

BMJ Open 'The fact that I know I can do it is quite a motivator now': a qualitative study exploring experiences maintaining weight loss 6 months after completing a weight loss programme for knee osteoarthritis

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ABSTRACT

Objective To explore experiences maintaining weight loss 6 months after completing a multicomponent weight loss programme for knee osteoarthritis.

Design Qualitative study based on an interpretivist paradigm and a phenomenological approach that was embedded within a randomised controlled trial.

Setting Semistructured interviews were conducted with participants 6 months after completing a 6-month weight loss programme (ACTRN12618000930280) involving a ketogenic very low calorie diet (VLCD), exercise and physical activity programme, videoconferencing consultations with a dietitian and physiotherapist, and provision of educational and behaviour change resources and meal replacement products. Interviews were audio recorded, transcribed verbatim and data were analysed based on the principles of reflexive thematic analysis.

Participants 20 people with knee osteoarthritis.

Results Three themes were developed: (1) successfully maintained weight loss; (2) empowering self-management of weight (understand importance of exercise; increased knowledge about food and nutrition; resources from programme still useful; knee pain as a motivator; confidence in ability to self-regulate weight) and (3) challenges keeping on track (loss of accountability to dietitian and study; old habits and social situations; stressful life events or changes in health).

Conclusion Participants had overall positive experiences maintaining their weight loss since completing the weight loss programme and were confident in their ability to self-regulate their weight in the future. Findings suggest a programme incorporating dietitian and physiotherapist consultations, a VLCD, and educational and behaviour change resources supports confidence maintaining weight loss in the medium term. Further research is required to explore strategies to overcome barriers like loss of accountability and returning to old eating habits.

INTRODUCTION

Overweight and obesity, defined as having a body mass index ≥ 25 or ≥ 30 kg/

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Strengths include the broad sample of participants interviewed, including males and females across regional and metropolitan areas of Australia.
- ⇒ Limitations of our study include the fact that our sample comprised participants who had volunteered for the randomised controlled trial and for this qualitative study. As such, our cohort may have more positive experiences or be more willing to share their perceptions.
- ⇒ We interviewed participants 6 months after completing the programme, and so it is not clear whether experiences would differ in the longer term.
- ⇒ Our sample comprised people who lived in Australia, spoke English and had private health insurance, and thus our findings may not be transferable to those in other settings and countries.

m² (respectively),¹ affects nearly two in every three adults across the world.² In Australia, 67% of adults have overweight or obesity,³ costing the Australian economy US\$11.8 billion annually.⁴ Having overweight and obesity is commonly associated with the development of osteoarthritis (OA)⁵ and other chronic diseases (eg, cardiovascular disease, diabetes, cancer).¹ Research suggests that having overweight and obesity leads to more severe OA-related pain and disability⁵ and increased odds of requiring costly joint replacement surgery.⁶ In addition, modelling shows that overweight and obesity accounts for 45% of the burden of OA in Australia.⁷ Weight is one of the few modifiable risk factors for OA progression,⁸ and, as such, the development of effective and accessible weight loss programmes for people with OA

has the potential to dramatically reduce the burden of the condition.

OA clinical guidelines recommend weight loss for people with overweight or obesity,^{9–11} and a recent systematic review found that diet plus exercise and physical activity interventions had small to moderate effects on pain and function in people with OA.¹² Weight loss may also confer additional benefits beyond OA, such as reversal of type 2 diabetes and prevention and management of cardiovascular disease, incontinence and sleep apnoea, among other benefits.¹³ This is particularly important given that people with OA are more likely to have such comorbidities than those without.¹⁴

Despite the potential benefits, very few people with OA and overweight or obesity make active attempts to lose weight,^{15 16} and instead attribute weight gain to non-modifiable factors.¹⁷ People with OA often seek treatment from their general practitioner (GP) or a physiotherapist,^{11 18} yet some GPs and physiotherapists lack confidence with weight management, and believe it is outside their scope of practice.^{19–22} It may, therefore, be more appropriate for people with OA to receive weight loss advice and guidance from clinicians who are specialised in weight management,²³ such as dietitians. However, given that people with OA erroneously believe exercise and physical activity is more important than dietary modification for weight loss,¹⁷ and believe controlling appetite and diet is difficult and uncomfortable,²⁴ dietary weight loss programmes may be challenging to implement within this population. As such, the development of acceptable, effective and scalable weight loss programmes for people with OA is needed.

