



Efficacy and acceptability of a pilot dietary intervention focusing on self-compassion, goal-setting and self-monitoring

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Abstract

Objective: Overweight and obesity are universal health challenges. Recent evidence emphasises the potential benefits of addressing psychological factors associated with obesity in dietary programmes. This pilot study investigated the efficacy and acceptability of a combined online and face-to-face dietary intervention that used self-compassion, goal-setting and self-monitoring to improve dietary behaviour, as well as psychological factors associated with dietary behaviour.

Design: Embedded mixed methods including a 4-week before-after trial and a one-on-one interview. Quantitative outcomes of the study were the levels of self-compassion; eating pathology; depression, anxiety and stress; and dietary intake. Qualitative outcomes were participants' perceptions about the acceptability of the intervention.

Setting: UNSW Kensington campus.

Participants: Fourteen participants with overweight and obesity aged between 18 and 55 years old.

Results: Results showed that the intervention significantly improved self-compassion and some aspects of dietary intake (e.g. decrease in energy intake) at Week Four compared with Week Zero. Some aspects of eating pathology also significantly decreased (e.g. Eating Concern). However, changes in self-compassion over the 4 weeks did not significantly predict Week Four study outcomes, except for level of stress. Most participants found self-compassion, goal-setting and self-monitoring to be essential for dietary behaviour change. However, participants also indicated that an online programme needed to be efficient, simple and interactive.

Conclusions: In conclusion, the current study provides preliminary but promising findings of an effective and acceptable combined online and face-to-face intervention that used self-compassion, goal-setting and self-monitoring to improve dietary habits. However, the results need to be examined in future long-term randomised controlled trials.

Keywords
Obesity
Self-compassion
Eating behaviour
Online
Goal-setting
Self-monitoring

The prevalence of overweight and obesity has risen dramatically worldwide and is considered to be a major global health concern⁽¹⁾. Overweight and obesity can put individuals at risk of physical (e.g. hypertension and type 2 diabetes)^(2,3) and psychological consequences (e.g. depression and anxiety disorders)⁽⁴⁾. Evidence shows that losing even a small amount of body weight (5–10% of body weight) can improve health outcomes such as blood pressure and total cholesterol⁽⁵⁾. However, traditional weight management approaches that promote

dietary restriction seldom lead to weight loss in the long term (i.e. >12 months)⁽⁶⁾. In addition, rigid dietary restriction can increase the risk of weight cycling and psychological problems, such as disordered eating⁽⁶⁾. Negative body image, disordered eating, depression and anxiety have been linked to poor compliance with weight loss programmes⁽⁷⁾, but these psychological factors are not typically addressed in many of these programmes^(8,9). A growing body of literature recommends encouraging healthy dietary habits rather than weight loss, and that

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targeting psychological factors that are linked to body weight could be beneficial for physical and mental health^(10,11).

A novel and promising approach to addressing these psychological barriers to promoting healthy dietary habits could be enhancing individuals' self-compassion. Self-compassion, which involves cultivating a kind and compassionate mindset towards oneself⁽¹²⁾, is associated with decreased disordered eating and body dissatisfaction⁽¹³⁾ and with increased mental well-being⁽¹⁴⁾. Therefore, including self-compassion in nutrition interventions might lead to better outcomes. However, most of the previous studies that examined the effects of self-compassion interventions have focused on weight loss rather than improved dietary habits. These studies have also suffered from some methodological limitations, such as selection bias (e.g. Mantzios and Wilson⁽¹⁵⁾), and none of them has examined participants' experiences in depth regarding the acceptability of a self-compassion intervention for improving dietary habits^(16–18). Examining the acceptability of nutrition interventions that include a new approach such as self-compassion could guide the development and facilitation of effective nutrition programmes.

Two additional strategies that could be useful in the promotion of healthy dietary behaviours are goal-setting and self-monitoring⁽¹⁹⁾ with effectiveness demonstrated in both short-term (≤ 6 months) and long-term studies (≥ 12 months)^(20,21). However, factors such as lack of motivation and negative reaction to minor failure could derail individuals from their goals and eventually lead to goal abandonment⁽²²⁾. Recent theoretical evidence⁽²³⁾ and empirical studies^(24,25) show that self-compassion might be beneficial in addressing these barriers through increasing motivation and regulating negative emotions related to goal lapses^(23,26). Thus, integrating self-compassion into goal-setting and self-monitoring interventions for improving dietary habits might improve goal-striving and intervention outcomes.

Finally, online interventions could provide useful tools for promoting healthy dietary habits. Online technologies, such as internet-based interventions and mobile health, have increasingly been used to facilitate the delivery of dietary change interventions⁽²⁷⁾. These interventions provide a platform for individualised feedback and support, which could also improve goal attainment⁽²⁸⁾. Studies indicate that using online technologies in nutrition programmes can be of low cost, have a wide reach to clients and could improve dietary habits⁽²⁷⁾. However, the development and assessment of online tools for dietary behaviour change are in their infancy⁽²⁹⁾. To ensure higher acceptability and adherence in future online nutrition interventions, exploring people's perceptions of the acceptability of these interventions is crucial⁽²⁹⁾.

The current pilot study aimed to investigate the efficacy and acceptability of a combined online and face-to-face behavioural intervention that used self-compassion, goal-setting and self-monitoring strategies for improving dietary

behaviour, as well as psychological factors associated with dietary behaviour, in subjects with overweight or obesity. Considering that the majority of nutrition programmes have poor outcomes⁽³⁰⁾, the insights gained from this research will be useful in guiding future dietary interventions.

