

Psychosocial enhancement of the Green Prescription for obesity recovery: a randomised controlled trial

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ABSTRACT

AIMS: Kia Ākina is a low-cost obesity recovery network providing ongoing addiction-orientated psychosocial support. This study explored the impact of Kia Ākina when added to the Green Prescription, a key government-funded health promotion programme in New Zealand.

METHODS: A randomised controlled trial (ACTRN12613001160729) involving 108 participants recruited from primary care compared Green Prescription plus Kia Ākina (KA/GRx) with Green Prescription alone (GRx) over 12 months. The primary *a priori* outcome measure was achieving 5% loss of weight from baseline.

RESULTS: KA/GRx participants lost more weight overall than GRx (3.6kg vs 0.7kg, $p=0.03$), while 39% of the GRx group *gained* weight compared with 21% of KA/GRx ($p=0.04$). However, KA/GRx and GRx had similar proportions with weight loss of 5% or greater (20% vs 17%, $p=0.62$). KA/GRx participants had greater changes in confidence about recovery ($p=0.02$), and quality of life measures ($p=0.03$) and greater overall satisfaction with assistance received ($p<0.001$) compared with GRx participants.

CONCLUSIONS: Psychosocial support provided through Kia Ākina enhanced treatment outcomes for people with obesity at 12 months when added to GRx, although weight-loss outcomes were modest. Before Kia Ākina is expanded, improved weight-loss outcomes are required, which may be achieved through individualised assessment and targeted dietary assistance.

The global increase in people with obesity¹ is well represented in New Zealand where obesity rates have sharply increased over the past 30 years so that over 30% of the general population 15 years and above are now obese.²

While governments across the world struggle with this epidemic,³ a fundamental challenge for health care systems is how to assist the thousands of people who now suffer from obesity.

Despite decades of research and formulation of weight-loss guidelines⁴⁻⁶ long-term non-surgical treatment outcomes for obesity remain disappointing.^{7,8} Even achieving the minimal permanent weight loss of 5% required to produce clinically significant improvements has proved too difficult for the majority.^{9,10} Nevertheless, metabolic benefits can occur with healthy nutrition and

increased physical activity in the absence of significant weight loss.¹¹

Primary care is a setting widely recognised as the most appropriate for the treatment of obesity and associated health conditions. However, the effectiveness of interventions by generalist health professionals and counselling by physicians is questionable.^{12,13} Lack of training, time and infrastructural support plus cynicism about treatment effectiveness have been identified as factors undermining physicians' effectiveness.¹⁴

The Green Prescription has been demonstrated to be an inexpensive intervention for increasing activity in sedentary people¹⁵ and is a key government-funded programme for assisting people with a range of chronic conditions, including obesity, to improve their health primarily through increasing physical activity.¹⁶ The most common

referrals are people who are overweight. This strategy is supported by evidence that exercise alone can be effective in weight reduction,¹⁷ and that, even when no weight loss occurs, exercise will improve general health as reflected in the reduction of cardiovascular disease risk factors.

Research on the role of addictive processes in obesity has been accelerating in recent years, and the use of addiction methods and therapies in assisting people with obesity is gaining traction.^{18,19}

Kia Ākina (“be encouraged and supported”) is an evolving obesity recovery network that emerged out of a study comparing Weight Watchers and Overeaters Anonymous. The study identified the need for a group-based addiction treatment programme for people with obesity wanting to lose weight, that provided ongoing support, was financially accessible and “non-religious”.²² Kia Ākina provides ongoing psychosocial support incorporating addiction and standard weight-loss strategies, encourages self-discovery and focuses on weight-loss based on a sustainable new recovery lifestyle.

Weight loss is the primary outcome measure in clinical studies of obesity.¹⁰ However, at times this focus has been to the exclusion of broader personal functioning measures, including quality of life data, limiting the overall clinical and life significance of weight-loss results.²⁰

This study aimed to investigate whether psychosocial support provided by Kia Ākina enhances the weight-loss and other outcomes from the Green Prescription programme within New Zealand primary care services.

