour

A study that investigated the relationship between MiL and disordered eating found MiL to be a significant predictor of the psychopathology of EDs (Marco et al., 2017). More specifically, low MiL was found in participants (mean age 25.7 years; 95% women) with an ED, whereas healthy eaters showed higher levels of MiL. Low MiL was found to be present in several EDs (Marco et al., 2017), however, the correlation between MiL and restrictive anorexia nervosa was more substantial than for other types of EDs (Marco et al., 2019). The findings indicate that

targeting MiL as an intervention in young adults may serve as an initial step in tackling their EDS and reducing the likelihood of developing an ED. The varying level of present MiL in different EDs underscores the potentially differential relevance of MiL as a risk or protective factor for a particular ED subtype.

Furthermore, the search for MiL was examined in a sample of Eastern European adolescents concerning healthy and problem behaviours (Brassai et al., 2012). Among other investigated factors, MiL was the most significant predictor regarding greater levels of healthy behaviours (e.g. healthy eating; Brassai et al., 2011) and associated with a reduction of problematic action (e.g. lack of diet control; Brassai et al., 2012). Eating healthy requires having a healthy approach to food, which contradicts disordered eating. This indicates that an increase in MiL is associated with a reduction in disordered eating behaviour.

Life Satisfaction

A concept found to be positively associated with MiL is LS (Park et al., 2010). LS is an aspect of one's quality of life which is an overall subjective measure of an individual's level of happiness (Matthews et al., 2012) and it can be defined as a cognitive evaluation of one's well-being (Góngora, 2014). Great LS is linked with high-rated well-being. LS has several positive aspects, for example, it is associated with the feeling of having high-quality interpersonal relationships (Suldo & Huebner, 2006) and good perceived health (Palmore & Luikart, 1972). LS can be divided into eight normative life domains (e.g. family, friends, school, self, living location, relationships, physical appearance, and overall life), that can be individually assessed (Zullig et al., 2009). As research showed, people who rate their interpersonal relationships highly, perceive themselves to be more self-efficacious in academic, social, and emotional settings (Suldo & Huebner, 2006). In addition, high LS is positively related to perceived individual health, with medical evaluation being subordinate to personal evaluation (Palmore &

Luikart, 1972). Overall, LS appeared to be a predictor of healthy behaviour, where those with high LS engaged in more healthy behaviour than individuals rating their LS low (Palmore & Luikart, 1972).

Life Satisfaction and Meaning in Life; Two Correlated Concepts

LS and MiL overlap to a certain extent in that both concepts contain positive impressions people form about their lives (Steger & Kashdan, 2007). But while LS relates to whether people like or dislike their lives, MiL deals with the feeling that their life matters, and has a purpose. Often, people who have a sense of meaning in their life also feel satisfied. However, this does not work the other way around, as people who are satisfied with their life do not necessarily feel like their life matters (Steger & Kashdan, 2007). A study conducted by Datu and Mateo (2015) examined the role of MiL as a mediating variable in the relationship between gratitude and LS in a sample of Filipino college students. The findings support a mediating role of MiL, indicating that an increase in gratitude enhances MiL, which consequently raises LS. These results support an association between MiL and LS and reveal that the amount of experienced LS might partly depend on the strength of MiL in relation to gratitude. The next step would be to test if experimentally increasing MiL also leads to an increase in LS.

The Inverse Relationship Between Life Satisfaction and Eating Disorder Symptoms

As research has shown, low LS is associated with EDS (Góngora, 2014; Matthews et al., 2012; van Doornik et al., 2021). A typical feature of EDs is the reduction of interest in life domains such as family, friends, school, self, etc., combined with a conversion of focus toward weight, shape, and related food-controlling behaviours (Fairburn et al., 2003). Individuals who do not exhibit disordered eating patterns tend to set and pursue goals across multiple domains in their lives, thereby deriving satisfaction from a diverse range of experiences. In contrast, those who prioritize weight, shape, and food-related concerns may be limited in their ability to

experience meaning in the typical (broader) domains of LS (Fairburn et al., 2003). The restricted view on mainly weight and shape is assumed to partly rely on an attentional bias for food-, weight-, and shape-related cues. This bias leads to increased sensitivity toward the 'perceived' threat of food-related cues in the environment and internal cues (emotions or physical sensations; Troop et al., 2003) Individuals with an attentional bias towards negative information processing are more likely to engage in catastrophic thinking, which together with anxious arousal potentially triggers a worrying process. This, in turn, intensifies the sensitivity to food-related cues, leading to a self-perpetuating cycle that is challenging to disrupt (Goss & Allan, 2009). An increase in satisfaction in several life domains might work as a counteracting lever to EDS because eating-disordered clients would then have fewer cognitive resources to focus on restricting eating habits (van Doornik, et al., 2022).

A study examining the relationship between LS and EDS in a non-clinical sample of college students found that the two variables were significantly correlated. The results suggest that a reduction in EDS goes along with an increase in LS and vice versa (Matthews et al., 2012). The correlation between LS and EDS implies that if the MiL intervention successfully reduces EDS, it might parallelly positively impact LS, based on the positive relationship found between LS and MiL (Datu and Mateo, 2015) and the reverse relationship between EDS and LS (Fairburn et al., 2003). This is further supported by longitudinal research that investigated the development of MiL and LS in anorectic patients compared with control patients, revealing that anorectic patients overall report less satisfaction within meaningful life domains (van Doornik et al., 2022c). After a year the EDS reduced parallel to an increase of LS in meaningful life domains (van Doornik et al., 2022c). Thus, low MiL and low LS may be relevant targets for interventions aiming to reduce EDS.

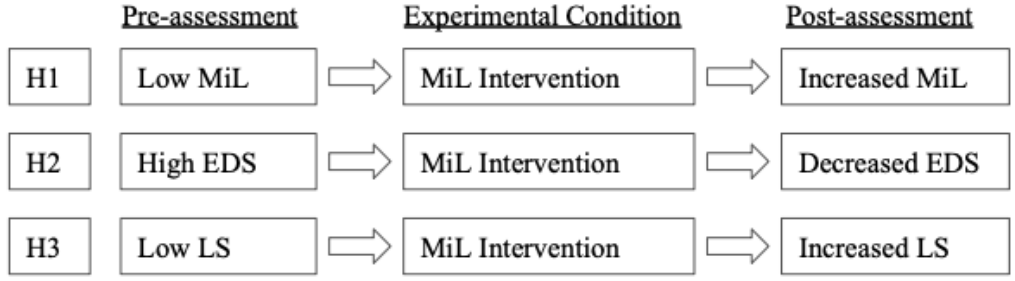
This study replicated an RCT that examined the efficacy of a meaning-centred intervention in a sample of young women with high weight and shape concerns (van Doornik et al., 2022; under review). The RCT aimed to experimentally increase MiL and see whether that would increase participants' MiL and LS, and reduce their EDS. For that, an intervention that strived to enhance MiL and well-being in patients with advanced cancer (Breitbart & Poppito, 2014) was adapted and used for the study (van Doornik et al., 2022; under review). The original 8-week MiL intervention for cancer patients (1-hour session per week, group or individual) was shown to be more effective compared to other methods previously used to improve MiL, quality of life, and reduce stress (Breitbart & Poppito, 2014). Breitbart and colleagues (2014) developed the MiL intervention based on Viktor Frankls' research on meaning-making (van der Spek et al., 2017). Similar to the results with cancer patients, the MiL intervention for young females with weight and shape concerns resulted in a successful increase in MiL and a reduction in participants' reported EDS (van Doornik et al., 2022; under review). MiL not only reduced EDS but also significantly increased satisfaction in two of eight normative life domains at post-assessment. The Covid-19 lockdown restrictions at the time, such as online-only education and infrequent opportunities to socialize due to the closure of most publicly open places (restaurants, bars, etc.), may have confounded the results of the study. Possibly, not the MiL intervention itself but the social connection to the instructor led to a reduction in EDS and an increase in MiL.