Methods

This pilot study had two main aims. The first aim was to investigate the efficacy of the intervention. The primary assessable outcomes of this aim were levels of self-compassion; eating pathology; depression, anxiety and stress; and dietary intake (e.g. fibre intake). Secondary outcomes were body weight, BMI and waist and hip circumferences. The second aim of the study was to examine participants' perceptions about the usefulness and acceptability of the intervention.

An embedded mixed methods design⁽³¹⁾ was used for the pilot study. This design involves collecting qualitative data and quantitative data on the same topic to answer different questions that require different types of data. In this study, the qualitative component was embedded within a quantitative design. The two qualitative and quantitative components were given equal weight. The quantitative phase was a 4-week before-after trial, and the qualitative phase of the study was a structured one-on-one in-person interview conducted after the intervention to provide data on participant perceptions about the acceptability of the intervention.

A convenience sampling strategy was used to recruit fifteen participants from the student and staff population of UNSW Sydney during early 2016. Online means such as emails and physical posters on the university campus were used to recruit participants. Participant inclusion criteria were: aged 18–55 years, BMI 25–40 kg/m², access to a computer/tablet/smartphone that can run an internet browser for at least 1 h/week, able to read and write English and being open to changing eating habits and potentially lose weight. The exclusion criteria were: taking any weight-loss medications or previous use of weight-loss medications during the past 6 months, currently using medication which has substantial weight gain, suffering from any major medical illness or having a history of major medical illness (in the last 5 years), pregnancy or lactation, current participation in any other nutrition or weight loss programme or seeing a nutrition professional, currently smoking, and weight loss of more than 4.5 kg (10 pounds) during the past 6 months. Participants who finished the study received two personal care items (a hand cream and sanitizer) and were entered into a prize draw to win one of the three packages of prizes that included three or two of the following items: a meditation course voucher, an organic fruit and vegetables box and/or a book.

Quantitative data collection

At the beginning and end of the intervention (i.e. at Week Zero and Week Four), participants completed several

questionnaires online to obtain demographic information and levels of self-compassion, eating pathology, and depression anxiety and stress. Participants also completed 3-d food diaries and had anthropometric measures taken at Week Zero and Week Four during one-on-one in-person meetings.

Self-Compassion Scale

The Self-Compassion Scale (SCS) is a twenty-six-item self-reported measure designed to assess typical thoughts, emotions and behaviours associated with different components of self-compassion⁽³²⁾. The SCS consists of six subscales: Self-Kindness, Self-Judgement, Common Humanity, Isolation, Mindfulness and Over-Identification. Responses are made on a five-point scale from 1 (*Almost never*) to 5 (*Almost always*). Subscale scores are computed as the mean of items in the subscale. For the computation of the overall self-compassion score, negatively worded items were reverse-coded and an average of all items was calculated so that higher scores represent greater levels of self-compassion⁽³²⁾. Internal consistency reliability for overall SCS was excellent (Cronbach's $\alpha = 0.93$) in the current study and was good for most of the SCS subscales (Cronbach's α 's ranged from 0.69 to 0.94).

Eating Disorder Examination Questionnaire

The Eating Disorder Examination Questionnaire (EDE-Q) is a twenty-eight-item questionnaire that asks about maladaptive eating behaviours over the previous 4 weeks⁽³³⁾ and provides two types of data. First, it generates a frequency of occurrence of the main behavioural traits of eating disorders such as binge eating (six questions). Second, it has subscale scores that provide the severity of eating-related psychopathology⁽³³⁾. These items are responded to on a scale that ranges from 0 (*No days*) to 6 (*All days*). The four subscales are: Restraint, Eating Concern, Shape Concern and Weight Concern. The score for each subscale is obtained by calculating the mean of all items for that subscale. The measure also produces a Global score for overall eating pathology which is obtained by averaging the four subscale scores. Higher EDE-Q scores reflect a greater severity of eating psychopathology. In the current study, Cronbach's alpha for EDE-Q Global was 0.90 and for the subscale scores of Restraint, Eating Concern, Shape Concern and Weight Concern were 0.71, 0.75, 0.85 and 0.58, respectively.

Depression Anxiety and Stress Scale-21

Depression Anxiety and Stress Scale-21 (DASS-21) is a twenty-one-item self-administered instrument assessing psychological distress⁽³⁴⁾. It is composed of three subscales: Depression, Anxiety and Stress. Respondents indicate the extent to which they experienced negative emotional states over the past week, ranging from 0 (*Did not apply to me*) to 3 (*Applied to me very much*)⁽³⁴⁾. To attain a score for each

subscale, the ratings for the subscale items are summed. Cronbach's alpha for the three subscales ranged from 0.77 to 0.92 in the current study.

Estimated food diary

Participants were asked to record every item of the food and drink consumed for three consecutive days (two weekdays and one weekend day)⁽³⁵⁾. To collect the 3-d food diary data, online Google Sheets with instructions on how to record food intake were shared with the participants. At the end of each 3-d recording period, the first author reviewed the food diaries with the respondent during the in-person meetings to clarify entries and to probe for forgotten items. Data from the food diaries were entered into the FoodWorks 7⁽³⁶⁾ software programme for nutrient analysis. Average daily energy intake and nutrient intakes (protein, carbohydrate, fat, alcohol and fibre) that were most likely to be associated with body weight regulation⁽³⁷⁾ were obtained from the software outputs.