Our recent qualitative study²⁵ found that people with OA had overall positive experiences with a 6-month weight loss programme involving a ketogenic very low calorie diet (VLCD), videoconferencing consultations with dietitians and physiotherapists, and provision of educational resources and meal replacement products.²⁶ However, we interviewed those participants immediately after finishing the programme, and one of the key findings from study participants was a feeling of apprehension about maintaining their weight without the guidance of the dietitian. Long-term maintenance of weight after a weight loss programme is challenging.²⁷ In fact, research suggests that 60% of weight lost on VLCDs is commonly regained over an average of 1.9 years,^{28 29} and people with chronic musculoskeletal pain, like OA, often experience more difficulty maintaining their weight loss than those without pain.³⁰ To our knowledge, no previous studies have explored the experiences of people with OA when maintaining weight loss after a weight loss programme involving a ketogenic VLCD, including any barriers or facilitators to success that may have implications for the design of future weight loss programmes. Thus, the aim of this study is to explore experiences of people with knee OA who are aiming to maintain weight loss following a multicomponent remotely delivered, clinician-supported weight loss programme. Our research question is: what

are the barriers and facilitators to weight loss maintenance 6 months after finishing a multicomponent weight loss programme for knee OA?

METHODS

This study is reported in accordance with the Consolidated criteria for Reporting Qualitative research guidelines.³¹

Design

A qualitative design based under an interpretivist paradigm was undertaken. According to this paradigm, knowledge about a phenomenon is developed by gathering perceptions and interpretations of participants who experience it.³² A phenomenological framework was used,³³ which focuses on the lived experiences of people involved with the issue being researched. The study was nested within a randomised controlled trial (RCT)²⁶ evaluating the effectiveness of adding dietitian-guided weight loss to physiotherapist-supervised strengthening exercise and physical activity for people with knee OA and overweight or obesity (Australian New Zealand Clinical Trials Registry ACTRN12618000930280).

Public and patient involvement

This study was designed based on the findings of our previous qualitative work,²⁵ which was nested in the same RCT and explored patient experiences immediately after the intervention. The barriers that were identified in that study informed the development of our interview guide for the current study. Patients were otherwise not involved in the design, recruitment or conduct of the study. Findings from this study will be disseminated via Medibank, who are partnered on this research (ie, funded the RCT and co-developed the intervention, but otherwise had no role in recruitment of participants or data collection for this qualitative study), and who provide private health insurance to >3.75 million Australians.

Participants and recruitment

Participants with knee OA were recruited from our RCT. To participate in the RCT, eligible participants: (1) held private health insurance with Medibank (one of Australia's largest health funds with 3.76 million members) at a level that included cover for arthroplasty surgery; (2) met the National Institute for Health and Care Excellence OA clinical criteria (aged ≥ 45 years, activity-related joint pain, morning stiffness ≤ 30 min);¹⁰ (3) had average knee pain ≥ 4 on 11-point numeric rating scale (0=no pain, 10=worst pain possible) in the past week; (4) had a history of knee pain on most days for at least 3 months; (5) were aged < 81 years and (6) had a body mass index ≥ 28 kg/m² and < 41 kg/m². Detailed inclusion and exclusion criteria for the RCT are published.²⁶

Participants who had been randomised to the weight loss arm of the RCT were invited to participate in this qualitative study within 1–3 weeks of having completed their final 12-month questionnaire for the trial, 6 months after

Table 1 Key components of the weight loss programme

Component	Description of purpose/content
Booklets	<ul style="list-style-type: none"> ▶ Preparing for your consultations: Information about consultations, instructions on how to use Zoom videoconferencing and Fitbit instructions ▶ Weight management 'how to' guide: Describes the VLCD and provides information about healthy food choices and portion sizes ▶ Weight management behavioural support activities: Workbook containing information and templates to track weight, a food diary, tips to find a support person, identifying food triggers, planning for 'at-risk' situations, overcoming barriers, changing thought patterns and monitoring hunger levels ▶ Recipe book: Over 100 recipes suitable for the VLCD ▶ Food list pocket guide: List of suitable low carbohydrate ingredients to consume when on the ketogenic VLCD
Other resources	<ul style="list-style-type: none"> ▶ Plastic portion plate: to help manage portion sizes ▶ Exercise bands: 3 exercise resistance bands (green, red and blue) for strengthening exercises ▶ Activity tracker (Fitbit): to help track and monitor physical activity
Study website	<ul style="list-style-type: none"> ▶ Electronic versions of printed resources ▶ Short video about the ketogenic VLCD featuring endocrinologists and dietitian experts, and a person with knee OA
Pretreatment survey	Patients completed a pretreatment survey prior to their first consultation regarding their current height and weight, their occupation, details about their knee pain and exercise history, previous experience with weight loss (if any), details about their eating habits and personal goals
Consultations with a dietitian	6 videoconferencing consultations over 6 months (45 min initial, 20 min follow-up) recommended to occur in weeks 1, 3, 6, 9–12, 14–17 and 19–23 but timing negotiated with participant. Helps participant undertake VLCD and transition to long-term healthy eating plan and provides behaviour change support.
Consultations with a physiotherapist	6 videoconferencing consultations over 6 months (45 min initial, 20 min follow-up) recommended to occur in weeks 1, 3, 7, 11, 16 and 21 but timing negotiated with participant. Provides advice on treatment options, prescribes a structured strengthening exercise programme and physical activity plan, and provides behaviour change support.
Meal replacements	Up to 6 months' worth of twice daily meal replacements for the VLCD
OA, osteoarthritis; VLCD, very low calorie diet.	

