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Investigating the effect of an online self-compassion for weight management (SC4WM) intervention on self-compassion, eating behaviour, physical activity and body weight in adults seeking to manage weight: protocol for a randomised controlled trial

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ABSTRACT

Introduction Individual weight management, defined as engaging in behaviours to maintain or lose weight, can improve health and well-being. However, numerous factors influence weight management outcomes, such as genetics, biology, stress, the social and physical environment. Consequently, weight management can be hard. Self-compassion, described as treating oneself kindly in times of failure or distress, has shown promise in improving weight management outcomes. The objectives of this study are twofold: (1) to examine the efficacy of an online self-compassion for weight management (SC4WM) intervention coupled with an online commercial weight management programme (WW Weight Watchers reimagined) with increasing self-compassion and improving weight management outcomes (eating behaviour, physical activity and body weight) in comparison with the WW programme only and (2) to explore whether improvements in weight management outcomes are moderated by eating restraint, weight self-stigma, perceived stress and psychological coping.

Methods and analysis To achieve these objectives, 240 participants seeking to manage their weight were randomised to either an online behavioural commercial weight management programme (WW) or the online WW +SC4 WM intervention. Validated measures of self-compassion, stress, weight self-stigma, eating restraint, psychological coping and weight management outcomes were administered online at baseline, 4 weeks and at a 12-week follow-up.

Ethics and dissemination Ethics has been granted by the University of Auckland Health Research Ethics committee. Results will be communicated in peer-review journals, conferences and a doctoral thesis. If effective in increasing self-compassion and improving weight management outcomes, the intervention could be made more widely available to supplement behavioural weight management programmes.

Strengths and limitations of this study

- This is the first study to test a 100% online, self-compassion for weight management intervention (SC4WM) designed to supplement existing weight management programmes.
- The study uses a randomised controlled trial design with the online version of a commercial behavioural weight management programme as an active control (WW Weight Watchers reimagined).
- This study is limited due to the non-blinding of the first author and self-reporting of outcomes.
- This study investigates a supplemental SC4WM intervention that could increase the efficacy of online behavioural weight management programme by improving self-compassion and weight management outcomes during the global pandemic and beyond.

Trial registration number ACTRN12621000580875; Pre-results.

INTRODUCTION

Successful weight management, defined as losing or maintaining body weight, can improve health outcomes.[1] However, several competing factors influence weight management behaviours (eg, healthy eating and physical activity), including body physiology, biology, psychological well-being, stress management, socioeconomic status and the physical and social environment.[2 3] Furthermore, ongoing public health restrictions to control the spread of COVID-19 and concerns about exposure mean access to in-person support may be limited and engaging in healthy behaviours can be even

more challenging (eg, accessibility to healthy food, more limited opportunity for exercise and financial stress).[4 5] Self-compassion, the ability or tendency to respond to oneself with care and kindness in times of suffering and distress,[6] has shown promise with improving weight management outcomes (healthier eating and reduced or maintained body weight).[7] However, few studies have investigated whether the changes thought to accompanyg the development of self-compassion can be successfully taught and practised 100% online as a supplement to an existing online weight management programme.

Healthy eating and physical activity are recommended for everyone to improve health outcomes and manage weight.[8] For those living with weight-related chronic disease, such as obesity, even a small amount of weight loss (5%–10% of body weight) can have positive physiological effects. For example, modest weight loss can lower blood lipids and improve glycaemic control, resulting in reduced risk for heart disease and diabetes complications.[9] Appropriate weight management can also support psychological outcomes, including improved emotional well-being, self-esteem, depressive symptoms, body image and health-related quality of life.[10] Behavioural-based weight management interventions have shown some effectiveness with weight loss and maintenance.[11 12] However, weight management history (eg, previous unsuccessful weight loss attempts and weight cycling) and early weight loss results (eg, in the first 4 weeks) can influence an individual's weight management success.[13 14] Weight regain is common due to physiological changes and when individuals cannot sustain the behavioural changes needed to maintain weight loss, such as healthy eating, increased physical activity and continued self-monitoring.[15 16]