Anthropometry

Body weight, height, and waist and hip circumferences were measured objectively. Weight was measured without shoes and in light clothing using a calibrated digital standing scale (SECA 817), with a precision of ± 0.1 kg. Standing height was measured without shoes, using a portable stadiometer (SECA 213). BMI was calculated from these measurements using the formula $\text{weight (kg)}/\text{height}^2 \text{ (m)}^{(1)}$. Waist circumference was measured directly on the skin using a measuring tape (SECA 201) at the midpoint between the margin of the last palpable rib and the top of the iliac crest⁽³⁸⁾. Hip circumference was measured with light clothing at the widest area of the buttocks⁽³⁸⁾. Waist and hip circumferences were assessed in duplicate, and the averages were calculated.

Structured interview

One-on-one, in-person structured interviews were conducted during the Week Four meeting. The interview also included some quantitative questions about the participant's satisfaction with the intervention. Closed-ended questions included questions such as, 'Which aspects of the program did you find most useful?', and participants were provided with a list of answers by the interviewer to select from (see online Supplementary Appendix 1 for the interview guide). Participants were also asked to rate their satisfaction with the intervention using a five-point rating scale that ranged from 1 (*very dissatisfied*) to 5 (*very satisfied*). These questions were then followed by open-ended questions such as, 'Can you describe why you found 'X' aspect of the study useful?' to probe reasons for participants' opinions. All participants who completed the study ($n = 14$) were interviewed in order to capture as much diverse insight as possible. Interviews were conducted by the first author in a private room at UNSW and lasted



between 20 and 35 min each. To add to the study's trustworthiness (study credibility), additional data resources such as participant goal sheets and the email correspondence between participants and the first author were reviewed to verify findings from participants' interviews.

The interviews were audio recorded using digital dictation voice recorders (Olympus DS-2500) and transcribed verbatim by a professional transcription service. To ensure the veracity of data, participants were provided with an opportunity to review and check whether the transcripts accurately reflected what they said (i.e. respondent validation); none of the participants expressed any concern.

Intervention

During the 4 weeks of the intervention, participants received information at the beginning of each week. The first information pack was given verbally as well as in printed handouts during the baseline face-to-face meeting. The rest of the information was sent in PDF documents via email. Each information pack had two sections: one providing information on nutrition and the other providing information on self-compassion. Participants were advised to set goals based on the information provided and to track their performance online over the intervention period.

Goal-setting

The goal-setting protocol was based on Locke and Latham's goal-setting theory⁽³⁹⁾. Participants were encouraged to set proximal (short-term), timely, specific goals, and to reward themselves for any success. In addition, factors that may facilitate achievement of health-related goals, such as promoting self-efficacy⁽²²⁾, were included in the goal-setting instructions.

During the initial in-person meeting, participants set two goals with the first author's guidance. One goal was about dietary habits (e.g. 'I aim to eat three serves of vegetables every day'), and the other goal was about self-compassion behaviours (e.g. 'I aim to treat myself like a good friend under challenging situations this week'). They were also advised to set new goals every week based on the new information they would receive. Participants had the option of carrying forward their nutrition goals to subsequent weeks or setting new ones. Participants were asked to set or retain a maximum of three nutrition goals and one self-compassion goal per week (i.e. a total of four goals in any week).

Participants were shown how to use a personalised online Google goal sheet for self-monitoring as well for interacting with the first author. Goal sheets were structured as weekly calendars with space to enter their goals and then track daily progress (i.e. indicating whether or not they completed the goal with a 'Yes' or

'No'). During the study, participants could contact the first author for further guidance. The first author reviewed each participant's goal sheet at the end of each week, and feedback was emailed to the participant. Email reminders were also sent to participants if they did not complete their goal sheets for three consecutive days.

Nutrition information

Nutrition information was based on the Australian Dietary Guidelines⁽⁴⁰⁾. Guidance on the ideal intake of foods was tailored to focus on the regulation of body weight and hunger. Therefore, the information encouraged a diet with foods high in protein, fibre and carbohydrates low in glycaemic index and low in energy density. Each week, two or three of the food categories listed in the Australian Dietary Guidelines were introduced to participants along with some goal options related to these food categories.

Self-compassion information

Self-compassion information and goal options were partially based on Neff's website⁽⁴¹⁾. The website teaches 'mindful self-compassion'⁽⁴¹⁾. The investigators partially modified the information to focus more on how self-compassion may be related to nutrition and dietary behaviour change (e.g. emotional eating or goal relapse)^(26,42). Goal options provided were either formal practices (i.e. guided meditation) or informal practices (i.e. self-compassionate thoughts in daily life, such as repeating self-compassionate phrases to oneself in moments of suffering). The informal practices were related to sufferings either in general life or relating to body image and diet. One of the goal examples relating to the distress associated with dietary habits was: 'If I do not accomplish my nutrition goals as much as I would like, and I won't feel guilty. Instead, I will motivate myself to do better in the future with encouraging language.'

Statistical analysis

Descriptive statistics were used to describe the baseline characteristics of the study sample. To compare changes before and after the intervention, paired samples *t* tests and Wilcoxon-paired rank tests were used for the normally distributed and non-parametric data, respectively. Simple linear regressions were carried out to examine if changes in self-compassion predicted the Week Four values of each outcome variable. The regression models were adjusted for baseline values of those outcome variables. Data analysis was performed using SPSS (version 22). Differences were considered to be statistically significant at $P < 0.05$. Cohen's *d* effect size was used for the effect size calculation, with effect sizes of 0.2, 0.5 and 0.8 representing small, medium and large effects, respectively⁽⁴³⁾.