completion of the weight loss programme. Invitations were targeted to those who had successfully lost any amount of weight after completion of the programme at 6 months. Once approximately 50% of interviews had been completed, sample demographics were reviewed and invitations were then targeted to ensure a relatively even spread of males/females across Australia. The final sample size was dictated by the principle of theoretical saturation, where no new themes or subthemes emerged from the data.³⁴

Weight loss programme

Details of the programme have been published²⁶ and are shown in [table 1](#). Briefly, participants completed a

6-month programme involving diet and exercise/physical activity components. The programme included six videoconferencing (Zoom Video Communications, California, USA) consultations with a dietitian for supervision of a ketogenic VLCD³⁵ and six videoconferencing consultations with a physiotherapist for prescription of a strengthening exercise and physical activity programme. This qualitative study focuses predominantly on the dietary component of the programme.

On the VLCD, two meals per day were replaced with very low-calorie products (Optifast meal replacements (Nestlé Health Science, Rhodes, Australia) or Optislim (OptiPharm, Clayton, Australia) for vegetarians) with a low-carbohydrate third meal, for a total of approximately 800 calories (3200 kilojoules) per day. Participants were encouraged to lose approximately 10% or more of their body weight, as this has been associated with clinically important improvements in knee OA pain.³⁶ When participants reached their target weight, they transitioned off the diet, which involved reintroducing carbohydrates and moving to one meal replacement per day over a 2-week period. After this, participants were encouraged to follow a healthy eating diet consistent with the principles of the Commonwealth Scientific and Industrial Research Organisation total well-being diet,³⁷ involving a high protein, low glycaemic index carbohydrate, low fat diet.

The first dietitian consultation lasted approximately 45 min, during which dietitians discussed weight loss goals and formulated a weight management plan with participants. Subsequent consultations were approximately 20 min in duration, whereby dietitians discussed progress and used motivational interviewing principles to facilitate adherence to the weight management plan. Consultations approximately occurred in weeks 1, 3, 6, 9–12, 14–17 and 19–23 of the programme.

Participants were provided with printed resource booklets (including a 'weight management how to guide', 'weight management behavioural support activities', recipe book and food list pocket guide), a Fitbit (Flex 2 model) to monitor their progress towards physical activity step goals (as individually prescribed by their physiotherapist), exercise bands, 6 months' worth of meal replacements, a plastic portion plate and access to a bespoke website containing digital versions of the resource booklets.

Interviews

Interview guides were developed ([box 1](#)) to explore experiences with weight loss maintenance in the 6 months after completion of the programme. Semistructured interviews were conducted over the telephone by SEJ, a non-clinician who is trained and experienced in qualitative research methodologies and had no other involvement in the overarching RCT or with the participants. Interviews were audiorecorded and transcribed verbatim by an external provider of transcription services. All data were deidentified and securely stored on a password-protected university server.

Box 1 Semistructured interview guide

1. First, tell me a bit about what you were aiming to achieve with your weight since you finished your consultations with the dietitian.
What did you do to try and achieve that aim?
How did you go achieving that aim? What worked/didn't work?
 2. What was challenging for you in achieving your aim?
What has made it difficult? How/why?
What could have helped you? What could be improved for future programs?
 3. What helped you in achieving your aim?
What did you try? What strategies did you use? How/why was that helpful? What could be improved for future programs?
 4. Have you tried other diets/weight loss programs in the past? If so, how did your experience managing your weight after BKBM compare to your experience after other you stopped diets/weight loss programs?
What was better/worse about the BKBM program compared to others when it came to managing your weight?
 5. Tell me about your eating habits and behaviours over the past 6 months since you finished with the dietitian.
How do they compare to before you started the program?
 6. Tell me about your exercise and physical activity behaviours over the past 6 months since you finished with the physio.
How do they compare to before you started the program?
 7. What have you noticed about your knee pain and function now?
How does it compare to before you started the program?
How has it changed over the last 6 months?
 8. What are your final impressions of the program now that you have finished?
 9. Do you have anything else to add?
- Questions in italics were used as prompts if necessary