Therefore, the current study tested the robustness of the RCT of van Doornik and colleagues (2022; under review) at times when there were none or only minor Covid-19 restrictions (wearing a mask). We examined how the MiL intervention impacted MiL, LS, and EDS in first-year female psychology students from the University of Groningen. The focus was on female students since a predominant amount of research indicated that weight and shape concerns are more pronounced in women (Góngora, 2014; Marco et al., 2017). Participants were

selected via a brief pre-screening on weight and shape concerns, which is one of the most applicable methods to identify females at risk of developing an eating disorder (Stice et al., 2011). The intervention consisted of six one-hour sessions that were held online. It comprised four sources of MiL, namely, the personal life story of the participant, how to deal with life's limitations, creating your own life, and experiences (van Doornik et al., 2022; under review). We anticipated that through the MiL intervention, the individuals will find and rediscover meaning and satisfaction in different areas of life (family, friends, school, etc.). It was hypothesized that this rediscovery process might let the weight and shape concerns seem less important compared to other relevant goals and sources of meaning in other life domains. By engaging in more meaningful behaviours, the participants' focus will shift away from the weight and shape concerns. All in all, we anticipated that the MiL intervention for women with high weight and shape concerns would positively impact their MiL, EDS and LS. More specifically, the following hypotheses were tested: The MiL intervention increases overall MiL in females (H1). The MiL intervention will reduce EDS in females (H2). The MiL intervention will increase overall LS in females (H3).

Figure 1

Visualization of Hypotheses.



Note. Besides the MiL intervention, a control group receiving no treatment was assessed on each Pre- and Post- assessment. The Follow-up measurement is not shown in the graphic because it is not considered in the analysis due to the time constraints of the master thesis.

Method

Participants

Participants were female first-year psychology students at the University of Groningen, recruited between October 2022 and March 2023. The screening had 468 responses in total, whereof 180 participants got invited to the study, 147 filled in the first questionnaire and 100 were finished with the study in time to be included in the dataset for the analysis. As a pre-screening a five-item 'weight concern scale' was used with a cut-off of ≥47 or replying to the question 'Do you ever feel fat?' with 'Often' or 'Always'(Killen et al., 1994; adjusted by Jacobi et al, 2004). An exclusion criterium for participation was being in treatment for an eating disorder or not being proficient in either Dutch, German, or English. Eligible participants got invited to participate in the study and were enlightened about the procedure. If they decided to participate, they were randomly assigned via the generator random.org (Random.org, 2023) to either the experimental condition, which contained the MIL intervention, or the waiting-list control condition, where no intervention or treatment was given. It was communicated that participation is voluntary and students could still withdraw before and during the intervention. Before the start of the intervention, all participants signed an informed consent form via Qualtrics.

To estimate the recommended sample size, an a priori power analysis was conducted using the free available software G*power (Faul et al., 2009; Version 3.1.9.7). With an alpha level of .05, an effect size of $f = .25$, a power of $\beta = .80$, two groups, and one covariate, the required sample size yielded $N = 128$. As done by van Doornik and colleagues (2022; under review), a drop-out rate of approximately 15% was added, resulting in a required sample size of 140 (70 assigned to the experimental condition, 70 to the waiting-list control). Due to a reduced number of participants signing up for the study, a set time frame for the thesis, and 15 dropouts after the baseline measure (12 in the intervention condition; 3 in the waiting-list control

condition), only 38 females of the experimental condition and 47 of the control condition could be included in the analysis. A second a priori analysis with an alpha level of $a = .05$, a power of $\beta = .80$, and a sample size of $N = 85$, revealed an f value of $\geq .40$, which means that only large effects can be detected in the acquired sample. To be able to detect medium effects, a minimum sample size of $N = 128$ ($f = .25$), and for small effects a sample size of $N \geq 787$ ($f = .10$) would be required. In total, the analysis comprised 85 participants, ranging from 17 years up to 25 years ($M = 19.41$, $SD = 1.55$). The instruction languages were Dutch, German, and English. While German and Dutch were chosen if it was the participants' mother language, English was used for native speakers and participants with English as a second language. Overall, 50.6% filled in the questionnaires in Dutch, 42.4% in English, and 7.1% in German. Participants' self-reported BMI was on average in the normal weight range ($M = 23.68$, $SD = 4.04$; based on kg/m^2), ranging from 16.56 (underweight) up to 44.08 (obese class III; World Health Organization, 2020). See Appendix A for the full distribution of the BMI classes. All participants were first-year psychology students at the University of Groningen. Participants received SONA credits as compensation for participation, which is relevant to their bachelor's program.

Measures

Weight and Shape Concerns. For the pre-screening, the 'Weight Concern Scale' originally developed by Killen and colleagues (1994) and adjusted by Jacobi and colleagues (2004) was used. The scale consists of five items, each based on a maximum score of 20. The items were derived from a principal component analysis and show high reliability with .85 and high convergent validity with two other eating disorder inventories, r = .68 and .69 (Killen et al., 1994). The five items assess the fear of gaining weight, the importance of weight, concerns about weight and shape, the last attempt at a diet, and the degree of the feeling of being fat (Killen et al., 1994). An example item is 'Do you ever feel fat?'. Three items are evaluated on a 7-point

Likert scale, and the last two one on a 5- and the other on a 4-point Likert scale. Jacobi and colleagues (2004) lowered the cut-off score to ≥ 47 after an analysis showed higher accuracy in detecting most adolescence with weight concerns.

Meaning in Life. To assess MiL, the 15-item 'Multidimensional Existential Meaning Scale (MEMS)' assessing comprehension, purpose, and mattering (George & Park, 2017) was applied. The questionnaire was translated into Dutch (van Doornik, 2022b) and back- and forth-translated into German by professionals and validated by native speakers. The scale got developed with a sample of undergraduates using factor analysis to test the three subscales comprehension, purpose, and mattering. If the single-factor model is significant, we check all subscales individually to see if the intervention was successful for each of the dimensions covered by the MEMS. Therefore, a total score based on the average of 15 items was created and three subscale scores were based on the average of the five respective items. An example item is 'My direction in life is motivating me', which can be answered as all other items on a 7-point Likert scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree; (George & Park, 2017). The analysis showed mostly good to excellent reliability with a Cronbach's alpha value ranging between .82 and .86 for the total, between .83 and .87 for comprehension, and .91 and .93 for purpose at baseline and post-assessment. The mattering subscale revealed unacceptable reliability with .29 and .49 for baseline and post-assessment.

Eating Disorder Symptoms. EDS were measured using the 'Eating Disorder Examination-Questionnaire (EDE-Q): overvaluation of eating, weight, and shape restraint' (Fairburn & Beglin, 2008), using 22 of the original 28 items. The questionnaire was translated into German (Hilbert & Tuschen-Caffier, 2016) and Dutch (Nauta et al., 2000). It consists of four subscales investigating the frequency and severity of disordered eating related to restraint, eating concern, shape concern, and weight concern (Fairburn et al., 2008). To create a total score, first,

all four subscale score items were individually averaged and finally, a total score was created based on the four subscale ones. Example items are 'Have you had a strong desire to lose weight?' in the weight concern scale or 'How dissatisfied have you been with your shape?' in the shape concern scale. The questions relating to frequency were answered on a seven-point scale, ranging from 0 (no days) up to 6 (every day). Questions regarding severity were answered on a seven-point scale ranging from 0 (not at all) to 6 (markedly; Fairburn et al., 2008). The Cronbach's alpha reliability was excellent with a range from .91 to .94 of the total scale for baseline and post-assessment. In prior research, discriminative validity was high with a correct discrimination value of 96% of people with or without an ED (Aardoom et al., 2012).

Life Satisfaction. To assess LS, the seven-item 'Brief Multidimensional Students' Life Satisfaction Scale-College' version (BMSLSS-C): satisfaction with normative life domains' was used (Zullig et al., 2009). The questionnaire was back- and forth-translated by professionals into German and Dutch and validated by native speakers. The scale was developed and validated using a sample of college students, to have a briefer and more appropriate scale to use for screening or larger survey studies. In addition to the five domains used in the brief standard version (family, friends, school, self, living environment), two more domains (romantic relationships, physical appearance) were found to significantly increase the prediction of college students' LS and added to the BMSLSS-C (Zullig et al., 2009) as well as one item assessing overall LS. All scores on the items were averaged to a total score (higher scores indicating higher LS). An example item of the questionnaire is: 'my family life' and participants were instructed to rate how satisfied they were with this item at the moment on a scale ranging from 1 (very dissatisfied) to 5 (very satisfied). Reliability was in between questionable and acceptable with a Cronbach's alpha of .64 and .74 for baseline and post-assessment. Construct validity was high

with a correlation around r = .81, and the investigation of criterion-related validity showed support for convergent and discriminant validity (Zullig et al., 2009).