Methods

The design was a parallel two-group, randomised controlled trial comparing Green Prescription plus Kia Ākina (KA/GRx) with Green Prescription alone (GRx) for people with obesity (BMI >30) (kg/m²), recruited during a routine primary care consultation.

The Green Prescription was provided by the GP before the GP or practice nurse obtained formal consent for the study, undertook BMI measurement and conducted a baseline physical fitness test. Contact details of each recruited participant were

then relayed to a National Addiction Centre researcher (RS) who arranged for baseline self-report measures to be completed via an online questionnaire. Randomisation to one of the two treatment groups (KA/GRx or GRx) occurred once these on-line measures were completed.

Randomisation involved a computer-generated random allocation sequence (1:1), stratified for gender and primary care venue, independent of the study’s clinicians.

Participants in the KA/GRx arm were invited to attend an introductory Kia Ākina workshop. Both treatment groups were actively encouraged by their primary care physician and practice nurse to become involved in the Green Prescription opportunities.

The study was registered with the Australian and New Zealand Clinical Trials Registry (ANZCTR) (ID: ACTRN12613001160729). Ethics approval was given by the Southern Health and Disabilities Ethics Committee (Ref: 13/STH/151).

Sample

One hundred and fifty-nine patients were screened during 2013/2014 in four geographically separate (North, South, West, North/West) general primary care venues in Christchurch, New Zealand. Inclusion criteria were: 23–65 years old, not currently involved in other weight loss programmes, with no current significant medical condition or undergoing medical treatment likely to significantly affect weight, or which would make weight loss or dietary restriction contraindicated. Fifty-one patients were excluded (11 did not meet inclusion criteria, 37 declined to participate and three for reasons unknown). The remaining 108 were recruited for the study, and randomised into the two groups. The percentage of men who were screened in but declined to participate (23%) was significantly higher than the percentage of men who subsequently participated in the study (9%), $p < 0.01$.

Interventions

The Green Prescription primarily provides free consultations with a qualified and experienced physical activity coach who helps to support each person to discover suitable physical activity options in their community. Each participant also has

the opportunity to try a range of activities in a supported environment, discuss topics that support a healthy lifestyle, establish a plan of activity suited to meet individual need and be supported by other participants and Green Prescription staff. During the time of the study, the Green Prescription programme in Canterbury underwent a widening of scope from a primary focus on physical activity to incorporate instruction about healthy food and eating behaviour. An eating programme “Appetite for Life”,²² group support and education sessions about healthy living, as well as text and email encouragement were added.

Kia Ākina is an obesity recovery network which utilises six standard addiction treatment strategies: permanent life-style change;²³ safe non-stigmatising venue;²⁴ motivational enhancement principles;²⁵ abstinence-based food-rules;²⁶ harm reduction²⁷ and care of long-term medical conditions;²⁸ and self-help recovery group processes. Kia Ākina primarily provides ongoing psychosocial support, but is grounded in traditional evidenced-based approaches to weight loss, involving a combination of Food/diet modification, increased physical Activity and Behavioural strategies, termed the FAB approach.⁴

Participants are encouraged to set personal weight loss goals, either on their own or in interaction with the network, select from a range of options to be involved in and work at their own pace. The options include face to face meetings—six monthly workshops (two hours each) and weekly facilitated group discussion meetings (one hour), with topics determined by participants—an ongoing email discussion group based on a weekly email message addressing one of five key principles (Take Control, Get Active, Eat Well, Persist, Enjoy Life),²⁹ a daily text buddy system and regular motivational text messages.

A list of 50 energy-dense, nutrient-poor foods high in fat, sugar and/or containing alcohol, has been developed,³⁰ referred to as the NEEDNT Food List (Non-Essential, Energy-Dense, Nutritionally-deficient). This list provides a starting point for participants to identify problematic foods to work on.