Data analysis

Inductive thematic analysis following the six phases as described by Braun and Clarke was undertaken,^{38,39} based on phenomenological framework,³³ facilitated by NVivo V.12 software.⁴⁰ BL and SJ first familiarised themselves with the data by reading transcripts multiple times⁴¹ (first phase of analysis). Both authors independently coded the data (second phase), which involved line-by-line analysis of the data and identification of elements that appeared important to the research question. Both researchers independently developed initial themes (third phase) by further refining codes and adapting, merging and sorting them into a structure representing themes and subthemes.³⁸ SJ and BL then met to discuss and review emerging categories and ideas (fourth phase). Themes and subthemes were reviewed multiple times to ensure external heterogeneity and internal homogeneity. Finally, themes were refined and given informative names (fifth phase) and were written up into an analytic narrative (sixth phase). To ensure credibility and confirmability of the data, another researcher (KLB) read all transcripts before meeting with SJ and BL to discuss and review the themes and subthemes that had been developed.

RESULTS

Interviews were undertaken with 20 participants (table 2). There was an equal mix of males and females, with

just over half (60%) residing in metropolitan cities of Australia. Participants had lost an average of 11.8% (SD: 5.2) of their body weight at the end of the weight loss programme, and 9.7% (6.9) at the time of the interview (6 months later).

Three themes (with up to five subthemes each) were developed: (1) successfully maintained weight loss; (2) empowering self-management of weight (understanding importance of exercise and physical activity, increased knowledge about food and nutrition, resources from programme still useful, knee pain as a motivator, have confidence in ability to self-regulate weight); (3) challenges keeping on track (loss of accountability to dietitian and study, old habits and social situations, other health problems and life events). A summary of themes, subthemes and exemplary quotes are in box 2.

Theme 1: successfully maintained weight loss

Most participants described overall success maintaining their weight in the 6 months since they finished the programme. Some continued to lose weight (between 1 and 4 kg) or maintained the weight that they were at the end of the programme. Many described a small weight gain of 1–4 kg, but were genuinely surprised at how easy it had been to maintain their weight.

I did put on a couple of kilos. I'm about 84 and a half at the moment, and so I've been very happy. It's not been as difficult as I thought P1

Participants described significant changes in their life as a result of losing weight, including improvements in their knee, their self-confidence and positive effects on other health conditions like high blood pressure. Two participants with divergent views (P5 and P13, table 2) reflected they had regained a significant amount of weight (between 7 and 16 kg) since the programme, being back at the same weight as they were before the programme.

Theme 2: empowering self-management of weight Understand importance of exercise and physical activity

Participants believed exercise and physical activity was important in maintaining their weight. Many reflected that they had been very physically active since the programme finished, including walking, running, swimming or playing sports (eg, kayaking, golf, tennis). Most found they had ceased their prescribed knee strengthening exercises in favour of more generalised physical activity or sports participation.

after the program finished you know, it wasn't hard to maintain it, and I still do a lot of walking and you know I've been to some strength training and stuff like that and actually I'm doing running and that was my aim, to be able to run. P4

Increased knowledge about food and nutrition: Participants described an increased knowledge about food and nutrition after having participated in the programme, predominantly from their dietitian consultations but also

Table 2 Participant characteristics (n=20)

Pseudonym	Age and gender	BMI (kg/m ²)	Knee pain severity* at baseline	Physical function† at baseline	Knee pain severity* at 12 months	Physical function† at 12 months	% body weight lost at 6 months	% body weight lost at 12 months
P1	Female in 60s	30.1	8	19	3	4	-2.4	-3.4
P2	Female in 60s	32.3	4	36	4	15	-8.5	-6.2
P3	Female in 50s	31.6	6	21	2	6	-7.4	-9.9
P4	Male in 50s	32.4	6	22	1	1	-18.1	-17.7
P5	Female in 60s	28.4	6	14	2	5	-3.9	+2.9
P6	Female in 60s	36.2	5	21	0	2	-9.7	-10.3
P7	Male in 70s	29.9	4	25	0	0	-15.0	-15.0
P8	Male in 80s	31.3	4	17	3	10	-7.4	-2.7
P9	Female in 70s	36.0	5	27	0	0	-18.0	-19.0
P10	Male in 50s	34.1	8	18	2	2	-16.2	-15.6
P11	Female in 50s	37.7	6	23	0	1	-7.3	-11.0
P12	Female in 50s	32.4	7	25	2	7	-10.6	-5.9
P13	Female in 50s	31.0	6	24	3	5	-12.7	+3.4
P14	Male in 70s	34.7	7	28	2	13	-18.2	-17.5
P15	Female in 60s	29.8	5	25	2	3	-5.8	-4.7
P16	Male in 60s	37.9	7	17	3	8	-14.2	-8.7
P17	Male in 70s	34.5	4	20	2	12	-14.6	-9.9
P18	Male in 40s	33.1	4	23	1	5	-17.8	-20.2
P19	Male in 70s	28.1	4	19	0	0	-10.1	-6.7
P20	Male in 80s	30.9	5	15	0	3	-18.2	-16.0
Mean	65 years	32.7	5.6	22.0	1.6	5.1	11.8	9.7
SD	9.0	2.9	1.4	5.1	1.3	4.5	5.1	6.9

*Measured by 11-point numeric rating scale (0=no pain, 10=worst pain possible).