Engaging in weight management can be challenging. Body weight is influenced by several factors (eg, biology, stress and environments).[2] However, many people believe their behaviours *cause* their weight.[17] Therefore, the inevitable ups and downs of body weight may result in feelings of distress, shame, failure and blame.[18–20] These feelings are exacerbated by weight stigma, which is the negative societal prejudice and stereotypes experienced by people with higher weights.[21 22] Facing weight stigma is common for adults who are engaging in weight management.[23] When internalised, weight self-stigma can create additional stress, ultimately resulting in less healthy eating and reduced physical activity.[22 24]

Furthermore, weight fluctuations are associated with stress, regardless of health behaviour.[25] The stress response activates the sympathetic nervous system, which can cause a release in hormones (eg, cortisol) and reduce executive function (eg, less mindful regulation of food intake).[26 27] Stress can trigger binge eating or the consumption of higher fat and higher sugar comfort foods, which may lead to weight gain over time.[28 29] Eating restraint, defined as engaging in a cognitive effort to reduce caloric intake, can support weight management outcomes.[30 31] However, those who are more restricted with their eating behaviours may paradoxically be more prone to overeating in stressful times.[32]

Self-compassion has shown the potential to moderate many challenges that plague weight management, including moderating the effects of stress.[33 34] Self-compassionate people treat themselves with kindness when experiencing stressful situations and appear less likely to use avoidance as a coping mechanism.[35] Thus, self-compassion potentially offers a way to cope with stress through the enhanced ability to regulate health-related behaviour such as healthier eating and physical activity.[36–38] In addition, people with greater self-compassion tend to have lower levels of internalised weight stigma[39 40] and improved emotional regulation.[36 41] Consequently, self-compassion could benefit weight management due to its ability to increase an individual's coping and self-management during stressful times.[39 42 43]

Both mindfulness and self-compassion have been explored in the context of weight management (see recent reviews).[7 44–47] Mindfulness is typically operationalised as self-regulation of attention, combined with curiosity, openness and acceptance of thoughts and feelings[48] and is a part of many self-compassion interventions (eg, mindful self-compassion).[6] Relative to a 'pure' mindfulness intervention, however, self-compassion may be more relevant to the challenges of weight management than mindfulness alone.[49 50] Specifically, because self-compassion reflects a way of relating to the self in times of failure and distress, it appears directly relevant to effectively managing the inevitable mistakes (eg, diet lapses),[51] challenges (eg, weight stigma)[52] and stress (eg, physiological and emotional regulation)[36 53 54] inherent to weight management efforts. Self-compassion interventions encourage participants to develop a more self-compassionate way of thinking (eg, through self-compassionate diaries[50] or self-compassion meditations);[55]both self-compassion-specific interventions and self-compassion as part of broader interventions (eg, adding self-compassion to behavioural weight management) increase participant self-compassion in a weight management contexts.[47]

Enhancing self-compassion in the context of weight management is complex.[56] For example, it is not uncommon when first practising self-compassion to feel some discomfort (eg, people may feel they do not *deserve* kindness).[57] Individuals engaging in weight management may be particularly vulnerable to feelings of discomfort due to internalised weight bias (negative attitudes associated with higher larger body size).[58] However, emerging research suggests that greater self-compassion can buffer the effects of weight self-stigma for individuals living with overweight or obesity.[52] Similarly, individuals may worry that *self-kindness* will undermine their motivation for losing weight.[57] Self-kindness could easily be interpreted as indulging in a favourite food after a stressful day, as opposed to taking the time to make a healthy meal.[59] Egan and Mantzios[59] qualitatively explored perceptions of self-compassion and kindness in weight management and found that people struggled to relate to the

term 'self-kindness', preferring the concept of *caring for their mind*. Thus, while self-compassion does include an element of self-kindness,[6] it also involves a recognition of experiences as part of common human experiences: '*everyone struggles with weight management at times*'. As well as being mindful of negative thoughts and feelings rather than overidentifying with them: '*I had a diet lapse, but that does not mean I am bad*'. [6] Viewed in this way, practising self-compassion has the potential to *boost* motivation for self-improvement in face of failures[60] and promote health behaviours.[61]

Although promising, there are still notable gaps in our knowledge of self-compassion in weight management contexts. First, most studies include self-compassion as part of broader interventions (eg, nutrition goal setting, yoga). Second, since this is an emerging area of research, most studies lack robust comparison conditions such as behavioural weight management interventions. Consequently, it is hard to determine if it is self-compassion per se that is contributing to positive outcomes rather than some non-specific element of participation.[47]