Qualitative analysis

Qualitative content analysis was used to analyse the qualitative interview data. A deductive approach was used to

code the data and assess the conceptual and theoretical underpinnings of the study^(44,45). An inductive approach was then applied to develop higher order categories or data that did not fit into the unconstrained matrix. The latter approach is taken when there is not enough information about the topic to be analysed⁽⁴⁴⁾.

The transcripts were read several times by the first author before coding. After initial open coding based on a few transcripts, the first author consulted with a qualitative expert to confirm the validity of the generated codes. Codes related to similar or dissimilar opinions on the same topic were collapsed into broader categories to reduce the total number of categories. QRS International Nvivo 11 software was used for coding and managing the data. After coding all transcripts, refining codes, categorisation and abstraction, a list of categories and subcategories was generated and their definitions were discussed between the first and fourth authors.

Results

Response rate and participant characteristics

Out of forty-six people (forty-three women and three men) who initially responded to the advertisements, eighteen female participants were interested and eligible; of those, fourteen completed the study. Figure 1 presents the recruitment process and the numbers of participants involved at each stage of the intervention. The average age of the sample was 37.9 (SD 9.8) years, and the average BMI was 30.58 (SD 3.44) kg/m². All participants had some university education with 71% having postgraduate education. The ethnic composition of the sample

was diverse with 29% of the participants being Oceanian, 14% European, 7% African and Middle Eastern, 22% Asian, 14% American and 14% others.

Participants' earlier exposure to self-compassion

Some information about participants' earlier exposure to self-compassion was collected because the early exposure might affect participants' ability to develop a self-compassion mindset and their perception of the study acceptability⁽⁴⁶⁾. Eight participants reported that they had already heard of or were familiar with the concept of self-compassion and some of the participants were familiar with some similar concepts, such as mindfulness.

Changes between Week Zero and Week Four

Table 1 provides within-participant comparisons on the following outcomes: self-compassion; eating pathology; depression, anxiety and stress; and anthropometry. With respect to self-compassion, there were significant improvements in the total scores on the SCS as well as some of its subscales. Global scores on the EDE-Q did not show any significant change, but there was a significant decrease for two of the subscales and for the frequency of binge days (days on which binge eating occurred). There was also an increase in levels of the Restraint subscale of the EDE-Q that fell just short of significance. Further analysis of the five items that make up the Restraint subscale revealed that the scores on items related to food avoidance ($P=0.01$) and dietary rules ($P=0.02$) increased significantly after the intervention, while scores on the other three items (restraint over eating, avoidance of eating and empty stomach) did not change significantly ($P_s > 0.60$). Among the DASS subscales, only a decrease in Depression scores approached significance. There was no significant change in any anthropometric variables after the intervention.

Week Zero and Week Four comparisons for dietary outcomes, such as energy and macronutrient intake, are presented in Table 2. Decreases in average daily energy intake and some macronutrients' intake were significant after 4 weeks of intervention. There was no change in fibre consumption; however, after adjusting for energy intake, fibre intake showed a significant increase from 2.9 to 3.5 g/MJ. The proportions of energy provided by the different macronutrients did not change significantly over the course of the intervention.

Self-compassion change as a predictor of study outcomes

Table 3 shows coefficients of simple linear regression predicting the study outcomes at Week Four based on changes in self-compassion total score and subscale scores. Note that, because the impact of the intervention was similar for the three positively worded items and for the three negatively worded items, these were combined to form

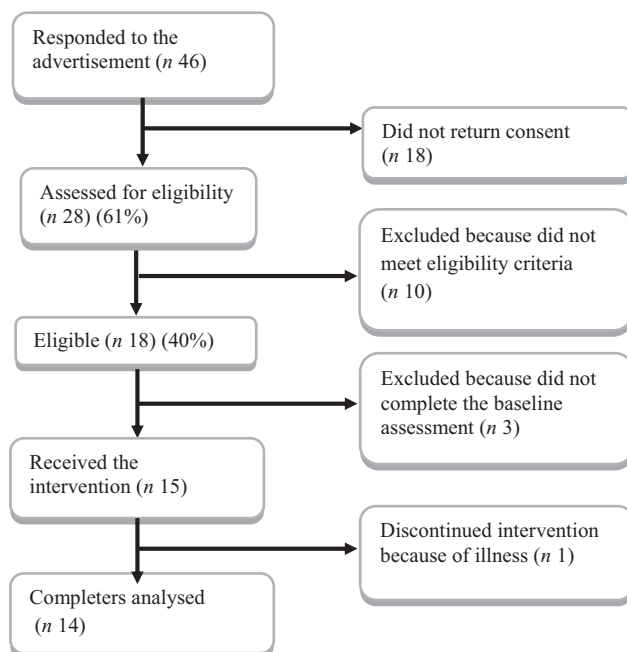


Fig. 1 Participant flow chart

**Table 1** Anthropometry, eating behaviours, depression, anxiety, stress and self-compassion at Week Zero and Week Four (n 14)