†Measured by Western Ontario and McMaster Universities Osteoarthritis Index, where physical function scores range from 0 to 68 (higher scores indicate poorer function).

BMI, body mass index.

from the educational resources provided. This knowledge helped participants make much more mindful decisions about the foods they consumed as well as be more conscious of portion sizes. Participants reflected that these eating behaviours were a significant change from their behaviours before they started the programme.

I've probably learnt one thing, is not to overindulge in your meal; like the size of a meal. And I'm probably a lot more cognizant of the types of food I've got on my plate. So I try and avoid any real fatty items and I really only just have vegetables or salad with my dinner, and just whatever bit of meat or fish or something. So I am aware of not pigging out, if you like, on quantities of food and trying to keep them reasonably well. P19

Resources from programme still useful

Participants described many of the programme resources as still being helpful to them in maintaining their weight. In particular, the booklets and recipe books were used regularly. Participants also described using Optifast meal replacement products regularly to help them maintain their weight if needed. Although participants had not

had any consultations with their dietitian in the prior 6 months, they still recalled the advice from the dietitian and described it as being crucial to the success of their experience maintaining their weight.

I thought the fact that it was holistic in terms of—you had the recipe books, you had the weight loss, you had the fitness bands, you had the plate. The fact that they gave you everything you needed made a difference. Like, I didn't have to go out and by the rubber bands for the physio, I—the book was there if you wanted it in a book. You know, the whole lot was there. So, I thought it was—I thought it was really, really, good. P1

Knee pain as a motivator: Participants described a motivation to maintain their weight to avoid worsening in their knee pain or avoid having to undergo joint replacement surgery. However, some participants with divergent views found that, because their knee pain had improved so much, they were actually struggling with motivation to maintain their weight and exercise/physical activity.

I guess also because my knee's feeling really good, and I suppose I've lost a bit of the drive to lose all that

Box 2 Themes and subthemes relating to participant experiences with weight loss maintenance at 6 months since the weight loss programme

Theme 1: Successfully maintained weight loss

I did put on a couple of kilos. I'm about 84 and a half at the moment, and so I've been very happy. It's not been as difficult as I thought P1 my weight is sitting still between 75 and 80, mostly around 77, around there. So, yeah, I'm not disappointed at all with where my weight's been. It hasn't zoomed back up again, thank goodness P12 maintaining it, I mean I started off with 107 kilos and I went down to, I think the lowest was about 85, but maintaining between 85 and 87–88 max. that's what I've done since the program finished. I mean, the six months, so it's been great. P4

Theme 2. Empowering self-management of weight

Understand importance of exercise and physical activity

I am doing my exercise program. I'm only doing it twice a week now, but I am doing it. I'm also doing walks on my day off, and I'm doing two yoga classes a week... you do, you need both of them. You need the exercise with the dieting. I know that. P13

I kayak every week, I play golf every week... And then I was doing my exercises that the physio gave me, and I was doing them probably, on average, once a week. But my knee's been so good the last couple of months I've really stopped doing that as well, so yeah. P19 after the program finished you know, it wasn't hard to maintain it, and I still do a lot of walking and you know I've been to some strength training and stuff like that and actually I'm doing running and that was my aim, to be able to run. P4

Increased knowledge about food and nutrition

I've probably learnt one thing, is not to overindulge in your meal; like the size of a meal. And I'm probably a lot more cognizant of the types of food I've got on my plate. So I try and avoid any real fatty items and I really only just have vegetables or salad with my dinner, and just whatever bit of meat or fish or something. So I am aware of not pigging out, if you like, on quantities of food and trying to keep them reasonably well. P19

[before the program] I wouldn't have even thought about what I was having. I wouldn't have thought about carbs or anything like that, I just wouldn't have had any of that in mind at all... I now automatically have in the back of my head the food mixes, and things like that that I should be aware of. P6

the type of diet regime they're giving you is much more realistic, easier to keep going afterwards. Because you're actually talking with a dietician and she's really helping you to understand how food works in your body and why it's so important what you put in. It's not just low fat, it's more than that. P12

Resources from programme still useful

I've just gone back and had a quick look at the support books and so on, and there, they've got enough in there for me to keep myself going.... The information that we were given through the booklets and through the website was extensive and easy to read and easy to look at and easy to follow. So overall, my impressions are that it has been a very useful programme to assist my health P16