Also unclear is how to best deliver such interventions. In-person weight management interventions are often associated with high attrition rates[62] and unpredictable public health measures to control the spread of COVID-19 may increase attrition and compound the challenges to engaging in health behaviours.[4 63] Online interventions using cognitive–behavioural therapies have shown good effect sizes with improving health behaviours (g̃=0.43, 95% CI 0.27 to 0.59).[64] Early evidence suggests that online weight management interventions show promise with supporting weight management outcomes, including online compassion-based interventions.[65–68] To this point, however, research has not contrasted the efficacy of an online self-compassion intervention tailored to weight management outcomes with a 100% online version of a behavioural weight management programme, which could provide increased scalability.[47] Therefore, the objective of this study is to assess whether an online, mobile-friendly self-compassion for weight management (SC4WM) intervention can increase participant self-compassion and improve weight management outcomes for those engaging in an online behavioural weight management programme (WW).

METHODS: PARTICIPANTS, INTERVENTIONS AND OUTCOMES

Following Consolidated Standards of Reporting Trials (CONSORT)[69] and Standard Protocol Items: Recommendations for Interventional Trials[70] guidelines, a two-armed, randomised controlled study comparing the addition of the SC4WM intervention to a widely available behavioural weight management programme (WW) will be conducted. The proposed study will investigate if the online SC4WM intervention can increase self-reported self-compassion and improve weight management outcomes, defined as eating behaviour, physical activity levels and body weight, for those in the first 4 weeks of a widely available online commercial programme (WW). In addition, this study will examine potential moderating variables, including perceived stress, weight self-stigma, eating restraint and psychological coping. This study will be delivered 100% online and undertaken over 4 weeks, with a subsequent 12-week follow-up. The randomised controlled trial (RCT) protocol has been prospectively registered with the Australian New Zealand Clinical Trials Registry ACTRN12621000580875 (https://www.anzctr.org.au/ACTRN12621000580875.aspx). Protocol amendments will be communicated through the trial registry.

Participants

Participants were New Zealand residents who were seeking to manage their weight. Inclusion criteria for participation included: (1) being an adult (≥18 years of age), (2) New Zealand resident and (3) seeking to manage their weight. Exclusion criteria for participation included: (1) being a current WW member, (2) pregnant or expecting to become pregnant in the next 3 months, (3) diagnosed with an active eating disorder (eg, bulimia nervosa or anorexia nervosa) and (4) being prescribed medication for weight management or newly starting a medication that may cause weight gain. All participants were given an access code to a widely available behavioural commercial weight management programme (WW). Participants were randomised into either the WW programme only (active control group) or the WW plus the supplemental SC4WM intervention. Recruitment commenced on 17 June 2021 and finished on 11 October 2021. Participants were able to withdraw at any time during the study. Data analysis is expected to begin in January 2022.

Participant timeline

Participants were recruited via posters, websites (eg, university research site) and national (New Zealand) social media posts and marketing (eg, via community board posts on Facebook and Twitter) with a link to a secure website (REDCap).[71 72] Potential participants clicked a link to the study eligibility questionnaire. If eligible to participate (eg, not a current WW member and ≥18 years of age), participants read and downloaded the Participant Information Sheet. After providing informed consent, participants completed the baseline questionnaires and were randomised using a computer-generated number sequence into either the online WW programme plus the SC4WM intervention or the online WW programme only (active control group). Please see figure 1 for the CONSORT diagram demonstrating the flow of participants through the study.

The intervention group filled out the baseline questionnaires and received an access code and instructions to download the WW app and a separate link to the SC4WM website with a guest code. During the first 4-week period, participants in the intervention group received one automated email at the beginning of each week (via REDCap), reminding them to complete the SC4WM online modules. The control group received an access