Besides the named questionnaires, different questionnaires to assess the same variables as well as further variables were used as part of the Ph.D. work of one of our supervisors. The exact questionnaires and developers can be viewed in Appendix B. They have no further relevance to this paper and the analysis.

Meaning-Centred Intervention

The MiL intervention consisted of six weekly online intervention sessions that lasted for one hour each. The intervention comprised discussing the theory of four sources of meaning, completing related exercises, and discussing homework assignments with the participant. The master students used manuals (van Doornik et al., 2020a) to guide the participant through the sessions, which contained additional descriptions to understand the context of the questions and exercises to be able to better explain them. The workbook (van Doornik et al., 2020b) was sent online to the participants, and if wished, also a printed version to their home address. Participants actively engaged with the workbook by writing and drawing into it during the sessions. Further detail can be found in the 'treatment manual: meaning-centred intervention' by van Doornik and colleagues (2020a). Originally, the intervention was developed to increase MiL in cancer patients (Breitbart & Poppito, 2014), based on research investigating MiL by Viktor Frankl (van der Spek et al., 2017).

Procedure and Design

The study was approved by the Ethics Committee of the University of Groningen. It is an experimental study with a mixed research design, including one between-subject factor condition (experimental; control) and one within-subject factor time (baseline, post, follow-up). All screened participants (experimental condition; control condition) signed an online informed

consent form and filled in the online questionnaires (approx. 30 min) within the same time intervals (baseline, seven weeks later post-, and four weeks later follow-up), assessing MiL, EDS, and LS. The questionnaires were administered using Qualtrics and were available in three languages, English, Dutch and German. All dates for the sessions were determined together with the participant and took place via Google Meets. The sessions were held in English, Dutch and German depending on the participants' native backgrounds and preferences. To protect the participants' privacy, all personal information (session dates, session notes) was solely stored in the University's server and letter synonyms for participants were used for e-mail and calendar communication. To prevent the ethical concern of withholding treatment, participants in the waiting-list control condition were offered to participate in the MiL intervention after the completion of the experiment.

Statistical Analysis

The analysis was conducted using the statistical software SPSS (version 26.0). First, all assumptions were tested for violations (independence, normality, homogeneity of variances, linearity, homogeneity of regression slopes, and covariate measured without error). Three separate Analyses of Covariance (ANCOVAs) were performed to test whether the MiL intervention positively impacts MiL, EDS, and LS. For each ANCOVA, we regressed the post-measurement score (dependent variable; DV) on the pre-measurement score (Covariate) of the respective variable to see whether the mean average of the variable differs between baseline and post-intervention. The between-subject factor was the condition (experimental, waiting list), to see if there is a significant difference between the two groups at post measurement.

A supplementary analysis examined the subscales of the MiL measure (comprehension, mattering and purpose) to see whether all (or which) subscales significantly increased from baseline to post-intervention. For that, three more ANCOVAs were performed with the post-

measurement as the DV, the baseline measurement as Covariate and the between-subject factor condition (experimental, waiting list). A second supplementary analysis investigated whether a change in EDS and a change in LS might be partly due to a change in MiL. For that, all change (Pearson) correlations of the three main variables of interest (MiL, EDS, and LS) as well as the three subscales of the MiL measure were computed from baseline to post-measurement.

Results

Dropouts and Missing Data

As notified in the participant section, in total 15 participants dropped out after the pre-assessment (15%, experimental condition n = 12; waiting-list control n = 3). For the MEMS total, the comprehension subscale, the mattering subscale and the BMSLSS-C, the participants who dropped out did not differ significantly from the participants that finished the study at the baseline assessment. However, for the purpose subscale of the MEMS, the dropped-out participants showed a significantly lower mean average than the ones who completed the study on the baseline measurement, (dropouts M= 4.28, SD = 1.04; completers M = 4.97, SD = 81.05; t (85) = 2.33, p = .022, d = 0.68). All dropouts were excluded which left 85 participants for the analysis. One data point was missing on the BMSLSS-C at pre-measurement, which, however, did not limit the analysis. The analysis is a completer analysis (likewise as in van Doornik et al., 2022; under review).

Test of assumptions

Before testing the assumptions, we examined the data set for outliers. Therefore, we created boxplots showing the DV post-measurement (Y-axis) and independent variable condition (X-axis). Only one outlier was detected in the waiting-list condition for the MEMS Questionnaire

(comprehension subscale). A linear regression showing the cooks' distance (influential if >1; Tabachnick & Fidell, 2014) for all items of the comprehension subscale revealed the outlier is not influential (Highest cooks distance = .094). Thus, all scores were included in the analysis.

The assumption checks for independence, homogeneity of variances, linearity, and the covariate measured without error showed no violation. Normality showed a violation for the MEMS subscale purpose (Shapiro-Wilk test; $p < .001$). However, the values of kurtosis (.18) and skewness (-.82) lay in the acceptable range (between +1 and -1; Field, 2018) and a visual inspection of the QQ-plots showed that the deviation from the normality line is small. Therefore, it was decided to proceed with the analysis and interpret the results with caution. Further, the assumption of homogeneity of regression slopes was violated for the EDEQ ($p = .002$). When visually inspecting the scatterplot of the distribution of the EDEQ of T1 and T2, one can see that the spread of the residuals of each condition does show only a slight deviation from homogeneity and again it was decided to proceed with the analysis. Though the deviations were not strong and a violation might be due to the conservativeness of the assumption tests, the results of the ANCOVA analyses of the EDEQ and MEMS (subscale purpose) should be interpreted with caution.

Descriptives

In Table 1 all variables and the strength of their relations can be examined at baseline and post-measurement.

Table 1

Pearson Correlation Matrix of the Linear Relationships between all Variables at T1 and T2.

Note. The table displays all unstandardized correlation coefficients of MiL, EDS and LS. MEMS

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. MEMS Total (T1)		.80**	.81**	.61**	.46**	-.15	.74**	.58**	.63**	.52**	.40**	-.21
2. MEMS Comprehension (T1)			.46**	.26*	.46**	-.21	.59**	.64**	.41**	.33**	.35**	-.13
3. MEMS Purpose (T1)				.26*	.42**	-.02	.65**	.45**	.77**	.29**	.38**	-.21
4. MEMS Mattering (T1)					.09	-.10	.37**	.14	.16	.62**	.14	-.10
5. BMSLSS-C (T1)						-.22*	.45**	.40**	.33**	.34**	.36**	-.18
6. EDEQ (T1)							-.14	-.20	-.02	-.10	-.17	.61**
7. MEMS Total (T2)								.86**	.82**	.67**	.61**	-.42**
8. MEMS Comprehension (T2)									.60**	.39**	.55**	-.45**
9. MEMS Purpose (T2)										.27*	.50**	-.30**
10. MEMS Mattering (T2)											.40**	-.23*
11. BMSLSS-C (T2)												-.38**
12. EDEQ (T2)												

= Multidimensional Existential Meaning Scale, subscales Comprehension, Purpose, Mattering; EDEQ = Eating Disorder Examination Questionnaire; BMSLSS-C = Brief Multidimensional Students' Life Satisfaction Scale-College. T1 = baseline measurement. T2 = post- measurement. *p ≤.05, **p≤.01

Hypothesis Testing

Table 2 displays the means and standard deviations for all outcome measures (including the ones of the post hoc analysis) at all measurement points.

Three separate ANCOVAs were conducted to examine the effect of the MiL intervention on MiL, EDS, and LS. Results indicated a significant main effect of the intervention condition on MiL (MEMS), (F (1, 82) = 9.94, p < .002, ηp^2 = .11). This showed the perceived level of MiL was significantly higher in the experimental than in the waiting-list condition after the

intervention. The effect size was moderate. Similarly, the ANCOVA for EDS (EDEQ) showed a significant main effect of the intervention condition, (F (1, 82) = 13.04, p < .001, ηp^2 = 14).

