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The Effectiveness of Including Support People in a Cognitive-Behavioural Weight Loss Maintenance Program for Obese Adults: Study Rationale and Design

Elizabeth Rieger¹, Janet Treasure², Jessica Swinbourne³, Brooke Adam³, Clare Manns³, and Ian Caterson³

¹Research School of Psychology, Australian National University, Canberra ACT, Australia

²Department of Psychiatry, Kings College London, United Kingdom

³Boden Institute of Obesity, Nutrition, Exercise and Eating Disorders, University of Sydney, Sydney NSW, Australia

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Author for correspondence: Associate Professor Elizabeth Rieger, Research School of Psychology, Australian National University, Canberra ACT 0200, Australia. E-mail: Elizabeth.Rieger@anu.edu.au

What is already known about the subject

- Weight loss maintenance following participation in a behavioural weight loss program remains a critical challenge in the obesity field.
- Social support predicts engagement in weight control behaviours yet interventions designed to enhance social support have had only limited success in improving weight loss maintenance in obese adults.

What this study adds

- The rationale for a novel approach to enhance the effectiveness of social support for weight loss maintenance is provided. Specifically, there is theoretical and empirical support for training support people in motivational interviewing in order to facilitate the development of self-motivation for weight control in obese adults. Self-motivation is in turn associated with long-term behaviour change, including sustained engagement in weight control behaviours.
- The design and methodology of a study for evaluating the effectiveness of training support people in motivational interviewing to assist obese adults with weight loss maintenance is described.

Abstract

Objective: The well-documented finding that obese adults have a high likelihood of weight regain following participation in behavioural weight loss programs highlights the importance of developing more effective approaches for weight loss maintenance. One promising approach is to improve the quality of social support for effective weight control available to an obese individual by including support people in behavioural weight loss programs. This paper describes the rationale and design of a randomised controlled trial that evaluates the effectiveness of training support people to assist obese adults in their weight management. **Design:** The study entails a two-arm randomised controlled trial in which obese participants take part in a one-year (26-session) cognitive-behaviour therapy group weight management program including motivational interviewing strategies (CBT-MI). In one arm, participants receive CBT-MI alone, while in the second arm (CBT-MI-SP) participants also have a support person who attends 10 group sessions designed to teach effective skills for supporting an individual in healthy weight control. Assessments of anthropometric, medical, behavioural, psychological, and social functioning take place at pre-treatment, post-treatment, and a one-year follow-up. **Conclusions:** By helping obese participants to increase and sustain their motivation and skills for weight control, the CBT-MI-SP approach of the current study has the potential to effectively help patients to achieve sustained weight loss while minimising the patient's need for ongoing, intensive weight control treatment with its attendant costs. **Trial**

Registration: anzctr.org.au Trial ID: ACTRN12611000509965

Introduction

It is well documented that a sustained, modest (approximately 5-10% of body weight) amount of weight loss in obese individuals is beneficial in reducing the health risk of associated comorbidities (1-3). Unfortunately, it is clear that for many obese individuals, healthy weight control is an extremely difficult task, with a high likelihood of weight regain following a period of weight loss from participation in a behavioural weight loss program. While short-term weight loss and treatment efficacy has significantly improved over recent decades (4), attaining long-term weight loss maintenance remains unachievable for the majority of obese patients after participating in behavioural weight loss programs. Specifically, it is estimated that at the 4-5 year follow-up, fewer than 25% of patients maintain the weight loss they achieved following intervention (5).

Interventions designed to enhance weight loss maintenance (e.g., by including relapse prevention training) show disappointing long-term outcome data, with treatment cessation inevitably followed by weight re-gain (6-13). While there is some evidence that extending the duration and intensiveness of treatment (e.g., weekly sessions for four years) can achieve better long-term maintenance of weight loss (14,15), this solution is largely unrealistic given the substantial demand this type of intervention would place on (already burdened) healthcare systems. The poor outcome data pertaining to weight loss maintenance from behavioural weight loss programs have even led some to suggest that psychosocial research shift from a treatment to a prevention focus (13). Therefore, a pressing research question is to determine whether a behavioural weight loss program that supports long-term weight control can be developed, whilst still being a realistic and cost-effective solution translatable to existing healthcare systems.

One approach to weight loss maintenance is targeting support people (i.e., members of the obese patient's social support network such as family members and friends) so as to improve the quality of social support available to the obese individual for long-term weight control. In effect, such an approach capitalises on the effectiveness of ongoing support for weight loss maintenance (14,15), without necessitating the involvement of formal healthcare systems. While this approach has been under-investigated in the obesity context, the inclusion of support people has been found to be effective in the treatment of cognate problems (such as alcohol dependence) (16). Suggesting the utility of such an approach in obesity, there is some evidence to suggest that social support is an important aid for weight maintenance (17-20) and it has been consistently shown that social support predicts successful engagement in weight control behaviours (21,22). Furthermore, there is evidence to suggest that, for obese patients in a behavioural weight loss program, adjunctive support provided by peers achieves weight loss outcomes comparable to that provided by professionals (23). Unfortunately, the inclusion of support people has only been shown to increase the weight loss maintenance of obese patients if the support people are themselves successful in losing weight (24). This strategy is of limited utility since only a minority (28%) of obese patients in this study had support people who were successful at weight loss (24) and not all available support people will be in need of weight loss treatment themselves. Thus innovative methods for equipping support people with the requisite skills to support an individual's weight management are needed.