Measures

The primary *a priori* outcome was a 5% reduction in weight at 12 months or

not. Additional weight measures included 12-month total weight loss, % weight loss and % excess weight loss (%EWL) using a BMI of 29 as the target weight. Secondary measures included: physical fitness using the 2-minute step in place test (Step Test)³¹ combined with heart recovery rate at 1 minute (HRR1)^{32, 33} the Kessler 10 Psychological Distress Scale (K10);³⁴ two Likert scales (0–10 scale) measuring the two central constructs of readiness for change²⁵—the importance of change to the individual and confidence that change is possible; and a quality of life questionnaire, WHOQOL-BREF.³⁵

Following initial baseline assessment, the practice nurse completed three-monthly weight (digital scales) and six-monthly physical fitness measures. The Step Test measures the number of steps a participant achieves in 2 minutes—right knee raised above a set level to achieve one step. HRR1 is calculated as the heart rate immediately at the end of the Step Test minus the heart rate one minute later. In addition to demographic, weight-loss and substance use questions at baseline, the other measures were completed on-line at baseline, six- and 12-months.

Likert scales (ranging 1–7) were administered six-monthly to check the total amount of food advice given by the GP and practice nurse. The Communication, Comfort and Rapport subscales of the Medical Interview Satisfaction Scale³⁶ measuring the quality of the therapeutic relationships were administered online six-monthly.

Finally, acceptability of adding Kia Ākina to the Green Prescription was assessed through a measure of overall satisfaction of assistance received using a 5-point Likert Scale (1. Very Satisfied–5. Very Unsatisfied).

Statistical analysis

The primary analyses of weight changes at 12 months were undertaken on an intention to treat basis, with missing weight-loss data imputed from 12-month group means. Secondary sensitivity analyses were undertaken on those who remained in the KA/GRx or GRx groups at 12 months. T-tests and chi-square tests were undertaken to compare outcomes where appropriate, with comparisons summarised as odds ratios and effect sizes (Cohen d).

Table 1: Demographic, substance and weight characteristics of the sample (n=108), and by treatment groups (n=54 each).

	Total	(sd)	KA/GRx	(sd)	GRx	(sd)
Current age (years):	43.7	(10.9)	45.1	(10.9)	42.4	(10.9)
Baseline weight (kg):	111.2	(21.4)	111.6	(21.2)	110.8	(21.9)
Baseline BMI (kg/m ²):	40.9	(7.1)	41.0	(7.0)	40.8	(7.3)
Weight age 20 years (kg):	79.5	(18.7)	79.3	(18.1)	79.7	(19.4)
Age first obese (years):	26.1	(11.3)	26.1	(11.2)	26.1	(11.5)
Highest weight ever (kg):	118.0	(23.9)	120.0	(25.3)	115.9	(22.4)
Female:	91	(84%)	45	(83%)	46	(85%)
Ethnicity:						
Pākehā (NZ European)	74	(69%)	38	(70%)	36	(67%)
Māori/Pacific	13	(12%)	6	(11%)	7	(13%)
Other	21	(19%)	10	(19%)	11	(20%)
Marital Status:						
Single	28	(26%)	14	(26%)	14	(26%)
Married/defacto	71	(66%)	33	(61%)	38	(70%)
Separated/divorced	9	(8%)	7	(13%)	2	(4%)
Highest level of education:						
Secondary	37	(34%)	16	(30%)	21	(39%)
Tertiary	71	(66%)	38	(70%)	33	(61%)
Main source of income: (n=103)						
Full-time employment	51	(48%)	27	(51%)	24	(44%)
Part-time employment	19	(18%)	8	(15%)	11	(20%)
Government benefit	17	(16%)	6	(11%)	11	(20%)
Supported by partner	14	(13%)	6	(11%)	8	(15%)
Other	2	(2%)	2	(4%)	0	(0%)
Smoking status: (n=107)						
Never smoked daily	64	(60%)	32	(59%)	32	(60%)
Non-smoker	34	(32%)	15	(28%)	19	(36%)
Current smoker	9	(8%)	7	(13%)	2	(4%)
Drinking status: (n=107)						
Never	15	(14%)	7	(13%)	8	(15%)
Ex-drinker	4	(4%)	2	(4%)	2	(4%)
Less than once a week	51	(48%)	23	(43%)	28	(52%)
1-2x/week	24	(22%)	11	(21%)	13	(24%)
3-4x/week	5	(5%)	3	(6%)	2	(4%)
5+x/week	8	(7%)	7	(13%)	1	(2%)