I thought the fact that it was holistic in terms of—you had the recipe books, you had the weight loss, you had the fitness bands, you had the plate. The fact that they gave you everything you needed made a difference. Like, I didn't have to go out and by the rubber bands

Box 2 Continued

for the physio, I—the book was there if you wanted it in a book. You know, the whole lot was there. So, I thought it was—I thought it was really, really, good. P1

I've continued on the Optifast Monday to Friday. Like I have my Optifast for lunch most days. Sometimes I'm caught out if I'm out somewhere or something like that and then on the weekends I pretty much, I might have take-away on a Friday night, pretty much just what I was doing before, and I've found it really easy to keep doing it. P3

Knee pain as a motivator

because it was a knee pain thing that I'm doing, I thought of the weight loss as a bonus. I was concentrating on getting the leg right—it would give me an opportunity to try an alternative to surgery, so I kept on track for that... Then eventually the knee was getting really good and the weight loss was happening so it kept me motivated to keep on going. P9

it's made me resolve to forego any knee surgery if I possibly can and certainly not allow an increase in weight to put me back in a greater risk of knee surgery. P7

I guess also because my knee's feeling really good, and I suppose I've lost a bit of the drive to lose all that weight and to exercise... I suppose it gets back to your attitude, your mental attitude to what you're doing. And I guess having the pain in the knee—the pain in the knee was a real impetus to put me head down and go for it P19

Have confidence in ability to self-regulate weight

I actually know I can, so the fact that I know I can do it is quite a motivator now... I think I now have the confidence and knowledge and understanding to be able to improve my health again. Even though at the moment I'm not achieving that how I would like to, I am confident that I can. I think that's a significant part of the programme P16 I know that if I want to get back to doing the same thing again I've got all the information here to go and do it on my own. P5

I kept weighing myself, and I think that makes a difference, because I could see that, you know, it was maybe inching up a wee bit so I would stop the pastries again, and—and the fact that I knew that it worked the first time around. I couldn't believe how well it worked P6

Theme 3. Challenges keeping on track

Loss of accountability to dietitian and study

I've found over the years that my biggest stumbling block is the accountability side of it. So while on the program I'm fine, but as soon as I come off the program, it's the fact that I'm not accountable to anybody but myself then and it's not enough to keep me right... most people have gone a lifetime with eating the wrong things and doing the wrong things so it's not going to just go away once you finish your program. So that's where I need the support and the accountability and the guidance. Those three things are what I feel would keep me better long term P9

I feel like I've self-destructed. I felt like once the program ended I probably—I really needed someone just doing a constant check-in with me, but that's just personally me. I feel that if I haven't got someone keeping an eye on me, that it's like—you know, I feel like I'm indestructible, I can just do what I want P13

I'm not real good if I'm not accountable to somebody or something... Once I had no contact with anybody I felt like I'd been left alone and nobody cared what I did so I didn't care what I did if

Continued

Continued

Box 2 Continued

you know what I mean...not everybody can have a guardian angel sitting over their shoulder watching them all the time. You've got to have a bit of self-discipline. But unfortunately you know how hard that is to do. P5

Old habits and social situations

Of course, when you go out with friends and they're bringing out the chips and the nuts and everyone's having a beer, it's very hard to have a soda water and not get stuck into the munchies that are on the table. Going out for dinner is a challenge. P18

All the carbs that I'd cut out of my diet, well not all them introduced back in, but I've started eating a lot more of them and I think that's my downfall...Like I didn't eat bread through the entire program and then I'm back eating bread again, even if it's a low carb variety it's still bread isn't it, it's still carbs. P5

trying to adjust back to a normal diet was one of those first things that was difficult... it simply became a case of monitoring, or trying to not, you know, eat all the nice things that you used to eat, and that's—that has been part—that's been the main problem. It has just gradually crept back in...So, learned/learnt habits of eating is probably the problem. I've always been a chops and, you know, chips man. So, that's the hassle. P8

Other health problems and life events

for me it's been why did I fall off the rails. I have incredible stress. My father is nearly 90, and all of a sudden we're in the middle of COVID, and he told me that he wanted to sell the house...And the wheels just fell off the wagon - I just fell into - Comfort eating...I think because I had everything sort of crumbling around me with a lot of—especially with the COVID thing. P13

I found Covid challenging—I probably spent more time in the kitchen. 'What am I going to do today? I can't go out, let's try and I'll give this a crack and see how I go at that.' And I'm not by nature a sweet tooth, but I found that I was delving into that, which is not a good thing. P15

I had to have a hip replacement. So, for the last six6 months I have not been able to do terribly much. Because I mean, I could walk one1 day, and then I'll be a cripple for two—I used to play golf, but I can't do that swinging motion because of my hips, and I'm finding—I'm finding that very, very difficult. You know, because I'm closer to the fridge now, too. P1

weight and to exercise...I suppose it gets back to your attitude, your mental attitude to what you're doing. And I guess having the pain in the knee—the pain in the knee was a real impetus to put me head down and go for it P19

Have confidence in ability to self-regulate weight

Participants expressed confidence in their ability to maintain their weight loss in the long term. The fact that the ketogenic VLCD had worked so well for them in the programme meant they were confident they could use the same diet principles again if needed, outside of the supported programme. Increased knowledge about food and nutrition also gave participants confidence that their weight was within their control.