Interventions designed to teach people skills for supporting obese patients in weight management will arguably be most effective if they are based on theoretically-driven and empirically-supported approaches regarding the social contexts that best

facilitate an individual's engagement in health behaviours. Several prominent approaches concur in highlighting the importance of social contexts that encourage an individual's self-motivation to engage in health behaviours as opposed to the individual experiencing a sense of pressure, coercion or other forms of external regulation to engage in these behaviours. For instance, self-determination theory proposes that behaviours vary in the degree to which they are autonomous (i.e., experienced as chosen and originating from the self such as dietary restriction motivated by valuing good health) or controlled (i.e., experienced as pressured or coerced by interpersonal or intrapsychic forces such as dietary restriction motivated by pressure from one's spouse or to avoid guilt) (25). Fundamental to self-determination theory is the notion that behaviours that entail a deep personal commitment (i.e., those behaviours that are autonomous or self-determined) will elicit greater effort, engagement, and persistence from the individual, thereby resulting in sustained behaviour change. The theory therefore predicts that successful weight loss and maintenance stem from weight control behaviours that are more autonomous (rather than controlled) in their motivation, with research supporting this prediction (26,27). For example, one study found that obese patients who reported higher levels of autonomous motivation for weight control attended significantly more sessions of a weight loss program, lost more weight during the program, and maintained greater weight losses 14 months after program completion (28).

As well as asserting that autonomous (versus controlled) motivation facilitates sustained behaviour change, self-determination theory also specifies the social conditions that foster the development of autonomous motivation. According to the theory, social contexts facilitative of autonomous motivation for engaging in a particular behaviour are those that satisfy the individual's needs for autonomy (i.e.,

the need to feel a sense of choice and volition regarding the behaviour), relatedness (i.e., the need to feel understood and supported by important others regarding the behaviour), and competence (i.e., the need to feel capable of performing the behaviour) (29). In the obesity field, research suggests that these autonomy-supportive contexts do indeed elicit greater autonomous motivation for weight control behaviours, which is in turn associated with greater success at weight management (26,27). In one study, obese patients' perceptions of a higher degree of autonomy support from their health care providers during a weight loss program was associated with more autonomous motivation for staying in the weight loss program and with continuing to adhere to the program guidelines 14 months after completing the program (28). Autonomous motivation in turn predicted more positive outcomes, including sustained weight loss. In a treatment study focused on increasing physical activity among overweight and obese women, an autonomy-supportive treatment environment resulted in significantly higher autonomous motivation for exercise than a health education intervention, as well as higher levels of physical activity and weight loss up to three years after the intervention (30,31).

While attempts to develop interventions derived from self-determination theory have been limited, a much broader literature exists regarding the effectiveness of motivational interviewing in promoting health behaviours, including dietary behaviours and physical activity. There is an argument for an integration between self-determination theory and motivational interviewing, with motivational interviewing providing the clinical application of self-determination theory's fundamental tenets of behaviour change (26,27,32-35). Akin to self-determination theory, motivational interviewing emphasises the importance of self-motivation for changing health behaviours, and that self-motivation is a function of the social

context. As defined by Miller and Rollnick (36), “motivational interviewing is a collaborative conversation style for strengthening a person’s own motivation and commitment to change” (p. 12). The key characteristics of this collaborative conversation style correspond closely to self-determination theory’s emphasis on autonomy, relatedness, and competence as features of the social context that facilitate autonomous motivation. Specifically, motivational interviewing “recognises and supports each person’s irrevocable *autonomy* to choose his or her own way, seeks through *accurate empathy* to understand the other’s perspective, and *affirms* the person’s strengths and efforts” (p. 19) (36), a definition that aligns with the needs for autonomy, relatedness, and competence respectively.

A growing evidence base supports the effectiveness of motivational interviewing in the obesity context (37-39). In a meta-analysis of randomised controlled trials using motivational interviewing for overweight or obese individuals, motivational interviewing was found to result in significantly greater reductions in body weight relative to controls of a medium effect size, and its effectiveness appeared to be enhanced when used in combination with a behavioural weight management program (40).

Overall, research evaluating self-determination theory highlights the importance of autonomous motivation for sustained behaviour change, and that the optimal social contexts for fostering autonomous motivation are those that support the individual’s needs for autonomy, relatedness, and competence – needs that are central to the practice of motivational interviewing which has been found to be an effective intervention for weight management. This body of theoretical and empirical work forms the foundation of the present study, which aims to improve the quality of social support available to obese individuals, and suggests that this can best be achieved by

training members of their social support network (i.e., support people) in the practice of motivational interviewing strategies, while they are engaged in a behavioural weight loss program (which itself includes motivational interviewing techniques). While instructing support people in motivational interviewing strategies has yet to be investigated in the context of obesity, this work has been undertaken in the eating disorder field, with promising results (41-43).

The primary aim of the present study is to evaluate whether weight loss maintenance outcomes in obese patients participating in a cognitive-behavioural weight management program are improved by including support people trained in motivational interviewing strategies. It is hoped that by employing a unique strategy to alter the social context of obese patients (i.e., producing motivationally-skilled support people), obese individuals will have the requisite support to effectively manage their weight both during and after the cessation of treatment.

Materials and Methods

Study design

The study is a multi-site (Canberra and Sydney, Australia), two-arm, randomised controlled trial in which obese patients participate in a cognitive-behavioural weight management program augmented by motivational interviewing strategies, either alone (CBT-MI) or with the addition of support people (CBT-MI-SP). All patients (CBT-MI and CBT-MI-SP) participate in 26 sessions over a one-year period of intervention comprised of 8 weekly, 16 fortnightly, and 2 monthly sessions. Each session is 90 minutes in duration and is conducted in groups of 3-8 patients, as group-based

interventions have been found to be of greater effectiveness than individual therapy for obese patients (44).