Power analysis

The primary outcome was a 5% reduction in weight at 12 months from baseline. It was estimated 25% of experimental participants (KA/GRx arm) would achieve this goal at 12 months based on preliminary Kia Ākina data, compared with 5% of controls (GRx) as anticipated from exercise programmes.³⁷ Using a two-tailed alpha of 0.05, there was 80% power to detect this difference between experimental (KA/GRx) and control (GRx) participants, with a sample size of 49 participants in each group.

Results

Table 1 outlines baseline demographic, substance use and weight characteristics of the sample.

The mean number of formal previous attempts at weight loss was 2.2 (range=0–8). The four most common methods were, in order, Weight Watchers, prescribed diet pills, Jenny Craig and the Atkins Diet.

Over the course of the study 18 participants formally withdrew, nine from each treatment group, and a further 13 partic-

Table 2: Distribution of participants according to the two treatment groups (KA/GRx vs GRx) across six weight loss categories at 12 months follow-up, for both those followed up (n=84) and the full imputed sample (n=108).

OUTCOME	Full sample (imputed) (n=108)				Completed follow-up (n=84)			
	KA/GRx		GRx		KA/GRx		GRx	
10+% weight loss	5	(9%)	2	(4%)	5	(12%)	2	(5%)
5.0–9.9% weight loss	6	(11%)	7	(13%)	6	(15%)	7	(16%)
0.0–4.9% weight loss	32	(59%)	24	(44%)	19	(46%)	13	(30%)
0.1–4.9% weight gain	8	(15%)	18	(33%)	8	(20%)	18	(42%)
5.0–9.9% weight gain	3	(6%)	3	(6%)	3	(7%)	3	(7%)
10+% weight gain	0	(0%)	0	(0%)	0	(0%)	0	(0%)
	54		54		41		43	

Participants were not available for follow-up at 12 months, seven from KA and six from GRx. This left 77 participants from whom complete data at 12 months were obtained (71% follow-up rate). There was no significant difference between the two treatment groups (Chi square=0.21, df=1, p=0.64) in terms of the overall percentage who withdrew or were lost to follow-up.

At 12-month follow-up, home weight measurements using digital scales were obtained from an additional seven participants from whom secondary follow-up measures were not completed (three from KA/GRx, four from GRx). This resulted in 84

participants followed up for weight (75% follow-up rate).

Weight loss

Weight change at 12 months varied considerably across the total sample from 10.5kg gained to 21.0kg lost.

Weight loss data were categorised into six clinically meaningful groups,¹⁰ as seen in Table 2. 11/54 (20%) of KA/GRx had a weight loss of 5% or greater compared with 9/54 (17%) in GRx (p=0.62, OR=0.78 (0.30, 2.07)). 21/54 (39%) of the GRx group gained weight compared with 11/54 (21%) of the KA/GRx group (p=0.04, OR=2.49 (1.05, 5.88)).

Table 3: Comparison of weight outcome measures between participants in the KA/GRx vs GRx groups for both those followed up (n=84) and the full sample (imputed) (n=108).