I know that if I want to get back to doing the same thing again I've got all the information here to go and do it on my own. P5

Theme 3: challenges keeping on track

Loss of accountability to dietitian and study

Some participants found that the loss of accountability to the dietitian, as well as to the study more broadly, meant their drive and motivation to maintain their weight had waned. They believed they needed someone checking in on them to help them keep on track. Many suggested that another follow-up consultation, phone call, or even an email from the dietitian would be helpful.

I feel like I've self-destructed. I felt like once the program ended I probably—I really needed someone just doing a constant check-in with me, but that's just personally me. I feel that if I haven't got someone keeping an eye on me, that it's like—you know, I feel like I'm indestructible, I can just do what I want P13

Old habits and social situations

Participants found that, once they had finished the programme, they began falling back into old eating habits and eating high calorie foods that they enjoyed. Carbohydrate foods and snacks were especially difficult to resist. Participants also described difficulties controlling their eating in social situations, either when eating out with friends or family or at events, or resisting eating when family members were indulging.

Of course, when you go out with friends and they're bringing out the chips and the nuts and everyone's having a beer, it's very hard to have a soda water and not get stuck into the munchies that are on the table. Going out for dinner is a challenge. P18

Stressful life events or changes in health

Participants described other health problems (eg, hip joint replacement, lower back pain, appendicitis) that made it difficult to eat healthily or exercise/be physically active. Participants also experienced difficulties exercising regularly and controlling eating during the COVID-19 pandemic, with many being bored at home and resorting to snacking or baking, or feeling that they were unable to get out and exercise/be physically active.

I found Covid challenging—I probably spent more time in the kitchen. 'What am I going to do today? I can't go out, let's try and I'll give this a crack and see how I go at that.' And I'm not by nature a sweet tooth, but I found that I was delving into that, which is not a good thing. P15

DISCUSSION

The aim of this study was to explore experiences maintaining weight loss following a multicomponent weight

loss programme for knee OA. We found that participants were overall successful in maintaining their weight loss, being aided by increased knowledge about food, the helpful resources from the programme, and high self-confidence in their ability to self-regulate their weight. However, there were challenges, including the loss of accountability to the dietitian, struggling with old eating habits and social situations, and experiencing other health problems and stressful life events.

To our knowledge, this is the first study to explore experiences maintaining weight loss after a weight loss programme in people with OA, but our findings can be compared with other studies outside of OA. Qualitative studies exploring experiences with long-term maintenance of weight after a weight loss programme have also found that positive feedback (ie, health benefits from weight loss and positive experiences of the programme),⁴² habit formation,^{43 44} exercise/physical activity,^{44 45} provision of educational resources,⁴³ being mindful of food choices and portions,⁴⁵ sustained self-motivation,^{43 45} enhanced self-confidence⁴⁴ and allowance for occasional controlled lapses⁴³ were crucial to success. Barriers to weight loss maintenance include difficulties managing weight when stressed or emotional,⁴³ loss of accountability,⁴⁵ stressful life events or changes in health,^{44 45} difficulties changing food habits⁴⁴ and negative social influences (eg, social norms or situations).^{43 45} These findings also reflect meta-analyses of RCTs examining long-term maintenance of weight loss following non-surgical intervention in adults with obesity, which found that lifestyle interventions combining behaviour change support, physical activity and diet were most effective at reducing weight regain within 12 months of weight loss.⁴⁶ Collectively, these findings suggest that people with OA have broadly similar experiences maintaining weight after weight loss as the broader population. One unique finding within our cohort was that, for some, improvements in knee pain actually reduced motivation to maintain weight loss and continue exercising. Previous research has found that continuously redefining goals, as well as being motivated by a combination of extrinsic (eg, desire for social standing/acceptance or a more socially acceptable body type) and intrinsic (eg, desire to improve health or prevent worsening of knee pain) factors, are important for successful long-term weight loss maintenance.⁴⁷ This suggests that participants within our cohort may have benefited from assistance in redefining goals and building other extrinsic and intrinsic motivators in order to maintain motivation once knee symptoms improve.