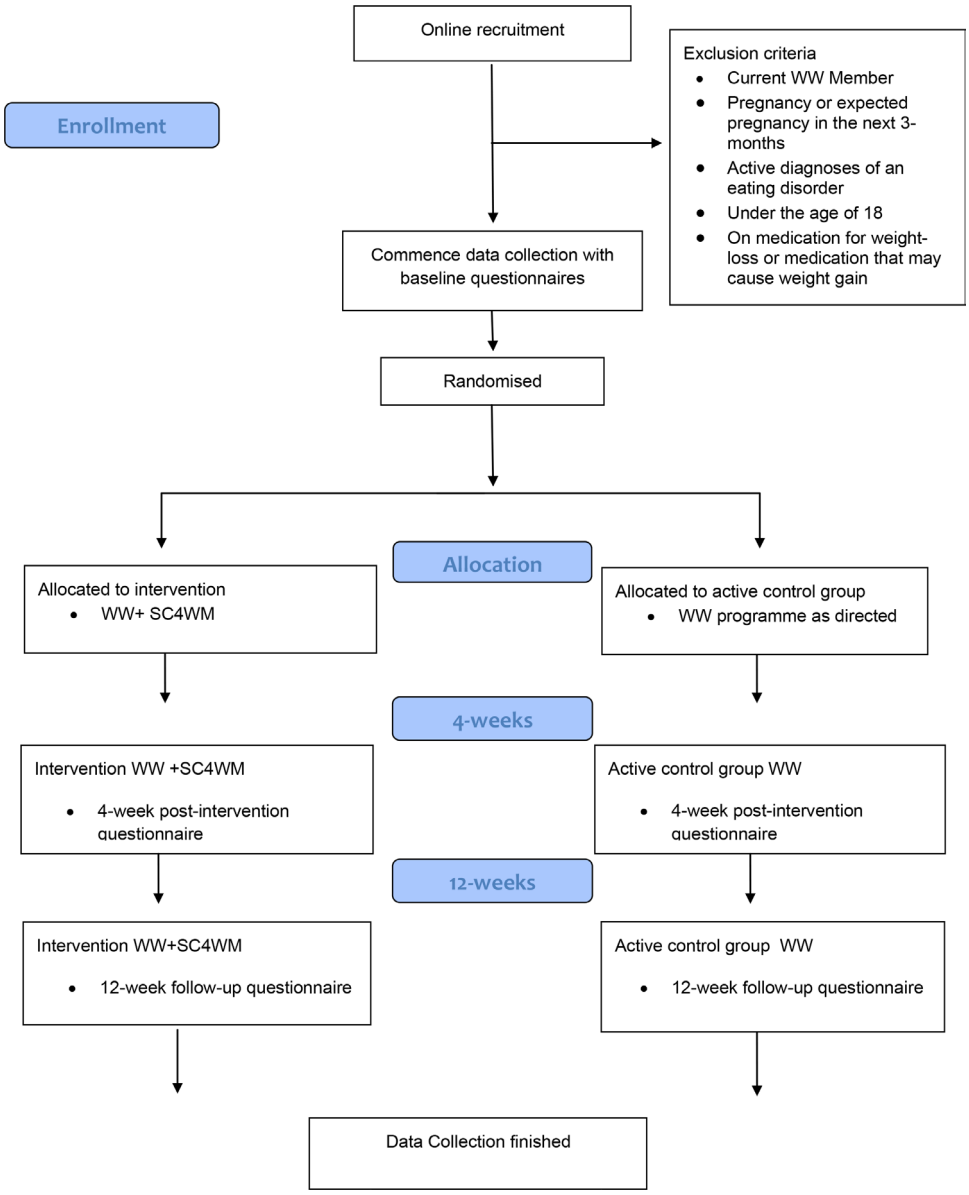

Figure 1 CONSORT diagram. The flow of participants through the trial. CONSORT, Consolidated Standards of Reporting Trials; SC4WM, self-compassion for weight management.

code and instructions to download the WW app. They were instructed to use the WW programme as directed and expect subsequent emails at 4 weeks and 12 weeks with follow-up questionnaires.

REDCap sent automated emails to both groups at 4 weeks from baseline (post-intervention) and 12 weeks from baseline (follow-up). After completing the final follow-up questionnaire, both groups were provided with the opportunity to enter a draw for an iPad (see figure 1 CONSORT diagram).