	Week Zero		Week Four		P	Cohen's d
	Mean	SD	Mean	SD		
SCS						
Self-kindness	2.73	0.63	3.01	0.80	0.37*	0.39
Common humanity	3.07	0.69	3.16	0.82	0.78*	0.12
Mindfulness	2.91	0.69	3.13	0.68	0.50	0.32
Self-judgment	3.04	1.03	2.53	1.00	<0.001	-0.51
Isolation	3.00	0.81	2.59	1.13	0.05	-0.42
Over-identification	2.96	1.06	2.48	1.02	0.01	-0.46
Self-compassion total	2.92	0.67	3.30	0.58	0.01	0.61
EDE-Q						
Restraint	1.24	1.12	1.64	1.25	0.06	0.34
Eating Concern	1.56	1.12	0.90	0.62	0.03	-0.72
Weight Concern	2.89	1.05	2.59	1.20	0.31	-0.27
Shape Concern	3.13	1.56	2.62	1.40	0.04	-0.34
Global score	2.20	1.01	1.94	0.99	0.17	-0.26
Overeating	6.46	5.94	4.57	4.20	0.30*	-0.37
Bingeing (episodes)	5.45	5.52	2.85	2.71	0.07	-0.60
Bingeing (d)	6.25	6.31	2.57	2.79	0.01*	-0.75
Purging (episodes)	0.05	0.31	0.00	0.00	-	-0.23
DASS						
Depression	5.64	4.27	4.00	3.40	0.07	-0.43
Anxiety	2.64	2.62	2.71	2.37	0.91	0.03
Stress	5.79	3.38	5.14	3.11	0.39	-0.20
Anthropometry						
Weight (kg)	83.02	14.22	82.75	14.23	0.31	-0.02
BMI (kg/m ²)	30.58	3.44	30.48	3.44	0.30	-0.03
Waist circumference (cm)	97.81	12.43	97.05	10.96	0.30	-0.06
Hip circumference (cm)	113.38	7.51	112.95	7.55	0.27	-0.06
Waist:hip ratio	0.88	0.08	0.87	0.08	0.70	-0.04

SCS, Self-Compassion Scale; EDE-Q, Eating Disorder Examination Questionnaire; DASS, Depression Anxiety and Stress Scale.
*Non-parametric analysis.

Table 2 Dietary intake at Week Zero and Week Four

	Week Zero		Week Four		P	Cohen's d
	Mean	SD	Mean	SD		
Average daily energy and macronutrient intake						
Energy (kJ)	9443.8	3461.4	7870.3	2074.6	0.02*	-0.55
Protein (g)	98.6	43.4	89.2	43.4	0.04*	-0.22
Carbohydrate (g)	236.4	87.8	189.5	54.8	0.01	-0.64
Sugar (g)	103.1	49.1	76.8	40.3	0.01	-0.59
Total fat (g)	95.3	41.0	76.9	29.2	0.10*	-0.52
Alcohol (g)	3.5	5.4	2.2	3.9	0.001*	-0.28
Fibre (g)	27.4	16.4	27.9	14.1	0.84	0.03
Fibre (g/MJ)	2.9	0.9	3.5	1.3	0.01	0.55
Energy intake ratio from different macronutrients						
Protein (% of energy)	18	6	19	7	0.36	0.21
Carbohydrate (% of energy)	41	6	40	8	0.45	-0.17
Total fat (% of energy)	37	6	36	10	0.63	-0.14
Alcohol (% of energy)	0.8	1	1	2	0.24	0.26

*Non-parametric analysis.

positive and negative subscales of self-compassion. The regression analyses were adjusted for baseline values of the respective outcomes. Changes in positively worded self-compassion subscales predicted Week Four scores on the Stress subscale of DASS and marginally predicted scores on the Week Four Anxiety subscale. Changes in negatively worded self-compassion subscales did not significantly

predict any Week Four scores for eating pathology or depression/anxiety/stress.

Goal adherence

To determine participants' goal adherence, participants' online goal sheets were reviewed. Goal adherence was



Table 3 Regression coefficients for changes in self-compassion predicting outcomes at Week Four

	SCS			SCS pos			SCS neg		
	<i>b</i>	SE	β	<i>b</i>	SE	β	<i>b</i>	SE	β
DASS – Depression	-1.33	2.07	-0.17	-0.78	0.77	-0.26	-0.67	1.51	-0.10
DASS – Anxiety	-1.21	1.48	-0.22	-1.06	0.55	-0.50†	-1.58	1.20	-0.34
DASS – Stress	-2.54	1.74	-0.35	-1.45	0.58	-0.52*	-1.64	1.32	-0.27
EDE-Q – Restraint	-0.37	0.60	-0.13	0.06	0.21	0.05	0.66	0.39	0.26
EDE-Q – Eating Concern	-0.58	0.34	-0.40	-0.15	0.14	-0.27	0.40	0.33	0.32
EDE-Q – Weight Concern	-0.51	0.70	-0.18	-0.08	0.28	-0.08	0.66	0.56	0.28
EDE-Q – Shape Concern	-0.45	0.51	-0.14	-0.05	0.20	-0.04	0.66	0.40	0.24
EDE-Q – Global	-0.44	0.44	-0.19	-0.08	0.17	-0.09	0.48	0.35	0.25

SCS, total self-compassion score; SCS pos, self-compassion positively worded items; SCS neg, self-compassion negatively worded items; DASS, Depression Anxiety and Stress Scale; EDE-Q, Eating Disorder Examination Questionnaire.

† $P < 0.10$, * $P < 0.05$.

calculated by the number of times a 'Yes' was recorded for reaching a goal divided by the number of times the goal was supposed to be accomplished. On average, participants accomplished 73 % (SD 14.8) and 67 % (SD 18.9) of their nutrition and self-compassion goals, respectively, during the 4 weeks of the intervention.

Acceptability and satisfaction with the study

The majority of participants stated that the study matched their expectations. Average satisfaction with the study was 3.9 out of 5 (where 4 = 'satisfied'), and 78.5 % of participants rated the study as 4 or 5. Participants were also asked to list verbally the most useful and the least useful aspects of the study using four categories that represented the main study components (i.e. self-compassion, goal-setting, nutrition guidance and online support). Participants stated that they found self-compassion and goal-setting to be the two most useful aspects of the study.