Table 2

Means and Standard Deviations of All Variables at Both Measurement Points.

	Experimental Condition		Waiting list Condition	
	Pre-intervention (N = 38)	Post-intervention (N = 38)	Pre-intervention (N = 47)	Post-intervention (N = 47)
	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*
1. MEMS TOTAL	4.18 *(.76)*	4.62 *(.68)*	3.83 *(.62)*	4.01 *(.73)*
1.1 MEMS Comprehension	4.01 *(1.14)*	4.73 *(1.0)*	3.72 *(.83)*	4.15 *(.95)*
1.2 MEMS Purpose	5.27 *(1.01)*	5.59 *(.81)*	4.71 *(1.02)*	4.74 *(1.06)*
1.3 MEMS Mattering	3.18 *(.86)*	3.50 *(.84)*	3.06 *(.68)*	3.12 *(.87)*
2. EDEQ	2.80 *(.88)*	1.97 *(1.02)*	2.80 *(1.14)*	2.67 *(1.24)*
3. BMSLSS-C	3.43 *(.62)*	3.66 *(.60)*	3.31 *(.60)*	3.39 *(.69)*

Note. MEMS = Multidimensional Existential Meaning Scale, subscales Comprehension, Purpose, Mattering (mean equals an average score of all scale or subscale items; range 1-7; higher scores display higher MiL); EDEQ = Eating Disorder Examination Questionnaire (mean equals an average score of all scale items; range 0-6; higher scores indicate more severe EDS); BMSLSS-C = Brief Multidimensional Students' Life Satisfaction Scale-College (mean equals an average score of all scale items; range 1-5; higher scores show greater LS).

Thus, the mean EDS score was significantly lower in the experimental condition than in the waiting list condition at post-assessment. The effect size was large, which suggests that the MiL intervention had a large impact on EDS. Levene's test of equality of error variances was significant, (F (1, 83) = 5.83, p = .018), which shows a violation of the assumption and indicates unequal variances across groups. Upon visual inspection of the variance scores in a box plot, it appeared that a violation is present, but it is very small and deemed acceptable to proceed with further analysis of the data. Also, the difference in sample size is not huge. Nevertheless, the results should be interpreted with caution. Finally, the ANCOVA for LS did not reveal a significant main effect of the intervention condition, (F (1, 81) = 3.78, p = .055, ηp^2 = .05). The

mean LS score of the experimental condition was higher compared to the waiting list condition at post-measurement but it did not reach the level of significance. The effect size was in the predicted direction and small.

Post Hoc Analyses

Since the condition effect of the MEMS total score was significant, it was interesting to explore whether all (or which) subscales of the MEMS (comprehension, mattering, purpose) were significant. Therefore, three further ANCOVAs were performed. The results indicated a main effect of the intervention condition for the MEMS subscale comprehension, (F (1, 82) = 4.38, p = .039, ηp^2 = .05; small effect size), purpose (F (1, 82) = 9.47, p = .003, ηp^2 = .10; moderate effect size), and mattering (F (1, 82) = 4.99, p = .028, ηp^2 = .06; moderate effect size). This indicated that all subscale scores in the experimental condition were significantly higher at post-measurement compared to the ones in the waiting list condition. However, the results of Levene's test indicated that the assumption of equal variances was violated for the purpose subscale, (F (1, 83) = 2.02, p = .010). This means the variance of the DV does not seem to be equal across groups. After visually inspecting the variance scores in a box plot, the violation seemed to be present but acceptable to further analyze the data. Still, the results must be interpreted with caution.

Further, to find out whether a change in EDS and a change in LS might be (partly) due to a change in MiL in our sample, we computed the correlations of the change between EDS, LS, and MIL with its three subscale scores of all participants (see Table 3). The correlations showed that an improvement in MiL (total measure) is moderately associated with a reduction of EDS (for visual inspection see Appendix C, Table 6). Also, the three subscales, comprehension, purpose, and mattering, showed that an increase in MiL is related to a decrease in EDS. While the change of EDS related to the scales' purpose and mattering was only small, the correlation

was moderate for the comprehension subscale. Further, an increase of MiL for the total and sub-scale scores in comprehension and mattering was shown to be moderately positively related to an increase in LS (for a visual representation of the relationships see Appendix C, Table 7). The variables LS and EDS showed a moderate and negative relationship. When the correlational analysis was only restricted to the experimental condition ($N = 38$; see Appendix D), thus, only showing changes that were related to the MiL intervention, the pattern was largely similar but the relationship between LS and the MEMS did no longer reach significance. A possible reason for insignificance could be the smaller sample size when only considering the experimental condition, which can lead to insignificant results since the significance level (given a certain effect size) is determined by the sample size.

Table 3
The Change of the Bivariate Correlations between Baseline and Post-measurement of the Variables MiL, LS, and EDS of all Participants.

Variable	1	2	3	4	5	6
1. MEMS Total change		.79**	.68**	.63**	-.39**	.37**
2. MEMS Comprehension change			.35**	.23*	-.45**	.37**
3. MEMS Purpose change				.12	-.14	.34**
4. MEMS Mattering change					-.19	.07
5. EDEQ change						-.35**
6. BMSLSS-C change						

Note. MEMS Total change = post score minus baseline score on the Multidimensional Existential Meaning Scale (MEMS); MEMS Comprehension, Purpose, and Mattering change = post score minus baseline score on each subscale of the MEMS; EDEQ change = post score minus baseline score on the Eating Disorder Examination Questionnaire (EDEQ); BMSLSS-C change = post score minus baseline score on the Brief Multidimensional Students' Life Satisfaction Scale-College (BMSLSS-C), Improvement is denoted by a positive change in scores. Sample size $N = 85$. *p ≤.05, **p≤.01

Discussion

The purpose of this study was to examine the robustness of the previous results of van Doornik and colleagues (2022; under review) in non-lockdown times, supporting the effectiveness of a MiL intervention for young women with weight and shape concerns. Therefore, participants' MiL, EDS, and LS were assessed before and after the intervention. The results revealed that the intervention successfully increased participants' sense of MiL (H1) and decreased their EDS (H2). However, the intervention did not have a significant impact on their overall life satisfaction (H3). A supplementary analysis showed that all three subscales of MiL (comprehension, mattering, and purpose) significantly increased from baseline to post-intervention. All significant results showed moderate to large effect sizes. The study's results give empirical support for the effectiveness of the MiL intervention as an approach to enhance the sense of MiL among young females with high weight and shape concerns. These results are in line with previous research that showed the intervention is successful in increasing MiL in cancer patients (Breitbart & Poppito, 2014) and young females at risk of developing an eating disorder (van Doornik et al., 2022). The findings add to previous research in that the MiL intervention still showed efficacy in increasing MiL and reducing EDS in times with no Covid-19 restrictions. Following, we can rule out the potential confound that the therapeutic relationship itself rather than the intervention led to an improvement in symptoms.

The intervention led to a significant increase in MiL, showing support for our first hypothesis in that the intervention successfully enhanced MiL in young females with weight and shape concerns. Viktor Frankl (2017) assumed that dealing with one's past, the present moment, and searching for ways to overcome (emotional) obstacles gives life a deeper sense of meaning. The intervention deals with such aspects, as discussing one's personal life story and discussing how to deal with life's limitations. Considering the positive change in MiL, the results go along

with Frankel's assumptions and support the effectiveness of the intervention. A high level of MiL has several positive effects such as greater well-being and emotional control and lower anxiety and depression levels (Zika & Chamberlain, 1992). Having a closer look at the three subscales of the MiL measure (comprehension, purpose, and mattering) that were examined in the post hoc analysis, all three subscales were found to be significant. The comprehension subscale measured the extent to which individuals feel that their life experiences make sense and are meaningful. Possibly the exercises connected to the source 'dealing with life's limitations', where participants were encouraged to find meaningful life lessons in setbacks they have experienced, helped them to find more coherence and meaning in their life experiences. The purpose subscale measured the extent to which participants feel their life has a meaningful direction, the awareness of their life goals, and their motivation to pursue them. The source 'creating your own life' gives participants space to create new life goals and discuss steps to pursue them. The results suggest that the MiL intervention has helped participants to find a stronger sense of direction (meaningful goals) they can strive towards in life. Lastly, the results imply that the MiL intervention had a positive impact on the mattering subscale, which assessed to what extent the participants perceive their existence as being generally relevant. The source 'experiences' may have helped participants to perceive their existence as more important in the grand scheme of life, making them realise that life is about its experiences, spending time with loved ones and doing things one enjoys. However, the reliability of the mattering subscale was found to be unacceptable, which raises doubts if mattering indeed can be seen as a reliable factor in this sample. Thus, the results should be interpreted with caution and future research could bring more clarity on the reliability of the subscale.