	Total	(sd)	KA/GRx	(sd)	GRx	(sd)	t	p	D
Baseline weight (n=84)	112.5	(22.3)	112.3	(21.5)	112.7	(23.1)			
12-month weight	110.4	(22.5)	108.6	(20.9)	112.0	(24.0)			
Weight loss (kg)	2.1	(6.2)	3.6	(6.5)	0.7	(5.6)	2.15	0.03	0.48
% Weight loss	1.9	(5.3)	3.1	(5.5)	0.7	(4.9)	2.15	0.03	0.46
% Excess weight loss	8.7	(28.5)	14.0	(33.1)	3.7	(22.6)	1.68	0.09	0.36
Baseline weight (n=108)	111.2	(21.4)	111.6	(21.2)	110.8	(21.9)			
12-month weight	109.0	(21.5)	108.0	(20.6)	110.0	(22.6)			
Weight loss (kg)	2.2	(5.5)	3.6	(5.7)	0.7	(5.0)	2.79	0.006	0.54
% Weight loss	1.9	(4.7)	3.2	(4.8)	0.7	(4.4)	2.84	0.005	0.54
% Excess weight loss	9.3	(25.6)	14.6	(29.3)	4.1	(20.2)	2.17	0.03	0.42

Table 4: Comparison of secondary outcome measures between KA/GRx vs GRx participants at 12-month follow-up (n=68-81).

	Total	(sd)	KA/GRx	(sd)	GRx	(sd)	t	p	d
PHYSICAL FITNESS (n=68)									
Baseline steps	80.1	(20.0)	80.5	(18.7)	79.8	(21.2)			
12-month steps	94.6	(24.3)	94.2	(27.3)	94.8	(21.9)			
Change steps	14.4	(17.1)	13.7	(18.3)	15.0	(16.3)	0.31	0.76	0.08
Baseline HRR1									
12-month HRR1	26.8	(12.2)	26.5	(13.7)	27.1	(11.1)			
Change HRR1	31.7	(14.4)	31.2	(14.9)	32.1	(14.3)	0.09	0.93	0.02
PSYCHOLOGICAL DISTRESS (n=81)									
Baseline K10 score	21.9	(7.3)	20.8	(7.3)	22.8	(7.2)			
12m K10 score	18.5	(6.4)	16.8	(4.4)	20.0	(7.5)			
Change K10 score	3.3	(6.2)	4.0	(6.5)	2.7	(4.0)	0.92	0.36	0.21
READINESS TO CHANGE (n=81)									
Baseline importance	10.1	(1.6)	9.9	(1.7)	10.2	(1.4)			
12m importance	9.7	(1.8)	9.5	(1.8)	9.8	(1.8)			
Change importance	0.4	(1.5)	0.4	(1.5)	0.4	(1.5)	0.01	0.99	0.00
Baseline confidence									
12m confidence	7.0	(2.5)	7.0	(2.6)	6.9	(2.6)			
Change confidence	7.0	(2.6)	7.8	(2.8)	6.3	(2.6)	2.41	0.02	0.56
QUALITY OF LIFE (n=81)									
Baseline physical health	51.2	(9.9)	51.3	(10.8)	51.1	(9.1)			
12m physical health	66.4	(17.3)	66.1	(18.6)	66.6	(16.3)			
Change physical health	15.2	(15.8)	14.8	(16.5)	15.5	(15.4)	0.19	0.85	0.04
Baseline psychological									
12m psychological	49.9	(12.9)	49.3	(12.1)	50.3	(13.6)			
Change psychological	58.3	(19.1)	61.0	(17.7)	56.0	(20.2)	1.86	0.07	0.41
Baseline relationships									
12m relationships	57.7	(20.7)	60.3	(22.8)	55.4	(18.5)			
Change relationships	62.0	(19.7)	65.1	(17.5)	59.3	(21.3)	0.26	0.80	0.05
Baseline environment									
12m environment	65.6	(14.6)	66.5	(16.2)	64.8	(13.2)			
Change environment	68.6	(14.0)	72.9	(13.4)	64.8	(13.5)	2.44	0.02	0.55
Baseline percep QOL									
12m percep QOL	66.6	(25.8)	60.8	(29.8)	71.5	(20.8)			
Change percep QOL	71.9	(20.8)	72.3	(21.1)	71.5	(20.8)	2.28	0.03	0.51
Baseline percep Health									
12m percep Health	30.2	(22.3)	30.3	(25.4)	30.2	(19.3)			
Change percep Health	43.8	(24.9)	47.4	(23.8)	40.7	(25.6)	1.08	0.28	0.24
OVERALL SATISFACTION OF ASSISTANCE RECEIVED (n=79)									
	2.4	(1.1)	1.8	(1.0)	2.9	(1.0)	4.96	<0.001	1.10