The support people of patients in the CBT-MI-SP condition participate in 10 group sessions comprised of support people alone over the course of 12 months. These sessions commence 8 weeks after the start of the patients' program, and consist of 6 fortnightly sessions; a 4-month period to practice support skills; 3 additional fortnightly sessions; and a final session one month later. The design of the study is shown in Figure 1.

INSERT FIGURE 1 ABOUT HERE

Participants

As the primary aim of the study is to assess the effectiveness of including an intervention for support people on the weight loss maintenance of obese patients, the main outcome is amount of weight lost one year after completing treatment. Power calculations indicated that a sample of 100 participants, 50 in each condition, would be needed to detect differences between CBT-MI-SP versus CBT-MI at a .05 level of significance with a power of 80%. This power was computed based on a within-cell standard deviation of 10 units and an average CBT-MI-SP effect of an additional 5kg weight loss at the one-year follow-up compared to CBT-MI. Results from our pilot trial on CBT-MI for obese patients indicate an attrition rate of approximately 25% of patients at the point of the one-year follow-up (45). Accordingly, a minimum of 134 participants (67 in each condition) need to be recruited for this study. Figure 1 details the flow of participants through the study to the point of random allocation.

Participants are recruited from two sites in Australia: the University of Sydney and the Australian National University, Canberra. At the Sydney site, participants are recruited from patients referred to the Metabolism and Obesity Services at Royal Prince Alfred Hospital Sydney, from the staff e-newsletter at the University of Sydney, and from the clinical trials database of the Boden Institute, University of Sydney. At the Canberra site, participants are recruited from local general practices, the staff e-newsletter at the Australian National University, and advertisements in a local free newspaper. The Human Research Ethics Committees of the Australian National University, the University of Sydney, and the Royal Prince Alfred Hospital in Sydney have approved the study.

Patients are eligible for inclusion in the trial if they are 18-65 years old, have a body mass index (BMI) ≥ 30 , and have a member from their social network who is able to attend all 10 support people group sessions. Exclusion criteria include: major psychiatric conditions (i.e., current psychosis, major depressive disorder, drug or alcohol abuse/dependence, or mental retardation) or major medical conditions (i.e., severe hepatic or renal dysfunction and significant cardiovascular disease such as heart failure) that would preclude full participation in the study; current treatment for obesity; current treatments known to affect eating or weight (e.g., steroids or psychotropic medications); and pregnancy. If on thyroxine, participants need to have been on a stable dose for the preceding 6 months. These criteria are assessed initially by a telephone screen conducted by research officers - which includes the Patient Health Questionnaire Depression and Alcohol Abuse modules (46) – followed by a pre-treatment assessment. Eligible participants are randomised to one of the two intervention conditions. Randomisation is undertaken using a computer-generated randomisation program, the Excel program's Ephron's Biased Coin.

Measures

The anthropometric, medical, behavioural, psychological, and social outcome measures detailed in Table 1 are administered to patients at pre-treatment, post-treatment, and the one-year follow-up (12 months after treatment contact had ceased) unless otherwise stated. The outcomes measures for the support people assess both their motivation and skill in supporting an individual in weight management, and are listed in Table 2.

INSERT TABLES 1 AND 2 ABOUT HERE

Interventions

Manuals that provide detailed session-by-session instructions and participant handouts have been developed by the first and second authors for both the patient and the support person programs.

Patient program: The 12-month intervention for patients consists of 26 group sessions, with the content of each session described in Table 3. The program combines both CBT and motivational interviewing. The CBT program was developed on the basis of published cognitive-behavioural (60) and cognitive (61) manuals for treating obese adults, found in one study to result in a loss of 8.85% of body weight at post-treatment (13). It focuses on teaching cognitive-behavioural skills for dietary modification and increasing physical activity, and includes both a weight loss phase (the initial 8 months) and a weight maintenance phase (the final 4 months).

INSERT TABLE 3 ABOUT HERE

The initial sessions entail education regarding the recommended caloric intake (an average of approximately 1500 calories per day, with patients provided with a book (62) and website addresses for calculating their caloric intake), rate of weight loss (approximately 0.5-1kg per week), and structure of eating (three meals and two to three snacks each day at regular intervals), and institute daily self-monitoring of eating and physical activity. Subsequent sessions teach a range of cognitive-behavioural skills to assist with weight loss such as strategies for managing cravings (e.g., stimulus control, 'urge surfing', and distraction), strategies for managing social situations that trigger overeating (e.g., assertiveness training), strategies for managing emotional triggers of overeating (e.g., pleasant activity scheduling and relaxation training), problem-solving skills, identifying and challenging dysfunctional thoughts that trigger overeating, and graded physical activity.

Weight maintenance sessions focus on the skills specific to maintaining weight losses such as identifying a maintenance weight range; engaging in weekly, structured self-review sessions for weight tracking and identifying strategies to assist with reaching one's weight goals; and developing a detailed weight maintenance plan. Based on the premise that individuals abandon their weight control efforts in part as a result of dissatisfaction with the benefits they obtained through weight loss (e.g., they may still have low self and body esteem despite having lost weight), patients are also encouraged to work on these life goals directly, irrespective of the amount of weight they have lost (60).

The motivational interviewing component of the CBT program is implemented in both the tone of treatment and the specific strategies employed (36).