Further, the analysis revealed a significant decrease in EDS at post-measurement in the experimental condition, with a moderate to large effect size. This indicates that targeting MiL

effectively reduces EDS in participants with weight and shape concerns, which is in line with prior research that supported the notion that MiL can be used as a treatment approach for EDS (Brown et al., 2008). The results showed an overall decrease in EDS after the MiL intervention, comprising various eating disorder psychopathology symptoms. This goes along with previous findings that MiL is found to be low in several EDs (Marco et al., 2017) and therefore suitable as a transdiagnostic treatment approach. Additionally, a reduction in EDS parallel to an increase in MiL is in line with Mulkerrin and colleagues (2016) assumption that an intensified engagement with general sources of MiL (such as social relationships and self-development) lead to a reduced capacity for only weight, shape and food-related cues, and there with a reduction in EDS.

The analysis showed that the MiL intervention did not have a significant impact on participants' overall LS, which contradicts prior findings suggesting an increase in MiL is at least partly associated with an increase in LS (van Doornik et al., 2022; Datu & Mateo, 2015). However, the p-value for this outcome was very close to the threshold for significance, and looking at Table 2, one can see an increase of LS from baseline to post-measurement (pre = 3.43; post = 3.66). One possible reason why the score did not reach significance might be that the overall score was less sensitive to detecting changes compared to individual items because it averaged the responses across items which might have attenuated some of the effects. This reduces the sensitivity of our measure to detect relevant changes.

To see if the satisfaction of only certain life domains increased significantly, an additional analysis was conducted (see Appendix E) which revealed a significant increase of LS in the domain 'friends' and 'self' from baseline to post-measurement in the experimental condition. These results differ slightly from van Doornik and colleagues (2022), who also found a significant increase in the domain's 'self', but additionally in the domain 'physical appearance' rather than 'friends' at post-assessment. However, a significant increase in the domain 'friends'

goes along with the content of the intervention, which for example asks participants to talk about important people in their lives and encouraged them to open up to one or two they are close with, which were often friends from their study program. The increase in the domain 'self' could be related to the content of the intervention which addressed how the participants view themselves and it encouraged goal setting to achieve personal goals. Possibly, the other domains (accepting physical appearance) have been addressed too little in the intervention and did therefore not show a significant increase in satisfaction. A change in the perception of physical appearance (a reduction in weight and shape concerns) was the central theme of the intervention, which leaves it up to future research to find out why the intervention failed to increase LS in this domain while perceived EDS was successfully reduced. Limitations in statistical power may have influenced the ability to detect significant effects on more domains of LS. With the achieved sample size, the study was not able to detect small effects, recommending future research to use a larger sample. Further possibilities are that the intervention may not have targeted specific factors that contribute to the domains of life satisfaction, or that confounding factors may have influenced the relationship between MiL and LS the study did not account for. Another option is that there is just no relationship between the MiL intervention and LS.

Interpreting the results of the post hoc analysis of the correlations of the change between the three variables, we find that an improvement of MiL is moderately associated with a decrease in EDS and has a small association with an increase in LS. This goes along with previous findings which state that a decrease in EDS could be partially attributed to an increase in MiL (Marco et al., 2017), suggesting that the MiL is an effective treatment for EDS. Further, an increase in MiL seems to go along with an increase in LS (van Doornik et al., 2022), even though this increase was not found to be significant. Furthermore, the moderate correlation between EDS and LS was negative, which provides support for prior research suggesting that people with EDS

mainly engage in life domains that are related to weight, shape and food. That again might lead to a decrease of LS in the normative domains of LS (Fairburn et al., 2003). However, this relationship might be rather spurious than causal, as it possibly just appeared because MiL as a third variable decreased EDS and partly increased LS. Therefore, LS and EDS are not necessarily causally related. Future research could investigate whether experimentally increasing LS has a causal influence on EDS.

Strength and Limitations

The main strength of the current study is that it was conducted in a context of minimal Covid-19 restrictions, which minimized potential overestimation of treatment effects and increased the robustness of the findings. Further, the study builds upon prior research in the field and therefore adds to the credibility of the previous results. Besides these positive characteristics, several limitations of the current study should be mentioned. Firstly, due to time constraints and fewer sign-ups in the second semester, the required sample size (N = 128) could not be reached (N post-assessment = 85). Therefore, insufficient power may have reduced chances to detect small and medium effects and systematic error is more likely to distort the results. Second, since the sample consists exclusively of first-year female psychology students at the University of Groningen, it is a homogeneous convenience sample. This reduces external validity and limits the generalisability of the results to different contexts (e.g., males, younger and older age groups, and people with lower education). Psychology students might systematically differ from the average population in terms of EDS and how to deal with them. Third, the treatment group got merely compared to a waiting-list control group and not in addition to a validated treatment protocol. Therefore, we do not know how effective the intervention is compared to other existing prevention and treatment options. Fourth, the study used self-reported data, which assumes the complete honesty and accuracy of the participants. However, often human judgment and self-

judgment are biased (Evans et al., 2003). Fifth, the low reliability of the mattering subscale of the MEMS lies in the unacceptable range for both baseline and post-measurement. This questions the reliability and validity of the scale and results cannot be considered meaningful. Sixth, this study only had one follow-up measure four weeks post-intervention (not included in the analysis due to time restrictions), thus no long-term predictions can be made. Therefore, all results should be interpreted with caution.

Future research and implications

Future studies should consider reaching a sufficient sample size to ensure good statistical power and accuracy of the results. The next step would be to test the intervention in a clinical sample as a treatment program rather than a preventative intervention. That way, researchers can assess its effectiveness in treating individuals with EDs and help to bridge the gap between prevention and treatment. Also, using an active comparison group would show its surplus effect over and above current treatment options. Further implications for future research are to broaden the population sample to include a more diverse range of participants in terms of age, gender, culture, and socio-economic status to improve the generalizability of the findings. To be able to predict the long-term effects of the treatment it is recommendable to add follow-up measures that have a period of six months or even a year. Lastly, it should be considered to only use the total MEMS scale or modify the mattering subscale or use an alternative, more reliable and valid measure to be able to interpret the intervention effects more accurately.

Conclusion

Overall, the results of the present study support the use of the MiL intervention as a promising approach to treating EDS in young females with weight and shape concerns. Overall LS was not shown to be significantly impacted by the intervention, but the two normative domains of LS ‘friends’ and ‘self’. Accordingly, the results of van Doornik and colleagues

(2022) could be partly supported. Future research should investigate whether the same results can be found in a clinical sample and explore their long-term effects. If more empirical evidence will be found, the new treatment approach for eating disorders can get implemented into current treatment protocols to treat and prevent EDS. In conclusion, our study highlighted the importance of MiL in promoting mental health and well-being regarding EDS and emphasizes the relevance of further research in the future.

References

Aardoom, J. J., Dingemans, A. E., Slof Op't Landt, M. C. T., & Van Furth, E. F. (2012). Norms and discriminative validity of the Eating Disorder Examination Questionnaire (EDE-Q). *Eating Behaviors*, *13*(4), 305–309. https://doi.org/10.1016/j.eatbeh.2012.09.002

American Psychiatric Association. Task Force on DSM-IV. (2022). *Diagnostic and statistical manual of mental disorders, DSM-IV* (5th ed., text revision). American Psychiatric Association; WorldCat.org.