KA/GRx participants lost more weight than GRx participants (3.6kg vs 0.7kg, $p=0.006$, $n=108$), which translated into significantly greater % weight loss and %EWL (Table 3).

Secondary measures

There were no significant differences between KA/GRx and GRx participants in the change to 12 months for the two physical fitness measures or psychological distress measure, although these improved from baseline across the whole sample (Table 4).

There was no difference between KA/GRx and GRx participants in terms of the change to 12 months in perceived importance of recovery, but there was a significant difference between the two groups in the change in confidence for recovery. KA/GRx participants increased in confidence over the 12 months (7.0 to 7.8), whereas GRx participants' confidence decreased (6.9 to 6.3) ($p=0.02$, $d=0.56$).

The WHOQOL-BREF measures quality of life (QOL) on six domains: Physical Health, Psychological Health, Relationships, Environment, Overall Perception of QOL and Overall Perception of Health, each scored as a percentage. There were significant quality of life improvements for KA/GRx participants compared with GRx for Environment ($p=0.02$, $d=0.55$) and Overall Perception of QOL ($p=0.03$, $d=0.51$), and some indication of a differential advantage to KA/GRx in terms of Psychological Health ($p=0.07$, $d=0.41$). There were significant quality of life improvements for the whole sample for each of the six domains, with medium to very large effect sizes detected for Physical Health ($p<0.001$, $d=1.08$), Psychological Health ($p<0.001$, $d=0.52$) and Perception of Health ($p<0.001$, $d=0.58$).

Participants ($n=79$) reported high overall satisfaction with the assistance received over the 12 months. The total mean score on the 5-point Likert scale was 2.4. KA/GRx participants scored significantly more satisfaction than GRx participants (1.8 vs 2.9, $p<0.001$, $d=1.10$). Eighty-nine percent of KA/GRx participants said they were either satisfied or very satisfied compared with 28% of GRx participants ($p<0.001$, $OR=20.7$ (6.0, 71.0)).

Threats to validity

There were no differences between KA/GRx and GRx participants in terms of the

measures of quality of therapeutic relationships with GP and practice nurse at six months and 12 months. However, at six months, GRx participants reported their GP talking with them more about the types of food to eat ($p=0.047$, $d=0.47$) and how much to eat ($p=0.063$, $d=0.43$). Following this finding, GP and practice nurse colleagues at the four primary care venues were reminded about the importance of clinical equipoise with study participants. The 12-month check revealed no significant differences in these two questions ($p=0.67$, $d=0.09$ and $p=0.28$, $d=0.24$ respectively) or any others.

Discussion

This randomised controlled trial aimed to investigate the impact of adding Kia Ākina, a novel addiction-orientated weight-loss programme providing ongoing psychosocial support to the Green Prescription. The overall 25% drop-out rate at 12-months compared well with other obesity studies.^{38,39}

KA/GRx participants lost more weight overall (3.6kg) than GRx (0.7kg). However, the two groups were not differentiated according to the primary *a priori* outcome measure, 5% loss of weight from baseline. The GRx group, with its widened scope involving eating advice as well as exercise coaching, was over three times more effective than anticipated (17% cf 5% estimated), whereas the KA/GRx group was a little less effective than was predicted (20% cf 25% estimated) in terms of 5% weight-loss from baseline.