In the literature, VLCDs are often considered to be unsustainable and associated with rapid weight regain,^{48 49} though other research has refuted this.⁵⁰ We found that the ketogenic VLCD is an acceptable weight loss diet for people with knee OA and that improvements in weight can be successfully sustained over 6 months. Further research is needed to explore experiences maintaining weight in the longer term, over a number of years, in

people with OA. Given we recruited participants who had successfully lost weight during the intervention, future research should also explore the experiences and perceptions of those who did not successfully lose weight. It is notable that many of our participants were still regularly using meal replacement products in the 6 months after the programme had ended, some of whom were still replacing two meals per day and following principles of the ketogenic restriction phase of the diet. This reflects the findings of a recent mixed-methods study that explored experiences of Australians who followed a VLCD.⁵¹ It found that people felt dependent on the VLCD in the long-term as they were afraid of regaining the weight they had lost, and of losing the benefits that had been achieved. This is a potentially undesirable finding given that the ketogenic restriction phase of the diet is not usually advocated for long-term use⁵² due to the potential negative effects on electrolyte balance, hypotension and gallstones.⁵³ Some research also suggests that VLCDs, compared with balanced weight loss diets, may lead to more disordered long-term eating behaviours, such as repeated cycling on and off the VLCD.⁵⁴ This, and our findings, suggest that greater focus on transitioning to a long-term healthy eating diet to maintain weight may be necessary and, in some cases, medication may be required to assist with weight maintenance—though these come with the risk of additional side effects. This also reflects findings from our other qualitative study exploring participant experiences with the weight loss programme immediately after completion,²⁵ which suggested greater emphasis be placed on building skills around long-term healthy eating.

Participants in our study felt that they were equipped with the skills and knowledge to manage their weight in the long term, and many did not appear to be concerned by the risk of future weight gain, as they felt confident in how to deal with it. This reflects previous research which found that individuals with obesity who were prepared for occasional failure were more likely to maintain their behaviour in the long term.⁴³ Another qualitative study exploring the dynamics of decision-making in weight loss and maintenance in people with obesity found that the individual's knowledge and skills was a key driver of behavioural decisions.⁵⁵ This highlights the importance of providing long-term education and improving self-efficacy around eating and nutrition to help facilitate long-term change in eating behaviours.

Although our participants were generally confident in their ability to self-regulate their weight in the future, the loss of accountability to the dietitian, or to the study more broadly, was a challenge to the long-term maintenance of their weight. This reflects previous research which similarly found that people with obesity desire greater support when maintaining their new weight after a weight loss programme.⁵⁶ This suggests that providing participants with some long-term support and follow-up, such as a booster session with the dietitian, is important. Digital technologies (eg, apps, text messaging, emails)

may also play a role in aiding weight loss maintenance.⁵⁷ Another potential option to improve feelings of accountability includes offering peer group-based support for people who have lost weight, as there is some evidence of a relationship between camaraderie in group-based interventions and successful long-term weight loss maintenance.^{42–47} Further research is required to investigate the most cost-effective ways of providing long-term support to patients to provide a sense of accountability in the long term.

Our findings have implications for future weight loss programmes for people with knee OA. Participants were generally successful at maintaining their weight loss in the 6 months since the programme, suggesting that this diet programme is an effective method of weight loss in people with knee OA in the medium term. Our participants valued the importance of exercise and physical activity in the management of their weight, suggesting that future weight loss programmes would benefit by including an exercise/physical activity programme alongside any dietary intervention. The resources provided in the programme, including educational booklets combined with dietitian consultations, helped participants increase their knowledge about food and nutrition, and hence these elements should also be included in future weight loss programmes. Finally, participants struggled with the loss of accountability to their dietitian, suggesting that longer-term follow-up consultations or support via digital health⁵⁷ may be beneficial.

Study limitations

Our study has strengths and limitations. Strengths include the broad sample of participants interviewed, including males and females across regional and metropolitan areas of Australia. Limitations of our study include the fact that our sample comprised participants who had volunteered for the RCT and for this qualitative study. As such, our cohort may have more positive experiences or be more willing to share their perceptions. We interviewed participants 6 months after completing the programme, and so it is not clear whether experiences would differ in the longer term. In addition, our sample comprised people who lived in Australia, spoke English and had private health insurance, and thus our findings may not be transferable to those in other settings and countries.

Conclusions

In conclusion, we found that participants had overall positive experiences maintaining their weight loss since completing the weight loss programme and were confident in their ability to self-regulate their weight in the future. Findings suggest a programme incorporating dietitian and physiotherapist consultations, a VLCD, and educational and behaviour change resources supports weight loss maintenance in the medium term. Further research is required to explore strategies to overcome barriers like loss of accountability and returning to old eating habits.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the University of Melbourne Human Research Ethics Committee (#12849). Written informed consent was obtained from all participants.

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Data availability statement No data are available. Due to the type of data used in this study (qualitative interview transcripts), raw data are not available for sharing to protect participant anonymity.

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