Bandura, A. (1977). *Social learning theory*. Prentice-Hall. http://www.gbv.de/dms/bowker/toc/9780138167448.pdf

Berends, T., Boonstra, N., & van Elburg, A. (2018). Relapse in anorexia nervosa: A systematic review and meta-analysis. *Current Opinion in Psychiatry*, *31*(6), 445–455. https://doi.org/10.1097/YCO.0000000000000453

Brassai, L., Piko, B. F., & Steger, M. F. (2011). Meaning in life: Is it a protective factor for adolescents' psychological health? *International Journal of Behavioral Medicine*, *18*(1), 44–51. https://doi.org/10.1007/s12529-010-9089-6

Brassai, L., Piko, B. F., & Steger, M. F. (2012). Existential attitudes and eastern european adolescents' problem and health behaviors: Highlighting the role of the search for meaning in life. *The Psychological Record*, *62*(4), 719–734. https://doi.org/10.1007/BF03395831

Breitbart, W., & Poppito, S. R. (2014). *Individual meaning-centered psychotherapy for patients with advanced cancer: A treatment manual*. Oxford University Press.

Brown, G. P., Roach, A., Irving, L., & Joseph, K. (2008). Personal meaning: A neglected transdiagnostic construct. *International Journal of Cognitive Therapy*, *1*(3), 223–236. https://doi.org/10.1521/ijct.2008.1.3.223

Datu, J. A., & Mateo, N. (2015). Gratitude and life satisfaction among Filipino adolescents: The mediating role of meaning in life. *International Journal for the Advancement of Counselling*. https://doi.org/10.1007/s10447-015-9238-3

de Vos, J. A., LaMarre, A., Radstaak, M., Bijkerk, C. A., Bohlmeijer, E. T., & Westerhof, G. J. (2017). Identifying fundamental criteria for eating disorder recovery: A systematic review and qualitative meta-analysis. *Journal of Eating Disorders*, *5*(1), 34. https://doi.org/10.1186/s40337-017-0164-0

Evans, D., Heuvelink, A., & Nettle, D. (2003). *The evolution of optimism: A multi-agent based model of adaptive bias in human judgement*.

Fairburn, C., Cooper, Z., & O'Connor, M. (2008). Eating Disorder Examination (16.0D). *Cognitive Behavior Therapy and Eating Disorders*.

Fairburn, C. G., & Beglin, S. (2008). *Eating Disorder Examination Questionnaire (EDE-Q 6.0). In C. G. Fairburn (Ed.), Cognitive behavior therapy and eating disorders. New York: Guilford Press*.

Fairburn, C. G., Cooper, Z., & Shafran, R. (2003a). *Clinical Perfectionism Questionnaire. (CPQ) [Database record]. APA PsycTests*. [Data set]. American Psychological Association. https://doi.org/10.1037/t59141-000

Fairburn, C. G., Cooper, Z., & Shafran, R. (2003b). *Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment—ScienceDirect*. https://www-sciencedirect-com.proxy-ub.rug.nl/science/article/pii/S0005796702000888

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). *Statistical power analyses using G*Power 3.1.9.7: Tests for correlation and regression analyses. Behavior Research Methods, 41(4), 1149-1160. Https://doi.org/10.3758/BRM.41.4.1149*.

Favaro, A., Ferrara, S., & Santonastaso, P. (2003). *The spectrum of eating disorders in young*

women. https://oce-ovid-com.proxy-ub.rug.nl/article/00006842-200307000-00033/PDF

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (Fifth edition.). SAGE Publications; WorldCat.org.

Frankl, V. E. (2017). *Man's search for meaning: Young Adult Edition*. Beacon Press.

Garner, D. M. (1991). *Eating disorder inventory-2: Professional manual*. Psychological Assessment Resources.

George, L. S., & Park, C. L. (2017). The Multidimensional Existential Meaning Scale: A tripartite approach to measuring meaning in life. *The Journal of Positive Psychology*, *12*(6), 613–627. https://doi.org/10.1080/17439760.2016.1209546

Góngora, V. C. (2014). Satisfaction with life, well-being, and meaning in life as protective factors of eating disorder symptoms and body dissatisfaction in adolescents. *Eating Disorders*, *22*(5), 435–449. https://doi.org/10.1080/10640266.2014.931765

Goss, K., & Allan, S. (2009). *Shame, pride and eating disorders*. 16(4), 303–316. https://doi.org/10.1002/cpp.627

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*.

Grieve et al. (2006). *Healthy and unhealthy weight management practices in collegiate men and women*. 29(3), 229+.

Harlow, L. L., Newcomb, M. D., & Bentler, P. M. (1986). Depression, self-derogation, substance use, and suicide ideation: Lack of purpose in life as a mediational factor. *Journal of Clinical Psychology*, *42*(1), 5–21. https://doi.org/10.1002/1097-4679(198601)42:1<5::AID-JCLP2270420102>3.0.CO;2-9

Hedayati, M. A., & Khazaei, M. A. (2014). An investigation of the relationship between

depression, meaning in life and adult hope. *Procedia - Social and Behavioral Sciences*, *114*, 598–601. https://doi.org/10.1016/j.sbspro.2013.12.753

Hilbert, A., & Tuschen-Caffier, B. (2016). *Eating Disorder Examination-Questionnaire. Deutschsprachige Übersetzung (2 ed.). Dgvt-Verlag.*

Jaarsma, T. A., Pool, G., Ranchor, A. V., & Sanderman, R. (2007). The concept and measurement of meaning in life in Dutch cancer patients. *Psycho-Oncology*, *16*(3), 241–248. https://doi.org/10.1002/pon.1056

Jacobi, C., Abascal, L., & Taylor, C. B. (2004). Screening for eating disorders and high-risk behavior: Caution. *International Journal of Eating Disorders*, *36*(3), 280–295. https://doi.org/10.1002/eat.20048

Killen, J. D., Hayward, C., Wilson, D. M., Taylor, C. B., Hammer, L. D., Litt, I., Simmonds, B., & Haydel, F. (1994). Factors associated with eating disorder symptoms in a community sample of 6th and 7th grade girls. *International Journal of Eating Disorders*, *15*(4), 357–367. https://doi.org/10.1002/eat.2260150406

Levine, M. P., & Smolak, L. (2020). *The prevention of eating problems and eating disorders: Theories, research, and applications* (2nd ed.). Routledge. https://doi.org/10.4324/9781315401065

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, *33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Marco, J. H., Cañabate, M., & Pérez, S. (2019). Meaning in life is associated with the psychopathology of eating disorders: Differences depending on the diagnosis. *Eating Disorders*, *27*(6), 550–564. https://doi.org/10.1080/10640266.2018.1560852

Marco, J. H., Cañabate, M., Pérez, S., & Llorca, G. (2017). Associations among meaning in life, body image, psychopathology, and suicide ideation in spanish participants with eating disorders. *Journal of Clinical Psychology*, *73*(12), 1768–1781. https://doi.org/10.1002/jclp.22481

Matthews, M., Zullig, K. J., Ward, R. M., Horn, T., & Huebner, E. S. (2012). An analysis of specific life satisfaction domains and disordered eating among college students. *Social Indicators Research*, *107*(1), 55–69. https://doi.org/10.1007/s11205-011-9826-5

Mulkerrin, Ú., Bamford, B., & Serpell, L. (2016). How well does Anorexia Nervosa fit with personal values? An exploratory study. *Journal of Eating Disorders*, *4*(1), 20. https://doi.org/10.1186/s40337-016-0109-z

Nauta, H., Hospers, H., Kok, G., & Jansen, A. (2000). A comparison between a cognitive and a behavioral treatment for obese binge eaters and obese non-binge eaters. *Behavior Therapy*, *31*(3), 441–461. https://doi.org/10.1016/S0005-7894(00)80024-6

Palmore, E., & Luikart, C. (1972). Health and social factors related to life satisfaction. *Journal of Health and Social Behavior*, *13*(1), 68–80. https://doi.org/10.2307/2136974

Park, N., Park, M., & Peterson, C. (2010). When is the search for meaning related to life satisfaction? *Applied Psychology: Health and Well-Being*, *2*(1), 1–13. https://doi.org/10.1111/j.1758-0854.2009.01024.x

Random.org. (2023). *True random number service*.