In terms of the tone of treatment, therapists adopt a guiding style (avoiding the extremes of directing and following styles) using core client-centred counselling skills (e.g., asking open-ended questions, using affirmations, and using reflective statements and summaries with an emphasis on reflecting and summarising change talk) with the primary aim of evoking change talk (i.e., patient statements in favour of change).

Specific motivational strategies are the focus of seven sessions, which is comparable in number to previous applications of motivational interviewing for weight loss (40).

In session 10, patients are introduced to the stages of change model (63) in order to understand the fluctuating nature of motivation, and are provided with information regarding the determinants of motivation to lose weight (i.e., weight loss being accorded a high degree of *importance* in the patient's life and the patient having a sense of *self efficacy* regarding his/her ability to lose weight). Sessions 11-13 respectively focus on increasing the importance of weight loss by (i) increasing awareness of the costs of eating and weight problems (e.g., health concerns) and decreasing the benefits (e.g., mood regulation) by finding non-food ways of achieving the same benefits; (ii) identifying core values and how eating and weight problems may conflict with these values; and (iii) exploring one's future across various life domains in the event of losing or not losing weight. Session 14 focuses on enhancing self efficacy for losing weight (e.g., by identifying personal qualities that can be harnessed for successful weight control). During the weight maintenance phase of treatment, session 23 focuses on increasing the importance of weight loss maintenance while session 26 focuses on increasing self efficacy for being able to maintain one's weight losses in the long-term. All sessions adhere to the same format, which is presented in Table 4.

INSERT TABLE 4 ABOUT HERE

In summary, while the CBT program focuses on teaching patients how to change, the motivational interviewing strategies focus on increasing patients' self-motivation to change problematic eating behaviours and insufficient physical activity. Combining CBT and motivational interviewing frameworks is designed to produce patients who are both highly motivated to change (motivational interviewing) and have the tools to successfully change (CBT).

Intervention for support people: The intervention for support people is comprised of 10 group sessions, with the content of each session described in Table 5. Session content was based on programs for instructing individuals in motivational interviewing skills (64) and programs for support people in the context of substance misuse (65) and eating disorders (41-43).

INSERT TABLE 5 ABOUT HERE

The aim of the intervention is to enable support people to become skilled in eliciting self-motivation from the patients. Support people are introduced to the stages of change model (63) in order to understand the fluctuating nature of motivation, and are provided with information regarding the determinants of motivation to lose weight. To help patients increase the importance of weight loss to them, support people are instructed in questions designed to elicit from patients the costs of their eating and weight problems. Support people are also instructed in questions designed to help patients identify the benefits of their eating and weight problems with a view

to discussing with their support person alternative (non-food) ways of obtaining these benefits and helping the patient to feel understood by their support person. To help patients increase their self efficacy for weight loss, support people are instructed in questions designed to elicit from patients statements of confidence in their weight loss abilities. Instruction in communication skills primarily focuses on the use of affirmations, asking open-ended questions, avoiding unsolicited advice-giving, and the primacy of good listening skills. Support people are encouraged to have regular (at least fortnightly) support sessions with the patient (continuing after program completion), which are based on a structured template for reviewing with the patient their weight goals, identifying the strategies the patient is using to achieve these goals or the obstacles that are impeding goal attainment through the use of a checklist, and scheduling the next support session. Support people are also instructed in problem-solving skills to encourage discussing weight-related problems with the patient in a collaborative manner. Throughout, support people are encouraged to adopt a guiding style and avoid the extremes of being controlling or passive in their support role (41). The group sessions deliberately eschew discussions on weight management skills with support people in order to emphasise the expert role of the patients in weight control, with the role of support people to elicit this expertise.

To maximise skill acquisition, each session follows the same format, in which skills are described, demonstrated, practiced with feedback, and then generalised to the real-world setting (66). The format of sessions for the support people is shown in Table 6.

INSERT TABLE 6 ABOUT HERE

Therapists' training and treatment fidelity: All therapists have completed postgraduate degrees in clinical psychology, and have extensive experience in CBT and prior training in motivational interviewing. In addition, the therapists participated in a two-day training session provided by the second author on motivational interviewing (including in the context of working with support people). Each therapist implemented the intervention manual with a pilot case prior to the treatment of trial participants. To ensure that the interventions for patients and support people are delivered in a standardised, quality manner, (i) the therapists participate in weekly supervision sessions with the first author; (ii) the program manuals provide a clear and detailed description of each session's content; and (iii) all sessions are audiotaped and a random selection is reviewed by the first author.

Discussion

To the best of the authors' knowledge, the present study is the first to evaluate the effectiveness of an augmented CBT-MI program that trains support people in the utilisation of motivational interviewing strategies so as to improve the quality of the obese patient's social support for weight control. The approach to training support people is grounded in empirically-supported theoretical models (self-determination theory) and interventions (motivational interviewing) regarding the social contexts that facilitate sustained behaviour change via their enhancement of self-motivation.

Innovative methods that entail effective and affordable interventions to address obesity are essential given the substantial prevalence, burden of disease, impaired quality of life, and financial cost that obesity entails. By helping obese patients to gain weight management skills and increase and sustain their motivation for weight control (as a result of both treatment and from the ongoing input of support

people), the CBT-MI-SP approach of the current study has the potential to help patients achieve sustained weight loss (contrary to previous behavioural weight loss programs) while minimising the patient's need for ongoing, intensive weight control treatment with its attendant costs. In addition, the research will produce innovative intervention manuals for patients and their support people that can be readily disseminated to clinicians and extended beyond obesity to address other health behaviours. By employing a unique strategy to alter the social context of obese patients (i.e., producing motivationally-skilled support people), the present study will provide the first evidence regarding a potential additional means to alter the obesogenic environment thought to be critical in the current obesity pandemic.