Interventions

Active control group

Participants randomised to the control group partook in the online WW *Weight Watchers reimagined* program (2021). The WW programme is a commercial behavioural weight management programme that aims to support its members with healthier habits.[73] The WW programme uses the Smartpoints food tracking system, which encourages members to make healthier food choices by assigning point values to foods requiring moderation (eg, higher fat and higher sugar foods). In addition, the WW programme promotes exercising, cultivating a positive mindset and tracking body weight with the objective of weight management. The most recent WW programme is the myWW+ programme, which includes a personalised meal plan, tracking and peer-support online. The myWW+ programme provides access to the myWW+ app that offers easy-to-use food and activity tracking, 24/7 live coaching and a supportive network of other WW members through a WW online forum.[73] The myWW+ programme may contain elements of self-compassion within its content. However, the SC4WM intervention

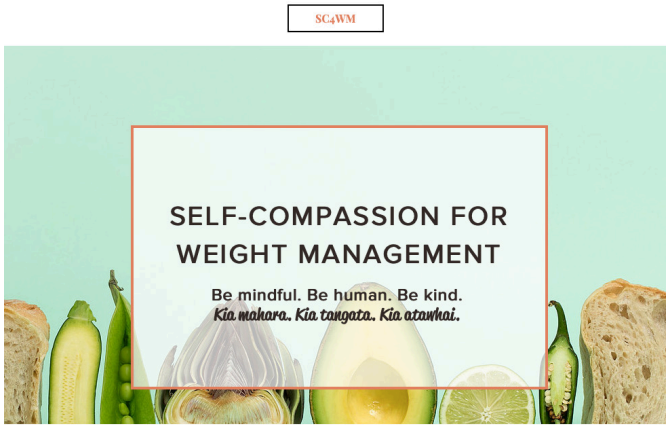

Figure 2 SC4WM landing page. SC4WM, self-compassion for weight management.

described further was designed to have a higher, more specific and more concentrated dose of self-compassion.

SC4WM intervention

The SC4WM intervention was designed for the Aotearoa New Zealand population and included consultation with Māori, Indigenous peoples of Aotearoa New Zealand. The SC4WM intervention was delivered online through a mobile-friendly website separate from the WW programme. Participants in the intervention group were also asked to follow the digital myWW+ programme as directed by WW. Participants required data or internet connectivity and an access code to log into the WW and SC4WM website content. The SC4WM intervention incorporated simple, evidence-based techniques (eg, construal journaling,[50] letter writing and reflections[55]) to deliver a self-compassion intervention tailored to weight management outcomes (ie, eating behaviour, physical activity and weight monitoring). The SC4WM intervention landing page (website) provided an initial definition and background on self-compassion and quick access to each module (see figure 2 *SC4WM landing page*). The SC4WM intervention was based on taking the meaning of compassion inward, being mindful of personal suffering or distress and applying the principles of mindfulness, self-kindness and shared humanity.[74] Given that previous research has found that people may feel uneasy with the term self-compassion,[59] care was taken to frame self-compassion as a whole construct, including increasing mindfulness (as opposed to overidentification), common humanity (tempering isolation) and self-kindness as a way to care for the body and mind (attenuating self-judgement).[6 59] The SC4WM intervention has four modules designed to specifically target participants' relationship with each weight management outcome, including self-compassion for eating behaviour, self-compassion for physical activity and self-compassion for body weight. Each module includes an adapted construal journal,[50] meditation and reflection activity[55] incorporating the principles of self-compassion to eating behaviour, physical activity behaviour and body weight. It was recommended that participants complete one module in sequence per week. The final module unifies all the concepts and encourages the participant to make a plan to include self-compassion in the future. To reduce any discomfort, participants were urged to start slow (eg, not to start with their biggest struggle right away) (see table 1).

Outcome measures

Completion of the questionnaires at baseline, postintervention (4 weeks) and follow-up (12 weeks) took participants approximately 25 min. REDCap collected demographic data via self-report (eg, sex, age, height, ethnicity, income, pre-existing weight-related chronic diseases and weight loss history, for example, number of previous weight loss attempts). Validated questionnaires were used to assess self-compassion, weight management outcomes and potential moderators at baseline, 4 weeks and 12 weeks after baseline. Since self-compassion is most useful when faced with a struggle or failure, participants reported on the degree of their struggle with weight loss or maintenance at baseline, 4-week and the 12-week follow-up. Adherence to both the WW programme and the SC4WM intervention was self-reported at 4-week and

Table 1 SC4WM modules

Module	Objective
Module 1: eat.	Cultivate a more self-compassionate attitude towards eating behaviours. Includes journaling, meditation and reflection activities designed to create mindfulness of eating behaviour, a feeling of shared humanity and self-kindness to the challenges of eating well.
Module 2: move.	Develop a more self-compassionate attitude towards physical activity behaviours. Includes journaling, meditation and reflection activities designed to create a mindful awareness of physical activity, a feeling of connection and self-kindness to the challenges of engaging in physical activity.
Module 3: weigh.	Foster a more self-compassionate attitude towards body weight. Includes journaling, meditation and reflection activities designed to create a mindful reaction to body weight, an awareness that they are not alone in their weight struggles, and strategies to bring self-kindness to the scale.
Module 4: unify.	Cultivate a more self-compassionate attitude towards weight management as a whole. Includes the selection of activites for the participant to continue with after the intervention.