Rosenberg, M. (1965). *Rosenberg Self-Esteem Scale. [Database record]. APA PsycTests*. https://psycnet.apa.org/doiLanding?doi=10.1037%2Ft01038-000

Schmidt, U., Adan, R., Böhm, I., Campbell, I. C., Dingemans, A., Ehrlich, S., Elzakkers, I., Favaro, A., Giel, K., Harrison, A., Himmerich, H., Hoek, H. W., Herpertz-Dahlmann, B., Kas, M. J., Seitz, J., Smeets, P., Sternheim, L., Tenconi, E., van Elburg, A., … Zipfel, S.

(2016). Eating disorders: The big issue. *The Lancet Psychiatry*, *3*(4), 313–315. https://doi.org/10.1016/S2215-0366(16)00081-X

Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, *36*, 439–451. https://doi.org/10.1007/s11031-012-9279-4

Shisslak, C. M., Crago, M., & Estes, L. S. (1995). The spectrum of eating disturbances. *International Journal of Eating Disorders*, *18*(3), 209–219. https://doi.org/10.1002/1098-108X(199511)18:3<209::AID-EAT2260180303>3.0.CO;2-E

Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The Meaning in Life Ouestionnaire: Assessing the presence of and search for meaning in life. *Journal of Counseling Psychology*, *53*(1), 80–93. https://doi.org/10.1037/0022-0167.53.1.80

Steger, M. F., & Kashdan, T. B. (2007). Stability and specificity of meaning in life and life satisfaction over one year. *Journal of Happiness Studies*, *8*(2), 161–179. https://doi.org/10.1007/s10902-006-9011-8

Stice, E., Marti, C. N., & Durant, S. (2011). Risk factors for onset of eating disorders: Evidence of multiple risk pathways from an 8-year prospective study. *Behaviour Research and Therapy*, *49*(10), 622–627. https://doi.org/10.1016/j.brat.2011.06.009

Stice, E., Marti, C. N., & Rohde, P. (2013). Prevalence, incidence, impairment, and course of the proposed DSM-5 eating disorder diagnoses in an 8-year prospective community study of young women. *Journal of Abnormal Psychology*, *122*(2), 445–457. https://doi.org/10.1037/a0030679

Suldo, S. M., & Huebner, E. S. (2006). Is extremely high life satisfaction during adolescence advantageous? *Social Indicators Research*, *78*(2), 179–203. https://doi.org/10.1007/s11205-005-8208-2

Tabachnick, B. G. 1936-, & Fidell, L. S. (2014). *Using multivariate statistics* (6th ed.). Pearson; WorldCat.org.

Troop, N. A., Allan, S., Treasure, J. L., & Katzman, M. (2003). *Social comparison and submissive behaviour in eating disorder patients. Psychology and Psychotherapy, 76(Pt 3), 237–49.*

van der Spek, N., Vos, J., van Uden-Kraan, C. F., Breitbart, W., Cuijpers, P., Holtmaat, K., Witte, B. I., Tollenaar, R. A. E. M., & Verdonck-de Leeuw, I. M. (2017). Efficacy of meaning-centered group psychotherapy for cancer survivors: A randomized controlled trial. *Psychological Medicine*, *47*(11), 1990–2001. https://doi.org/10.1017/S0033291717000447

van Doornik, S. F. W., Glashouwer, K. A., & de Jong, P. J. (2022). *Authorized dutch translation of the Multidimensional Existential Meaning Scale (MEMS).*

van Doornik, S. F. W., Glashouwer, K. A., Ostafin, B. D., & de Jong, P. J. (2022). 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 [unpublished manuscript]. Faculty of Behavioral and Social Sciences, Department of Clinical Psychology and Experimental Psychotherapy, University of Groningen. *Unpubilshed Manuscript.*

van Doornik, S. F. W., Glashouwer, K. A., Ostafin, B. D., & de Jong, P. J. (2020a). *Treatment manual: Meaning-centered intervention for youth worrying about their weight and shape [unpublished manuscript] University of Groningen.*

van Doornik, S. F. W., Glashouwer, K. A., Ostafin, B. D., & de Jong, P. J. (2020b). *Workbook: Meaning-centered intervention for youth worrying about their weight and shape [unpublished manuscript] University of Groningen.*

van Doornik, S. F. W., Ostafin, B. D., Jonker, N. C., Glashouwer, K. A., & de Jong, P. J. (2022). Satisfaction with normative life domains and the course of anorexia nervosa. *International Journal of Eating Disorders*, *55*(4), 553–563. https://doi.org/10.1002/eat.23691

van Doornik, S. F. W., Ostafin, B. D., Jonker, N. C., Glashouwer, K. A., & de Jong, P. J. (2022c). Satisfaction with normative life domains and the course of anorexia nervosa. *International Journal of Eating Disorders*, *55*(4), 553–563. https://doi.org/10.1002/eat.23691

van Doornik, S. F. W., Ostafin, B. D., Jonker, N. C., Glashouwer, K. A., & Jong, P. J. (2021). Low satisfaction with normative life domains in adolescents with anorexia nervosa. *Clinical Psychology & Psychotherapy*, *28*(5), 1266–1274. https://doi.org/10.1002/cpp.2574

World Health Organization. (2020). *A healthy lifestyle—WHO recommendations—BMI*. https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle---who-recommendations

Zika, S., & Chamberlain, K. (1992). On the relation between meaning in life and psychological well-being. *British Journal of Psychology*, *83*(1), 133–145. https://doi.org/10.1111/j.2044-8295.1992.tb02429.x

Zullig, K. J., Huebner, E. S., Patton, J. M., & Murray, K. A. (2009). The brief multidimensional students' life satisfaction scale-college version. *American Journal of Health Behavior*, *33*(5), 483–494. https://go-gale-com.proxy-ub.rug.nl/ps/i.do?p=AONE&sw=w&issn=10873244&v=2.1&it=r&id=GALE%7CA209477233&sid=googleScholar&linkaccess=abs

Appendix A

Table 4

Distribution of all BMI Classes and the Participants for each Class.

BMI	Nutritional status	Number of participants
Below 18.5	Underweight	4
18.5 – 24.9	Normal weight	59
25.0 – 29.9	Pre-obesity	16
30.0 – 34.9	Obesity class I	4
35.0 – 39.9	Obesity class II	1
Above 40	Obesity class III	1

Note. All classes are taken from the WHO (2020) information.

Appendix B

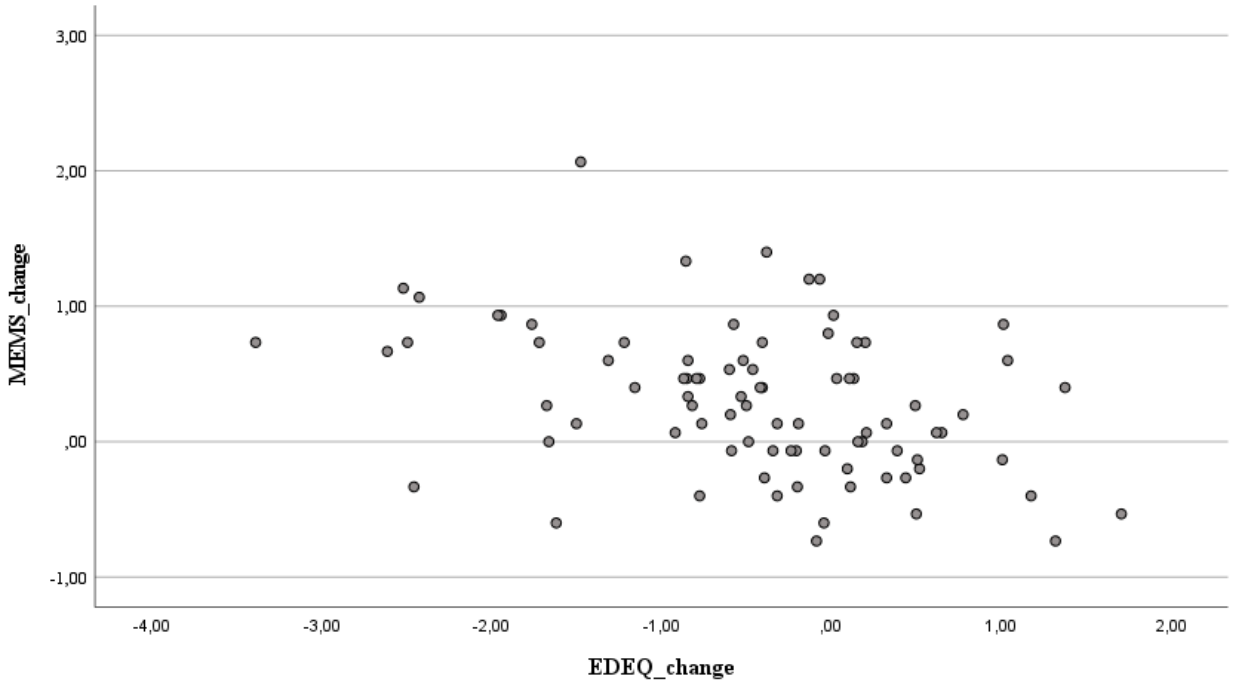
Table 5
Further Questionnaires Assessed at Baseline, Post- and Follow-up Measurement.