Conflict of Interest Statement

None

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Figure 1. Study design and participant flow through the study.

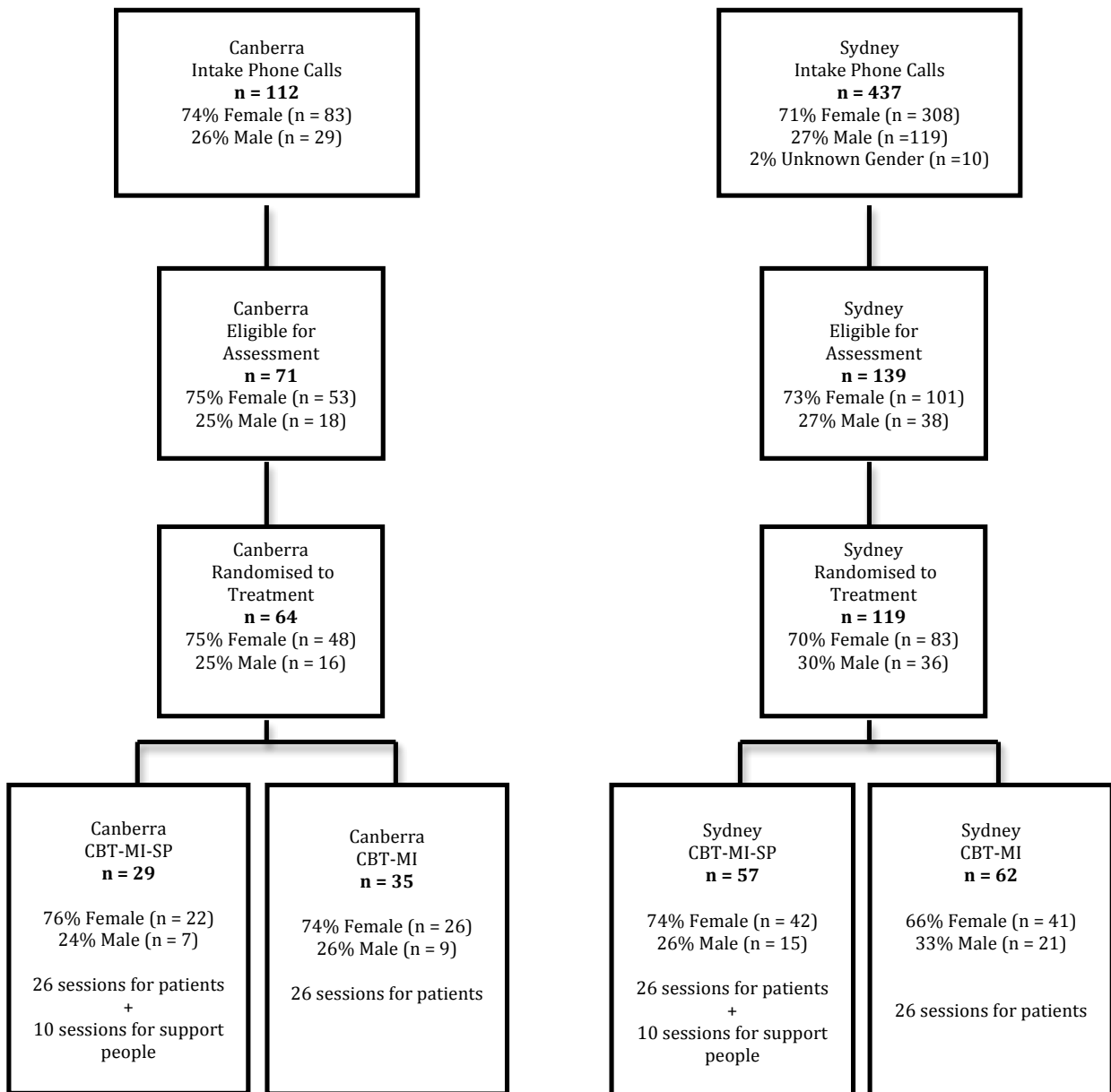


Table 1. Anthropometric, medical, behavioural, psychological and social outcome measures administered to patients at pre-treatment, post-treatment and the one-year follow-up (12 months after treatment has ceased)

Domain	Measure	Description
Anthropometric	Weight*	Assessed in light clothing using an electronic scale with a 200kg capacity, accurate to 0.1kg
	Height	
	Abdominal adiposity	Waist and hip circumference; waist-to-hip ratio
Medical	Blood pressure	Assessed using a standard sphygmomanometer with a large cuff
	Serum metabolic parameters	Assessed in the fasting state and include blood glucose, glycated haemoglobin, lipid profile (HDL-cholesterol, triglycerides and total cholesterol), insulin (for the calculation of HOMA [homeostatic model assessment-estimated insulin resistance]), adiponectin, hsCRP, IL-6 and -10, renal function (serum electrolytes, creatinine, eGFR, and urinary microalbumin) and liver function tests.
	Six-minute supervised walk test	To assess exercise capacity and dyspnoea
Behavioural	National Diet and Nutrition Survey (47)	A four-day food diary to assess dietary intake
	International Physical Activity Questionnaire-long version (IPAQ) (48)	Assesses five domains of physical activity over the preceding seven days
	Treatment adherence	Assessed in terms of session attendance and a questionnaire developed for the purposes of this study in which participants rate both the usefulness and the frequency of their use of each of the strategies taught in the program
Psychological	Readiness to Change Rulers (36)*	Two rulers that assess the importance to the patient of losing 0.5-1kg in the next week and their confidence to do so respectively on a scale from 0 to 100
	Decisional Balance Inventory (49)	Assesses the pros and cons of losing weight
	Weight Efficacy Lifestyle Questionnaire (50)	Assesses confidence in successfully managing one's weight
	Dietary Fat Pros and Cons Scale and the Physical Activity Pros and Cons Scale (51)	Assess decisional balance for reducing dietary fat and increasing physical activity respectively
	Dietary Fat Confidence Scale and Physical Activity Confidence Scale (51)	Assess confidence in successfully reducing dietary fat and increasing physical activity respectively
	Impact of Weight on Quality of Life Questionnaire-Lite (52)	Assesses five domains of quality of life: Work, Public Distress, Sexual Life, Physical Function, and Self Esteem
	Binge Eating Scale (53)	Assesses eating disturbance (especially disinhibited eating tendencies)
	Body Esteem Scale (54)	Assesses general satisfaction with appearance,