SC4WM, self-compassion for weight management.

the 12-week follow-up. This study used validated measures that are referenced and described further below.

Primary outcome

To confirm that the intervention increased participant self-compassion compared with the WW programme, we will use the Self-Compassion Scale (SCS[75]) at baseline, and at 4-week and 12-week follow-up. The SCS is a well-validated scale with high internal validity, Cronbach's *a* between 0.76 and 0.94 in previous studies.[76] The SCS indexes how participants typically respond towards themselves in times of failure or distress.[6 77] Using a scale of 1=almost never to 5=almost always, participants are asked questions related to six subscales: self-kindness: '*I am loving towards myself when I am feeling emotional pain*'; self-judgement: '*I am disapproving of my own flaws and inadequacies*'; common humanity: '*When things are going badly for me, I see the difficulties as part of life that everyone goes through*'; isolation: '*When I think about my inadequacies, it tends to make me feel more separate and cut off from the world*'; mindfulness: '*When something upsets me I try to keep my emotions in balance*'; and overidentification: '*When I am feeling down I tend to obsess and fixate on everything that's wrong*'. The scale can be analysed both in terms of specific subscales (ie, self-kindness, mindfulness, common humanity, isolation, overidentification and self-judgement) as well as generating a total SCS score.[75] The SCS total score at 4 weeks (postintervention) will be used as the primary outcome for this study. The SCS subscales will be analysed to provide a better understanding how self-compassion may support weight management outcomes (eg, increased mindfulness, common humanity or reduced self-judgement, overidentification or isolation).[77]

Secondary outcomes

The Weight Control Strategies Scale (WCSS) will be used to measure changes in participants' eating behaviour and physical activity behaviour.[78] The WCSS has subscales to measure weight control strategies commonly used in weight management programmes, including dietary choices, physical activity and self-monitoring. The WCSS is a well-validated scale with a Cronbach's *a* >0.79 and as high as 0.94 in a WW population.[30] The WCSS has also been modified to fit the WW programme specifically (eg, low-calorie foods have been changed to low point foods).[30] The WCSS asks participants on a scale of 0=never and 4=always to describe the strategies and behaviours they engage in when trying to lose or maintain weight loss over the last month. For example, '*I had several servings of fruits and/or vegetables each day*' and '*I engaged in a moderate-intensity exercise like brisk walking or something similar to brisk walking for at least 30 minutes a day*'. Scale items are totalled and divided by the number of items (total mean score). Separate subscale scores are achieved by summing all items in a subscale and dividing by the number of subscale items (total mean subscale score).[78]

The impact of the SC4WM intervention on body weight outcomes will be determined by self-reported body weight and height to calculate body mass index (kg/m^2). Self-reported body weight has been seen to strongly correlate with objectively measured body weight.[30 79]

The overall objective of weight management is to support both physical and psychological health.[8] Therefore, potential improvements in emotional well-being will be assessed using the WHO-5 Well-being Scale.[80] The WHO-5 is a brief well-validated scale with good internal reliability (*a*=0.84). Participants will be asked how they have been feeling over the last 2 weeks, with a higher number indicating better emotional well-being. For example, '*I have felt cheerful and in good spirits*' is rated on a scale of 0–5 with 0 meaning 'at no time' and 5 'all the time'. A total score is calculated by summing all items.