Questionnaire	**Assessed Variables**	**Researcher**
Eating Disorder Inventory 2	bulimia / ineffectiveness / social insecurities / interpersonal distrust	(Garner, 1991)
Meaning in Life Questionnaire	presence of life meaning / search for life meaning	(Steger et al., 2006)
Balanced Measure of Basic Psychological Needs	need for autonomy / need for competence / need for relatedness.	(Sheldon & Hilpert, 2012)
Depression Anxiety Stress Scales-21	depression / anxiety / stress	(Lovibond & Lovibond, 1995)
Rosenberg Self-Esteem Scale	self-esteem	(Rosenberg, 1965)
Clinical Perfectionism Questionnaire	perfectionism	(Fairburn et al., 2003a)
Difficulties in Emotion Regulation Scale	mood intolerance	(Gratz & Roemer, 2004)

Appendix C

Table 6

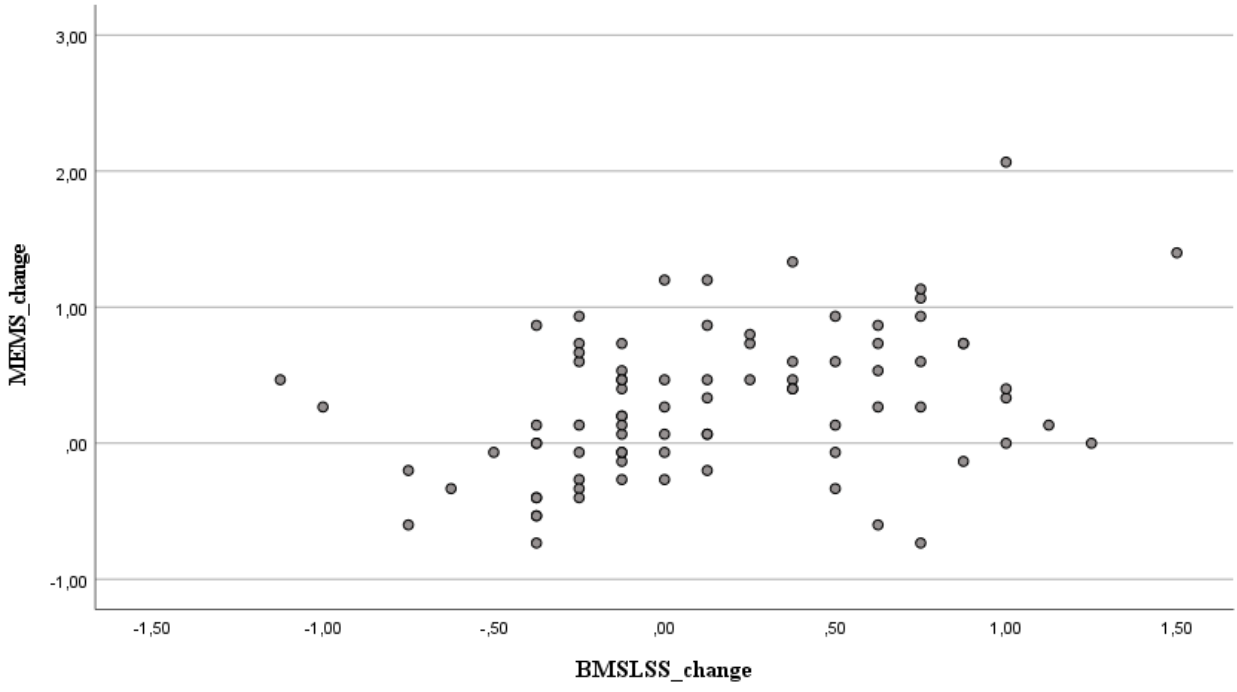
Visual Representation of the Relationship between the MEMS Total Change and the EDEQ Change of all Participants.



Note. *N* = 85

Table 7

Visual Representation of the Relationship between the MEMS Total Change and the BMSLSS-C Change of all Participants.



Note. *N* = 85

Appendix D

Table 8

The Change of the Bivariate Correlations between Baseline and Post-measurement of the Variables MiL, LS, and EDS of only the Participants in the Experimental Condition.

Variable	1	2	3	4	5	6
1. MEMS Total change		.89**	.62**	.65**	-.45**	.29
2. MEMS Comprehension change			.36**	.43**	-.49**	.28
3. MEMS Purpose change				.06	-.34*	.10
4. MEMS Mattering change					-.09	.23
5. EDEQ change						-.48**
6. BMSLSS-C change						

Note. MEMS Total change = post score minus baseline score on the Multidimensional Existential Meaning Scale (MEMS); MEMS Comprehension, Purpose, and Mattering change = post score minus baseline score on each subscale of the MEMS; EDEQ change = post score minus baseline score on the Eating Disorder Examination Questionnaire (EDEQ); BMSLSS-C change = post score minus baseline score on the Brief Multidimensional Students' Life Satisfaction Scale-College (BMSLSS-C), Improvement is denoted by a positive change in scores. Sample size of experimental condition $N = 38$.
*p ≤.05, **p≤.01.

Appendix E

Since the overall BMSLSS-C score only slightly missed significance, we performed subsequent ANCOVA analyses examining the change in each individual normative life domain from baseline to post measurement between conditions. To control for the familywise error rate, the Bonferroni-Holm correction was applied which resulted in a required p value of $a = 0.00625$ for each of the eight normative domains. A significant effect of condition was found for the normative life domain friends (F (1, 82) = 8.12, $p < .0055$, $\eta p^2 = .09$) and self (F (1, 82) = 9.30, $p < .003$, ηp^2 .10). However, for both normative domains the assumption of normality and homogeneity of regression slopes was violated. Therefore, results have to be interpreted with caution.

Table 9

Means and Standard Deviations of all BMSLSS-C Domains at Baseline and Post-assessment Displayed per Condition.

	Experimental Condition		Waiting-list Control Condition	
	Pre intervention (N = 67)	Post intervention (N = 61)	Pre intervention (N = 67)	Post intervention (N = 64)
	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*
Family	3.50 *(1.41)*	3.82 *(1.20)*	4.35 *(0.85)*	4.19 *(1.15)*
Friends	4.05 *(1.04)*	4.45 *(0.69)*	3.89 *(1.05)*	3.91 *(0.97)*
School experience	3.79 *(1.07)*	3.68 *(1.02)*	3.53 *(0.95)*	3.57 *(1.02)*
Self	2.95 *(1.04)*	3.53 *(1.01)*	2.72 *(1.12)*	2.83 *(1.05)*
Living location	3.97 *(1.10)*	4.24 *(1.00)*	3.64 *(1.33)*	3.81 *(1.17)*
Romantic relationships	3.16 *(1.60)*	2.97 *(1.57)*	2.98 *(1.38)*	3.04 *(1.44)*
Physical appearance	2.47 *(1.06)*	2.87 *(1.04)*	2.19 *(0.77)*	2.40 *(1.04)*
Life in general	3.53 *(0.98)*	3.79 *(0.81)*	3.30 *(1.04)*	3.38 *(0.97)*

Note. BMSLSS-C = the Brief Multidimensional Students' Life Satisfaction Scale-College version. Mean equals an average score of all scores of the domain; range 1-5; higher scores show greater LS).