Analysis of the transcripts from the Week Four interviews generated six major categories describing features that may have an impact on the acceptability of the study and participant adherence. Table 4 presents these six major categories and their subcategories with example quotes supporting these findings. Participants had mixed opinions and feelings about the presence or absence of these features in changing their dietary behaviours.

Participants generally appreciated the idea of goal-setting (including self-monitoring) and self-compassion for dietary behaviour change. They believed that goal-setting and self-monitoring increased their motivation and emphasised that aiming for a realistic level of change could increase goal adherence. Participants also stated that self-compassion helped them to regulate the negative affect associated with eating and dietary change but noted that cultivating a self-compassion mindset could be challenging.

In addition to the study intervention components, participants talked about other aspects that may impact their adherence to the study. One of these aspects was the simplicity and efficiency of the current study. While some participants found the study to be time-efficient, easy to

understand and accessible, others thought that the study needed to be simpler and more time-efficient. The informative aspects of the study were also something that the participants found useful. In addition, some participants highlighted that the study could have been more flexible and more interactive to address participants' needs more favourably. Finally, feedback from the 'expert' (i.e. the investigator) and reminders were considered as factors that increased engagement with the study. However, some participants also suggested that opportunities for interaction with peers and more frequent interaction with experts and feedback might have improved engagement with the study.

Discussion

This pilot study aimed to investigate the efficacy and acceptability of a combined online and face-to-face behavioural intervention that used self-compassion, goal-setting and self-monitoring strategies for improving dietary behaviour in fourteen adults with overweight or obesity. The quantitative data show that the study was effective in improving self-compassion, some aspects of eating behaviour and some aspects of dietary intake. The qualitative data indicated that participants generally liked the idea of self-compassion and goal-setting for promoting healthier dietary behaviour and found the intervention to be partly acceptable and feasible. However, change scores in self-compassion did not predict any outcomes measure at Week Four, except for stress levels.

In the current study, the level of total self-compassion improved significantly over 4 weeks. The effect size (Cohen's $d = 0.61$) attained in our study was comparable to previous short-term (e.g. 5 d)^(18,47,48) or online self-guided self-compassion interventions^(17,48). These effect sizes are smaller than those reported in interventions with a longer period (i.e. 3–8 weeks) or group sessions (average effect size Cohen's $d = 1.4$)^(46,49). In those studies, group sessions might have given participants a better understanding of self-compassion as well as more opportunities for formal practice.

**Table 4** Six major categories describing features that may have an impact on the acceptability of the study

Categories	Sub-categories	Summary of key points identified	Representative quotations
Promoting goal-setting activity	Goal as a motivator	Goal setting facilitated the relevant tasks both cognitively and behaviourally.	'It [goal-setting] was good to sort of make yourself go [choose healthy foods]', [#12] 'Goals keep me moving [towards healthy diet]' [#16]. '[With goal-setting], I got back into it [healthy eating]' [#13]. Goal-setting helped participants to 'focus' [#12, 18, 25, 39], 'think' [#12–14, 16], 'be aware' [#25], 'be active' [#13], 'be organised' [#14, 18] and 'make better decisions' [#36] about goal-related actions or consider 'the task necessary' [#23].
	Self-monitoring	Self-monitoring was appreciated by most of the participants; however, a small number of participants indicated that it made them feel guilty when they could not achieve their goals.	It [goal] wasn't manageable, unless you were writing [typing and tracking]' [#16]. Self-monitoring 'was like a mental note' for realising a 'need of change' [#21]. Deviant cases: '[Self-monitoring] made me feel a bit guilty. It was like, 'Oh I'm feeling like a failure.' But it didn't, like somehow it didn't [help me] . . . no it helped me to try to do better next day I guess. Yeah' [#25].
	Attainable goals	Having ' <i>a slower, more gradual pace</i> ' [#39] or ' <i>having one goal at the time</i> ' [#36] made the tasks manageable.	'I think it is better to have a longer period for each goal such as two or three weeks, and then we add the second goal on top of that. In that case, it would be easier to get used to the first goal, but now one week has passed very quickly and then suddenly you have so many goals for vegetables, for grains [food group], and fat, and it is very difficult to do all of them at the [same] time'[#36].
Promoting self-compassion	Empowering the sense of self-care	Self-compassion helped participants realise the importance of self-care and a balanced life.	'I start thinking about my behaviour' [#14]. 'I don't prioritise the self-care tasks which take a lot of time and that's why [practising] the compassion approach works well' [#13].
	Enhancing emotional regulation	Self-compassion assisted in coping with negative affect and judgemental thoughts that may lead to overeating.	'I ate better and there was a less emotional drive to eat badly' [#13]. 'The most important thing for me and what makes me overeat and eat foods like . . . discretionary food is when I get down on myself and it's mostly because of work. This [self-compassion] made me stop worrying about work so much which then motivated me to go shopping and then I ate good food so it was kind of sort of one after the other . . .'[#14]. 'I am a stress eater and then you do that whole negative talking afterwards about like, 'Oh you shouldn't have eaten that,' you know and that sort of . . . that silly, 'You're ridiculous, you're hopeless, dududah.' And then of course, what does it matter now, you may as well eat more,' or you know, I found it [self-compassion] was sort of making me a little bit more conscious of that to go, 'Okay, you know that there were better choices but let's make a better choice next time' [#12].
	Facilitating cultivation of self-compassion	Participants found cultivating self-compassion challenging, some suggestions were provided for facilitating the cultivation of the mindset such as using group sessions facilitated with an instructor.	'I think sometimes it [having self-compassion] is a bit of a struggle, it's not that easy to apply' [#16]. 'It's very difficult to apply on yourself like when you're actually in the, in that situation where you need it the most' [#21]. 'As I haven't been very compassionate towards myself in many years, it was difficult to achieve this [self-compassion] goal' [extracted from goal-sheets; #36]. . . . towards the end I felt like it became a bit more easier to be [self-compassionate] [#33].
Being informative	–	Receiving new information on nutrition and self-compassion made the study acceptable.	'Definitely, the nutrition PDF was helpful' [# 39]. 'That's [self-compassion information] something that I need a lot of help with' [#12]. 'I found it [the information] very enlightening' [#33]. Deviant cases: 'It wasn't telling [me] anything new' [#18].
Catering to individual needs	Being interactive	While some people believed that the study should have been more interactive with adding some extra support from an expert and peers, others found the level of support enough to address an individual's need.	'I did not understand what direction I should be moving in to be healthier' [#18] 'I was a bit confused on what I should choose' [#25]. Deviant cases: 'The amount of contact [support]' provided by the researcher 'was probably fine [adequate]' and 'really helpful'.
	Flexibility and variety	Flexibility may help to address participants' needs.	'The fact that there was a range of decisions that you could make and a range of goals that you could achieve . . . I think it just, it allows for individual variation, which was good because it meant that I could . . . sort of pick things that I specifically thought needed working on and then, you know . . . so there was a lot of flexibility which I really liked' [#13]. Deviant cases: The self-compassion practices were 'boring', 'repetitive' and 'more variety is needed.'