		weight satisfaction, and a sense of others' evaluations about one's appearance
	Depression Anxiety and Stress Scales (DASS-21) (55)	Assesses mood disturbance in the previous four-week period
	Rosenberg Self Esteem Scale (56)	Assesses one's overall evaluation of oneself as a person
Social	Support for Healthy Eating Habits Scale (57)	Two versions are administered: one for friends and one for family members.
	Support for Exercise Habits Scale (57)	Two versions are administered: one for friends and one for family members.
	Quality of Relationships Inventory (58)**	Assesses the level of social support, depth, and conflict that an individual perceives to exist in a specified relationship

*Assessed at each session as well as at each assessment time point

** Is only administered to patients in the CBT-MI-SP condition and is completed in relation to the patient's support person.

Table 2. Outcome measures administered to support people to assess their motivation and skill in supporting an individual in weight management

Domain	Measure	Description
Motivation	Readiness to Change Rulers (36)*	Two rulers that assess the importance to the support person of providing effective support for weight management and their confidence to do so respectively on a scale from 0 to 100
Support Skills	Quality of Relationships Inventory (58)**	Assesses the level of social support, depth, and conflict that an individual perceives to exist in a specified relationship
	Motivational Interviewing Treatment Integrity Scale (MITI 3.1) (59)***	Role-plays are conducted at the end of the program. In these role-plays, support people are presented with a problem scenario (e.g., an obese adult making a poor food choice) and are asked to respond using the various motivational techniques introduced during the course of the program. These role-plays are audio-recorded and rated by the therapist and an independent rater using the MITI.

*Assessed at each session as well as at each assessment timepoint

** Assessed at each assessment timepoint; it is completed by the support person in relation to the patient whose weight management they are supporting.

*** Assessed at post-treatment

Table 3. Summary of the session content for the cognitive behavioural and motivational interviewing intervention for obese patients

Session*	Topic	Content
1	Introduction to the Program and Establishing Recording of Weight, Eating and Physical Activity	Introduction to the program including a description of the program goals, the group schedule, and program guidelines (e.g., the importance of practicing skills between sessions in the form of homework tasks); Provision of a rationale for monitoring eating and physical activity, and the provision of daily eating and physical activity self-monitoring forms (which are provided at each session) and a weekly weight chart
2	Preparing to Change Eating Patterns: Meal Planning	Review of weight changes since the previous session and a review of the homework task (daily recording of eating and physical activity which is continued throughout most of treatment); Provision of information to assist patients prepare to change eating behaviours including: setting realistic weight loss goals (0.5 – 1kg / week), caloric intake guidelines (1,500 calories/day); the structure of eating (3 main meals and 2-3 snacks each day, with no more than 3 hours between each meals/snack); Introduction to meal planning; Provision of daily meal planning forms (which are provided at each session)
3	Barriers to Changing Eating Patterns	Review of weight changes since the previous session a review of the homework task (daily meal planning which is continued throughout treatment); Provision of information to help patients identify and overcome barriers to changing eating patterns (e.g., accuracy of recording, meal planning, eating patterns, portion size, food choices in terms of caloric and fat content, alcohol consumption, and eating mindfully)
4	Managing Hunger and Cravings	Review of weight changes since the previous session and a review of the homework task (identifying barriers to changing eating); Discussion of how hunger and cravings act as barriers to changing eating patterns and instruction in anti-craving and hunger strategies (e.g., regular eating, 'urge surfing', distraction, externalizing the craving, reminding oneself of the advantages of weight loss, delaying eating in response to a craving, addressing sleep problems)

5	Managing Eating in Social Situations	Review of weight changes since the previous session and a review of the homework task (cravings/hunger barriers); Discussion of how social situations can act as a barrier to changing eating patterns and strategies for managing these situations (e.g., assertiveness training)
6	Managing Emotional Triggers of Overeating	Review of weight changes since the previous session and a review of the homework task (managing eating in social situations); Introduction to strategies for managing emotional eating such as developing awareness of emotional states, tolerating negative feelings (e.g., using 'mood surfing'), and coping with negative feelings (e.g., pleasant activity scheduling for depressed mood)
7	Managing Cognitive Triggers of Overeating	Review of weight changes since the previous session and a review of the homework task (managing emotional triggers of overeating); Introduction to the cognitive model: identifying and managing thoughts that trigger overeating (e.g., "I deserve a treat") and strategies to manage them (i.e., developing alternative helpful thoughts)
8	Introducing Weekly Review Sessions	Review of weight changes since the previous session and a review of the homework task (managing cognitive triggers of overeating); Review of sessions 3, 4, 5, 6 & 7, with the aim of continuing to identify barriers to changing eating patterns and identifying CBT strategies for overcoming these barriers; With the transition to fortnightly sessions, introduction of the strategy of weekly Self-Review Sessions in the week between sessions
9	More on Cognitive Triggers of Overeating	Review of weight changes since the previous session and a review of the homework task (establishing a weekly Self-Review Session which is continued throughout treatment); Discussion of common negative automatic thoughts that arise in response to eating (e.g., "I've blown it now so I might as well keep eating") and strategies to manage them (i.e., developing alternative helpful thoughts)
10	Understanding Motivation to Change	Review of weight changes since the previous session and a review of the homework task (managing cognitive triggers of overeating); Provision of information on motivation to change (Stages of Change model) and the factors that increase motivation to change (importance and confidence)
11	Importance of Losing Weight:	Review of weight changes since the previous session and a review of the homework task (understanding motivation to change);