The 12-month weight loss of 3.6kg in KA/GRx participants compares well with the 3.0kg weight loss found in an independent study of Weight Watchers, the most prominent commercial weight-loss programme in New Zealand.⁴⁰

One in five of the KA/GRx group and one in six of the GRx group achieved a 5% weight loss in this 12-month study. This contrasts favourably with the estimated natural history in the US population of one in eight and one in seven morbidly obese men and women who achieve this annually.⁴¹

The odds of *gaining* weight in the KA/GRx group were two and a half times less than in the GRx group, suggesting the addition of Kia Ākina may be most helpful at reducing

an ongoing progression of obesity at the harder-to-treat end of the obesity spectrum.

The further advantages for KA/GRx in increasing confidence about recovery and enhancing aspects of quality-of-life suggest the additional content of Kia Ākina has some impact on improving participants' life functioning and providing hope for future recovery from obesity. These are elements consistent with a contemporary addiction treatment orientation; ie concern with broader life functioning than simply whether there has been a cessation of addictive behaviour.⁴²

Five of the six strategies underpinning Kia Ākina—permanent lifestyle change, safe non-stigmatising venue, motivational enhancement, long-term harm reduction and recovery group process—are standard addiction treatment strategies, but not unique to addiction treatment. The one unique strategy, abstinence rules for NEEDNT food,³⁰ is different to the traditional moderation approach in obesity treatment,^{43,44} although is unlikely to be a single factor underlying Kia Ākina's apparent effectiveness.

Strengths of this study were its real-life setting, procedures involving routine primary care consultations, ensuring the main outcome measures (weight and fitness) were obtained during routine care and the use of a comprehensive outcome measurement package.²¹

An important limitation was the relatively short follow-up period of 12-months, which precludes any definitive conclusion about Kia Ākina being an effective weight-loss addition to the Green Prescription in obesity. Kia Ākina is continuing to run as a recovery network, emphasising the importance of ongoing recovery work while enjoying life now, and providing the necessary support for maintenance of weight-loss,⁴⁵ making positive longer-term outcomes a possibility. A further limitation was the relative lack of men in the study brought about in part by significantly more men declining to participate following being screened in. While

there is little evidence that effective weight loss strategies are different between men and women,⁴⁶ there is a growing literature on specific needs for men in weight-loss programmes.⁴⁷ Further research is needed to determine whether Kia Ākina is inherently less appealing to men than women.

The positive results found for KA/GRx participants indicate that Kia Ākina has promise as an addition to the Green Prescription, especially when more psychosocial support is required, although weight-loss outcomes at 12-months were modest. Nevertheless, the high satisfaction rating by KA/GRx participants compared with GRx participants indicates the Kia Ākina programme is providing participants with something important and of value. However, before expanding the programme there are three challenges:

1. To better understand what it is that is valued by participants. For instance, is it the existence of a safe place among peers to feel accepted and supported, or is it the provision of hope that longer-term recovery is possible?
2. To undertake longer follow-up of participants in order to investigate whether positive outcomes are obtained over time; and
3. To explore enhancement of Kia Ākina in order to improve the weight-loss outcomes while maintaining participants' high satisfaction with the programme. These developments could include clinical assessment, tailoring approaches to the type of obesity and providing individualised dietary assistance. These additions would move Kia Ākina away from being a low-cost recovery network towards functioning more as a specialist obesity clinic. However, these two orientations could feasibly be combined in a service utilising the best dietary approaches available while continuing a peer-based recovery network.