Table 4 *Continued*

Categories	Sub-categories	Summary of key points identified	Representative quotations
Efficient and simple	Taking less time	While some people found the study time-consuming and discussed the time barrier, others found the study acceptable because it was time-efficient.	Participants indicated that they were 'too busy' and had 'no time to read [the information].' Deviant Cases: The study was acceptable because it was 'online' [#14] allowing 'quick communication'. 'It was really easy because you just had to say "Yes" or "No"' [#39]
	Easy and convenient	Mixed opinions found about the simplicity of the study.	The educational material was very 'long and hard to read,' as well as 'complicated and confusing.' Information should have displayed 'visually,' and in a 'more clear and easy to digest' way. 'I'd like to have, something that is just a table of options that I can just put on my fridge and look' [#25].
	Being usable and accessible	While some people found the study tools easy to work, others believed that there was a need for more user-friendly tools.	'Would be really handy' [#39] to have an 'easier version' [#18] without requiring a 'good level' [#12] of technological knowledge. Deviant cases: 'It was absolutely easy because I'm on the computer all the time' [# 14].
Engaging	Feedback	Participants found the feedback and support encouraging.	'You [the follow-up emails from the expert] were helping me to push' [#23], and receiving feedback 'makes you feel good, as you see some change, happening' [#18].
	Reminders	Reminders seemed to be helpful in engaging participants in the study.	'Maybe little [more] reminders to go, you know, how you going, did you achieve yesterday's goals. That sort of thing, possibly ... might've been more effective if it was like right in the forefront' [#12].
	In-person counselling and peers support	In order to make the study engaging, there is a need for in-person counselling sessions or peer support.	'That [the study] has to be reinforced and encouraged with personal meetings and group sessions' [#16]. Deviant cases: There was a need for 'day-to-day support' ... 'many times I would forget [to follow the study tasks]' [#12].

The current intervention significantly decreased some aspects of disordered eating as measured by the EDE-Q. Similar studies report comparable findings to the current study, such as significant decreases in disordered eating and body image concerns in clinical and non-clinical samples^(18,26,50–53). Scores on the Restraint subscale showed a slight (but non-significant) tendency to increase over the intervention ($P = 0.06$, $d = 0.34$). However, this might not be considered as a detrimental outcome given that the increase was observed on two items of 'food avoidance' (limiting specific foods) and 'dietary rules' (having some rules for eating) rather than items with more concerning patterns including 'desire for empty stomach' or a 'long period of fasting'. There is evidence that self-control and some degree of restraint in people with overweight and obesity can result in less binge eating and more success in weight loss compared with subjects with lower levels of restraint^(7,54). Thus, the slight increase in the Restraint subscale might be considered as a positive outcome in this context.

Significant improvements were also observed in some aspects of dietary intake over the 4 weeks of the intervention. Energy, carbohydrate, protein and alcohol intakes decreased; and fibre intake per unit of energy increased. Our findings are consistent with the few other studies that have examined the efficacy of self-compassion on dietary intake. Those studies have also reported improvements in some aspects of the diet, such as increased scores on nutrition subscale of a health questionnaire⁽⁴⁷⁾, and reduced frequency of dietary fat consumption⁽¹⁶⁾.

One of the study's hypotheses was that the current intervention could decrease depression, anxiety and stress, but there was no statistically significant effect of the intervention on these outcomes. (Depression scores did show a decreasing trend, $P = 0.07$, $d = -0.43$.) This lack of statistical significance is not congruent with previous study results, where significant decreases in emotional distress have been reported^(14,46,55,56). The null results of the current study might be due to the short period of the intervention and the fact that current study observed a smaller effect size in self-compassion levels compared with the previous study and this change might not be sufficient to cause a significant change in the study other outcomes.