Potential moderators

To assess participant eating restraint, the Revised Rigid Restraint Scale (RRRS)[81] will be used. The RRRS is a validated 12-item scale designed to assess participants' thoughts, feelings and behaviours related to restrictive and guilty eating behaviours. The RRRS has good internal reliability with a Cronbach's *a* of >0.80 in previous studies.[81] Participants are asked to rate how often statements describe their thoughts, feelings or behaviour regarding eating using on a five-item scale, 1 being ('never') to 5 ('always'). For example, '*There are certain unhealthy foods that I try not to eat in any quantity*'. All items are summed to assess dispositional eating restraint. A higher RRRS total score is indicative of higher eating restraint.[81]

The Weight Self-Stigma Questionnaire (WSSQ)[82] is included in this study to measure the extent to which individuals have internalised weight self-stigma. The WSSQ is a 12-item scale used to measure weight self-stigma on a scale of 1 (completely disagree) to 5 (completely agree). For example, '*I don't have enough self-control to maintain a healthy weight*'. All items are summed to calculate a total score, or two subscales, self-devaluation and fear of enacted stigma. The WSSQ was designed to help evaluate if interventions reduce weight self-stigma.[82] The WSSQ is correlated with the Weight Bias Internalisation Scale and predicts quality of life and self-esteem.[83] The WSSQ has good internal reliability with a Cronbach's *a* of 0.81 in a similar study.[84]

The Perceived Stress Scale (PSS)[85] will be used to measure stress over the last month. The PSS is a 14-item scale that asks participants to rate feelings and thoughts over the last month related to coping with change, ability to handle personal problems and control irritations on a scale of 0 ('never') to 4 ('very often'). For example, '*In the last month, how often have you felt nervous or "stressed"*?'. The PSS total score is obtained by summing all 14 items. A higher score indicates higher perceived stress in the past month. The PSS is a well-validated scale with high internal reliability Cronbach's alpha of 0.88 in a previous study.[85]

To assess psychological coping, the 28-item brief COPE[86] will be used. The brief COPE is the most frequently used coping scale; thus, it is a well-validated measure with a median Cronbach's alpha of 0.68 and a range of

0.55–0.92.[87] The brief COPE has 14 subscales that can be used to evaluate the frequency with which coping strategies are used (eg, self-distraction, active coping, denial, emotional support and behavioural disengagement). Participants use a scale of 1=I have not been doing this at all to 4=I have been doing this a lot. Each subscale item is added together. A subscale of the WCSS will also be used to asses psychological coping. Based on a scale of 0=never and 4 being always, participants will be asked to describe how often they engaged in psychological coping strategies in the past month. For example, '*If I regained weight, I thought about my past successes and reminded myself that I could get back on track'*.

Adherence

Participants in both groups were asked how often they used the WW app or digital online programme '*How many days did you use the WW program?*' at 4 weeks and 12 weeks from baseline. Participants in the intervention group were asked how many modules of the SC4WM intervention they completed and how many days they used the SC4WM activities postintervention (4 weeks) and at follow-up (12 weeks from baseline).

METHODS: DATA COLLECTION, MANAGEMENT AND ANALYSIS

All participant data (eg, demographic data and weight management outcomes) was collected using validated questionnaires through REDCap. No data were collected through or by WW. Participant names only appeared on the online consent form; the remaining data were automatically coded with an alphanumeric participant identification number using REDCap. Potentially identifying information will be stored securely and separately from questionnaire data. Only the research team (JB-P, NC, RR, AS and AC) will have access to participant data.

Hypotheses

It is expected that the SC4WM intervention group will report greater increases in self-compassion, improved eating behaviours (eg, increased fruit and vegetable consumption), physical activity (eg, increased physical activity), body weight outcomes (eg, weight loss or less weight regained) and emotional well-being at the 4-week follow-up compared with the control group and that these improvements will persist at the 12-week follow-up. It is expected greater perceived stress (PSS), eating restraint (RRRS) and weight self-stigma (WSSQ), and decreased psychological coping (WCSS subscale) at baseline will moderate the relationship between the SC4WM intervention and changes in self-compassion and weight management outcomes at 4 and 12 weeks.

Sample size

In order to calculate the required sample size to examine group differences in self-compassion, we used an effect size from a compassion-based intervention study in a population struggling with weight, which found a small to medium effect size for self-compassion (Cohen's d=0.38).[88] Using GPower,[89] it was calculated that to detect a small to medium change in self-compassion, using an independent samples t-test (with an alpha of 0.05 and power of 0.90), 240 participants would be required (120 per treatment arm).