	Benefits and Costs	Assist patients to explore the importance of changing their eating and weight (through evaluating the costs of eating and weight problems) so as to increase their motivation to change; Provision of information about the health consequences of obesity; Encourage patients to identify the benefits of eating problems (e.g., mood regulation) and explore alternative, non-food ways of attaining the same benefits (e.g., pleasant activity scheduling) so as to increase their motivation to change
12	Importance of Losing Weight: Values	Review of weight changes since the previous session and a review of the homework task (practicing non-eating ways of meeting the short- term benefits of overeating); Assist patients to explore how important it is to change their eating and weight (through evaluating values and how overeating/overweight may be inconsistent with core values) so as to increase their motivation to change
13	Importance of Losing Weight: Looking Forward	Review of weight changes since the previous session and a review of the homework task (engaging in behaviours/activities consistent with values); Assist patients to explore how important it is for them to change their eating and weight (by imagining their future if they have/have not changed their eating/weight) and use this information to write letters to their future self
14	Confidence to Lose Weight	Review of weight changes since the previous session and a review of the homework task (letters to future self); Assist patients to increase their confidence in their ability to change their eating and weight so as to increase their motivation to change (e.g., use of the Confidence Ruler, identify personal strengths, identify past successes, utilise social support, reframe past 'failures' in weight management as 'steps towards success')
15	Mid-Program Review	Review of weight changes since the previous session and a review of the homework task (strategies for increasing confidence) To help patients identify any barriers that they are still experiencing to changing their eating/weight and to identify strategies to overcome these barriers
16**	Managing Special Occasions and Holidays	Review of weight changes since previous session / Review of homework tasks (overcoming barriers to change); Provision of strategies for coping with the festive season and special occasions more generally (e.g., setting weight goals, developing a meal plan, and identifying strategies for adhering to

		the meal plan)
17**	Special Occasions Review	Review of weight changes since the previous session and a review of the homework task (managing special occasions); Review how each patient coped with a specific special occasion, including identifying successful strategies, challenges to adhering to the meal plan, and how they could apply this knowledge to future special occasions
18	Increasing Physical Activity	Review of weight changes since the previous session and a review of the homework task (managing special occasions); Discussion of the role of physical activity in weight management, including the benefits and barriers to increasing physical activity as well as strategies for increasing physical activity and overcoming barriers.
19	Developing Problem-Solving Skills	Review of weight changes since the previous session and a review of the homework task (setting a physical activity goal); Instruction in the skill of structured problem solving as a strategy for reducing stress that can trigger overeating and overcoming other barriers to healthy eating and physical activity
20	Developing Relaxation Skills	Review of weight changes since the previous session and a review of the homework task (problem solving task); Instruction in the skill of relaxation (i.e., Breathing method, Progressive Muscular Relaxation method, and Guided Imagery method) as another, non-food strategy for mood regulation
21	Identifying Life Goals	Review of weight changes since the previous session and a review of the homework task (relaxation training task); Introduction to the topic of pursuing life goals (e.g., improving self-esteem) irrespective of one's weight, based on the premise that not attaining such goals can result in abandoning weight loss efforts
22	Pursuing Non-Weight Goals	Review of weight changes since the previous session and a review of the homework task (identifying life goals and strategies for reaching them); Continuation of the focus on pursuing life goals by exploring strategies for reaching them, barriers that could impede attaining these goals, and strategies for overcoming these barriers
23	Importance of Maintaining Weight: Benefits and Costs	Review of weight changes since the previous session and a review of the homework task (pursuing a selected life goal); Introduction to the topic of weight maintenance with a focus on helping patients explore how important it is for them to maintain their weight so as to increase their motivation for weight

		maintenance; Provision of information on when to shift from losing weight to weight maintenance, the unique challenges of weight maintenance, and the benefits of weight maintenance
24	Learning the Skills of Weight Maintenance	Review of weight changes since the previous session and a review of the homework task (weighing up the costs and benefits of weight maintenance); Introduction to the skills required for weight maintenance (including developing a goal weight range and weight maintenance plan)
25	Developing a Weight Maintenance Plan	Review of weight changes since the previous session and a review of the homework tasks (weight maintenance plan); Continuation of developing the skills of weight maintenance by problem solving high-risk weight maintenance scenarios
26	Confidence to Maintain Weight	Review of weight changes since the previous session and a review of the homework task (weight maintenance plan) Assist patients to increase their confidence in their ability to maintain their weight so as to increase their motivation for weight maintenance

* Sessions 1 – 8: Weekly / Sessions 9 – 24: Fortnightly / Sessions 25 – 26: Monthly