In contrast to earlier findings^(15,18,57), the current study did not show any change in the secondary outcomes of anthropometry. This is perhaps not surprising given that (a) the current intervention was focused on improving dietary habits rather than weight loss and (b) the intervention was of relatively short duration. Other self-compassion studies that have focused on improving dietary habits similarly either found no change⁽¹⁶⁾ or reported only a small change in BMI and waist circumference (Cohen's $d = 0.10$)⁽¹⁸⁾.

Although the current intervention successfully improved self-compassion scores, there was very limited evidence that changes in self-compassion account for the changes in other outcomes. Positively worded subscales of SCS (e.g. Self-Kindness) predicted Week Four Stress scores; for Anxiety scores, the correlation was marginally significant ($P = 0.08$).



There were no other significant associations. These findings are in contrast to earlier research which reported that changes in self-compassion negatively predicted changes in psychological distress^(58,59) and eating pathology⁽⁶⁰⁾. This inconsistency may be explained by the fact that the current self-compassion intervention was in the form of unsupervised self-help that did not result in as large an effect for self-compassion as the other studies have. The small sample size also could be another possible explanation for this inconsistency.

This study had a good retention rate, with 78% of participants who gave consent completing the study. This retention rate is within the acceptable range of retention for intervention studies (i.e. about 20% attrition for short-term studies)⁽⁶¹⁾. The ethnic composition of the study sample was also heterogeneous indicating that the acceptability of the current study could be generalisable to more diverse ethnic groups of people. In addition, qualitative exploration also showed that the study is acceptable and promising. Most of the participants found the goal-setting and self-monitoring to be essential aspects of the current study for changing dietary behaviour. Respondents also reflected on the importance of having attainable and short-term goals. Recent studies that examined participant perceptions or expectations from web-based health programmes also reported similar findings^(29,62–65).

Participants' perceptions regarding the benefits of self-compassion for dietary change support the self-compassion model of health behaviours, which theorises that self-compassion might be beneficial in regulating undesirable thoughts and emotions^(23,25) that are associated with emotional eating and goal abandonment⁽⁶⁶⁾. However, similar to previous qualitative studies in clinical and non-clinical samples, the findings indicated that understanding the concept of self-compassion or developing a self-compassionate attitude might be difficult, especially when participants have negative thoughts, or they are self-critical^(67,68).

In addition to the findings related to the conceptual and theoretical underpinnings of the study, qualitative data also showed the importance of simplicity, ease of access and efficiency of online tools for dietary behaviour change. Time efficiency^(63,69), ease of use and accessibility of the online tools^(63,70,71) have also been discussed by participants in other studies that asked for participants' perceptions of using mobile or online health applications for dietary change. The importance of having novel information that helps participants with dietary change in nutrition programmes was another finding which is consistent with the findings of studies that sought participants' experience about dietary habits programmes^(29,62,63,70).

Finally, the last feature that participants considered essential to the study's acceptability was for it to be engaging. Some participants suggested that the study could have been more engaging and had there been more online and in-person support, feedback and reminders. Participants in

other studies also spoke about the value of feedback and reminders to increase engagement in technology-based dietary interventions^(29,63).

Overall, the evidence obtained from this study suggests that nutritionists and healthcare providers could include self-compassion in their counselling for promoting healthy dietary habits as a means of assisting people in dealing with negative emotions related to eating behaviour modification. Self-compassion mindset might have the potential to be beneficial in a broader scope such as promoting healthy eating in different settings such as schools. Schools could be an ideal setting because adolescence and childhood are important periods for growth and cognitive changes⁽⁷²⁾ and might facilitate the development of both healthy eating behaviours⁽⁷³⁾ and a self-compassion mindset⁽⁵⁵⁾. Self-compassion could also be beneficial in addressing other public health issues, such as changing a sedentary lifestyle⁽²⁴⁾. Future studies should explore the application of self-compassion interventions in these contexts to broaden the applicability of the self-compassion concept.

Several limitations to this study need to be acknowledged. First, this study was a short-term, one-armed pilot. Furthermore, because this was a pilot study with a small sample size, the alpha level of significance was not corrected for the multiple comparisons on the effects of the intervention. Therefore, multiple comparisons from the same set of data might have increased the likelihood of type I error (i.e. false rejection of null hypotheses). Thus, quantitative results must be interpreted with caution. In addition, the majority of participants were familiar with concepts similar to self-compassion, such as mindfulness, that could also assist with building self-compassion whereby having prior experience in similar activities is advantageous⁽⁴⁶⁾. Therefore, the current study findings could not be generalised to the general population. Finally, the qualitative interviews were conducted by the same person who provided support to participants throughout the intervention. While this connection might have contributed to a good rapport and allowed participants to feel more comfortable talking with a familiar person, it might also have influenced participants to respond in a positive way to questions about the intervention.

Conclusions

This pilot study provides preliminary but promising findings on the feasibility of the current behavioural intervention. Despite having a small sample size and a short intervention period, the intervention improved some aspects of dietary and eating behaviours. However, changes in self-compassion over the 4 weeks did not significantly predict study outcomes at Week Four, except for the level of stress. The efficacy of the intervention and the mechanism of change in the study

outcomes need to be examined in future research with a larger sample, a longer intervention period and a control arm.

The current study also indicates that the combined online and face-to-face behavioural intervention that aimed to improve dietary habits was feasible and acceptable. Overall, participants in the current study found self-compassion, goal-setting and self-monitoring are essential for promoting dietary change. However, some factors such as efficiency, simplicity and the interactivity of the programme should be taken into consideration for future studies. Furthermore, self-compassion researchers might want to consider the challenge of cultivating a self-compassion mindset and explore different methods to facilitate the adoption of a self-compassionate mindset.

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Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980020000658>

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