Data analysis plan

Using SPSS software version 27, data will be assessed for violations of the parametric assumptions. Generalised linear mixed models will be used to explore within and between-group differences in changes in the primary (SCS total) and secondary outcomes (eating behaviour, physical activity and body weight) at the 4-week follow-up, with random intercepts for participant to account for repeated measures. Primary and secondary outcomes will also be evaluated at a 12-week follow-up. Possible moderators of the relationship between the SC4WM intervention and changes in self-compassion (eg, greater weight self-stigma WSSQ at baseline) and weight management outcomes at 4 and 12 weeks will be explored by adding an interaction term (eg, WSSQ*group*time) to the linear mixed models.

Baseline differences between completers and non-completers in the intervention and control groups will be evaluated using independent sample t-tests. The analyses will be based on both intention-to-treat and complier average causal effect (CACE) analytic methods.[90] CACE is preferred to per-protocol for this study as it recognises that different individuals may have different intervention needs (eg., differing intervention doses that may be effective for each individual participant).[90] CACE modelling considers intervention outcomes (μi) and proportion of the intervention participants completed (ϖi) in four cells defined by treatment use. The mean at each time point for the intervention and control group will be the average of $\mu 1 = \varpi c \mu c 1 + \varpi n \mu n 2 + \varpi a \mu a 3 + \varpi d \mu d 4$.[90] For example, mean self-compassion (SCS total) at each time point (eg, 4 weeks from baseline and 12 weeks from baseline) for participants in the SC4WM intervention will be determined by grouping participants based on usage of the SC4WM intervention (eg, 1=completers, 2=half-completers, 3=minimal completers and 4=non-completers based on reported completion of models of the SC4WM intervention). The self-compassion means for those in the control group will be determined by grouping participants based on usage of the WW programme (eg, 1=completers, 2=half-completers, 3=minimal completers and 4=non-completers based on reported usage of the WW programme). Therefore, using CACE, the mean self-compassion score at each time point (eg, post at 4 weeks from baseline and follow-up, 12 weeks from baseline) for the intervention and control group will be the average of $\mu 1 = \varpi c \mu c 1 + \varpi n \mu n 2 + \varpi a \mu a 3 + \varpi d \mu d 4$.[90]

Participant open-ended comments on their experience at 4 and 12 weeks will be analysed using directed content analysis.[91]

DISCUSSION

This study is designed to investigate whether an SC4WM intervention can improve self-compassion and weight management outcomes for those engaging in a digital, widely available behavioural commercial weight management programme and begin the process of identifying potential moderators of self-compassion efficacy. The findings will be used to refine the SC4WM website and disseminate the SC4WM intervention to a broader audience.

Limitations to this study are expected to be similar to other online weight management interventions and may include low adherence to the intervention and high attrition rates.[65] We have tried to minimise attrition and improve adherence by keeping the intervention brief (4 weeks), engaging and easy to access.[64 65] Maintenance of weight management outcomes (eg, weight loss) is a well-established challenge, even with self-compassion interventions.[47 49] Integrating continued practice of self-compassion for weight management was part of the last module of the SC4WM intervention, with a follow-up at 12 weeks to determine if between group differences in self-compassion and weight management outcomes are maintained. Future research should test the effectiveness of self-compassion based interventions for relapse prevention and weight management in the longer term (6 months+). Finally, other possible limitations are the non-blinding of the first author and participants and relying on self-reported outcomes. Future research avenues include incorporating more objective measures of the intervention usage (eg, Google Analytics), body weight and physiological effects (eg, cortisol and heart rate variability) obtained by physicians or health professionals.

There is an urgent need to increase the scalability of weight management interventions as well as develop flexibility in delivery during the global pandemic and beyond. Self-compassion shows promise in improving weight management outcomes, including healthier eating, physical activity and body weight and could be a useful supplement to behavioural weight management interventions such as WW. However, more research is required to investigate if online self-compassion interventions tailored to weight management outcomes can increase self-reported self-compassion and improve outcomes, especially during the first 4 weeks of engaging in weight management.

It is acknowledged that this intervention uses a fee-based commercial weight management programme that may not be accessible to all. However, testing a widely available commercial weight management programme can support future public health initiatives and enhance current knowledge. For example, an RCT design using a robust behavioural comparator fills a gap in the literature, specifically testing whether self-compassion can enhance weight management outcomes over and above current weight management programmes. Furthermore, if found to be effective, the scalable online SC4WM programme could be made more broadly available to augment weight management programmes in the community or to increase the efficacy of current public health initiatives targeting weight outcomes.

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