** Sessions 16 and 17 are conducted prior to and following the festive season respectively.

Table 4. Format of sessions for the obese patients

Session Phase	Content
Review	Prior to the session, each patient is weighed in private. The session commences with a weight review whereby each patient discusses up to three strategies or obstacles that resulted in weight loss or gain respectively since the previous session. The homework is also reviewed.
Skills to be Learned	The therapist introduces the CBT or motivational strategies that are the focus of the session. Skills are discussed based on detailed handouts and exercises to practice the skill are undertaken.
Conclusion	At the conclusion of each session: 1. Homework tasks are discussed. 2. Patients are asked to write down a goal for the upcoming week in the form of an "implementation intention" (i.e., a statement that specifies the when, where, and how of what one intends to do) based on the session's content. 3. Patients are encouraged to identify a non-food reward they will receive for implementing their goal so as to (i) increase their awareness of their successes and hence self efficacy and (ii) broaden their repertoire of sources of pleasurable activity and positive coping strategies to overcome an over-reliance on food. 4. Readiness Rulers regarding the patient's importance to them of losing 0.5-1kg in the next week and their confidence to do so are completed.

Table 5. Summary of the session content for the intervention for the support people

Session*	Topic	Content
1	Introduction to the Program and Understanding Motivation to Change	Introduction to the program including a description of the program goals, the group schedule, and program guidelines (e.g., the importance of practicing skills between sessions in the form of homework tasks); Provision of information on motivation to change (Stages of Change model) and the factors that increase motivation to change (importance and confidence)
2	Increasing the Importance of Losing Weight: The Costs of Eating and Weight Problems	Review of the homework task (understanding motivation to change); Introduce Support People to the strategy of increasing the patient's awareness of the costs of his/her eating and weight problems which may result in increased importance of change; Provision of information regarding the health consequences of obesity; Introduction to the communication skill of affirmation
3	Increasing the Importance of Losing Weight: The Benefits of Eating and Weight Problems	Review of the homework task (discussing with the patient the costs of not losing weight and the use of affirmations); Introduce Support People to the strategy of helping patients to reduce the benefits of eating and weight problems (i.e., achieving these benefits without overeating), which may result in increased importance of change; View a DVD demonstrating the skill of discussing costs and benefits between a patient and support person; Use of role-play to practice the skills of increasing awareness of costs and decreasing the benefits of eating/weight problems
4	Increasing Confidence to Lose Weight	Review of the homework task (discussing with the patient the benefits of eating/weight problems and how Support People can help the patient achieve these benefits in non-food ways); Introduce Support People to the strategy of helping patients to increase their confidence in losing weight (e.g., use of the Confidence Ruler, identify personal strengths, identify past successes, utilise social support, reframe past 'failures' in weight management as 'steps towards success'); View a DVD demonstrating skills to enhance confidence in a discussion between a patient and support person; Use of role-play to practice the skills of increasing confidence for weight management

5	Communication Skills	Review of the homework task (discussing with the patient their confidence regarding weight loss); Introduce Support People to the key communication skills when discussing eating, physical activity and weight with the patient (i.e., using positive statements, asking questions, and effective listening); View a DVD demonstrating these communication skills in a discussion between a patient and support person; Use of role-play to practice the communication skills
6	Establishing Support Sessions	Review of the homework task (practicing communication skills with the patient); Assist Support People in implementing regular (at least fortnightly) Support Sessions with the patient; View a DVD demonstrating the skill of conducting a Support Session between a patient and support person; Use of role-play to practice the skill of conducting a Support Session
7	Developing Problem-Solving Skills	Review of the homework task (conducting regular Support Sessions with the patient); Introduce the skill of problem-solving as a way of addressing problems that arise in their role as a Support Person; View a DVD demonstrating the skill of problem-solving between a patient and support person; Use of role-play to practice the steps of problem-solving
8	Support Styles	Review of the homework task (implementing the problem-solving exercise); Assist Support People to identify their support styles and change those that may be unhelpful; View a DVD demonstrating different support styles (e.g., controlling versus guiding) between a patient and support person; Use of role-play to practice a more effective support style
9	Reviewing the Skills for Being an Effective Support Person	Review of the homework task (increasing awareness of one's support styles); Review the skills required for being an effective support person that have been presented in the program; View a DVD containing scenes demonstrating these skills in interactions between a patient and support person
10	Practicing the	Review of the homework task (practicing effective support skills

Skills for Being an Effective Support Person	with the patient); Provide an opportunity for Support People to practice the skills required for being an effective Support Person by introducing challenging scenarios typically faced by Support People and using role-plays to practice the skills learnt throughout the program; Provision of feedback by the therapist based on the role-play
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* Sessions 1 – 6: First phase fortnightly / Sessions 7– 9: Second phase fortnightly / Session 10:
Monthly

Table 6. Format of sessions for the support people

Session Phase	Content
Review	The session commences with a review of the homework from the previous session.
Skills to be Learned	The therapist introduces the skills that are the focus of the session. Skills are discussed based on detailed handouts. These skills are then demonstrated via a DVD developed for the project in which actors play the roles of a patient and support person. Having observed the skill, support people practice the skill with each other in the form of role-plays while receiving feedback from the therapist.
Conclusion	At the conclusion of each session: 1. Homework tasks (entailing practicing the skill with the patient in real-world settings) are discussed. 2. Patients are asked to write down a goal for the upcoming week in the form of an "implementation intention" (i.e., a statement that specifies the when, where, and how of what one intends to do) based on the session's content. 3. Patients are encouraged to identify a non-food reward they will receive for implementing their goal. 4. Readiness Rulers regarding the importance to them of their role as a support person and their confidence in providing effective support for weight management are completed.