Competing interests:

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REFERENCES:

- World Health Organization. Obesity and overweight. Fact Sheet #311, updated January 2015. <http://www.who.int/mediacentre/factsheets/fs311/en/> (accessed 12/3/2015).
- Ministry of Health. New Zealand Health Survey. Annual update of key findings 2012/2013. Wellington: Ministry of Health, 2013.
- James WPT. WHO recognition of the global obesity epidemic. *Int J Obes (Lond)*. 2008 Dec; 32 Suppl 7:S120-126. doi: 10.1038/ijo.2008.247.
- Ministry of Health, Clinical Trials Research Unit. Clinical guidelines for weight management in New Zealand adults. Wellington: Ministry of Health, 2009.
- National Health and Medical Research Council (NHMRC). Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia. Melbourne: National Health and Medical Research Council, 2013.
- National Institute for Health and Care Excellence (NICE). Managing Overweight and Obesity in Adults: Lifestyle Weight Management Services, 2014. <http://www.nice.org.uk/guidance/ph53> (accessed 25/9/2015).
- Fabricatore AN, Wadden TA. Obesity. *Annu Rev Clin Psychol*. 2006; 2:357-77.
- Laddu D, Dow C, Hingle M, et al. A review of evidence-based strategies to treat obesity in adults. *Nutr Clin Pract*. 2011 Oct; 26(5):512-25. doi: 10.1177/0884533611418335.
- Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002 7; 346(6):393-403.
- Douketis JD, Macie C, Thabane L, Williamson DF. Systematic review of long-term weight loss studies in obese adults: clinical significance and applicability to clinical practice. *Int J Obes (Lond)*. 2005; 29(10):1153-67.
- Huang T, Tobias D, Hruby A, Rifai N, Tworoger S, Hu F. An Increase in Dietary Quality Is Associated with Favorable Plasma Biomarkers of the Brain-Adipose Axis in Apparently Healthy US Women. *Journal of Nutrition* 2016; 146:1101-8.
- Tsai AG, Wadden TA. Treatment of obesity in primary

- care practice in the United States: A systematic review. *Gen Intern Med.* 2009; 24(9): 1073–1079. doi: 10.1007/s11606-009-1042-5. Epub 2009 Jun 27.
13. Hartmann-Boyce J, Johns DJ, Jebb SA, et al. Behavioural weight management programmes for adults assessed by trials conducted in everyday contexts: systematic review and meta-analysis. *Obes Rev.* 2014; 15(11): 920-932. doi: 10.1111/obr.12220. Epub 2014 Aug 11.
 14. Forman-Hoffman V, Little A, Wahls T. Barriers to obesity management: a pilot study of primary care clinicians. *BMC Fam Pract.* 2006; Jun 6; 7:35.
 15. Elley R, Kerse N, Arroll B, et al. Cost-effectiveness of physical activity counselling in general practice. *N Z Med J.* 2004; 117(1207) http://www.nzma.org.nz/_data/assets/pdf_file/0011/17948/Vol-117-No-1207-17-December-2004.pdf
 16. Ministry of Health. Green Prescription, 2014, <http://www.health.govt.nz/our-work/preventative-health-wellness/physical-activity/green-prescriptions> (accessed 6/9/2015).
 17. Shaw KA, Gennat HC, O'Rourke P, Del Mar C. Exercise for overweight or obesity. *Cochrane Database of Syst Rev.* 2006 Oct 18; (4): CD003817 DOI:10.1002/14651858.CD003817.pub3.
 18. Brownell KD, Gold MS (eds). *Food and Addiction: A Comprehensive Handbook.* Oxford University Press, New York, 2012.
 19. Barry D, Clarke M, Petry N. Obesity and its relationship to addictions: Is overeating a form of addictive behavior? *Am J Addict.* 2009; 18(6):439–451. doi: 10.3109/10550490903205579.
 20. Schroder RN, Stevenson R, Sellman JD, et al. Abstinence vs. moderation in obesity treatment: client perceptions of what works. A commissioned paper for the National Heart Foundation of New Zealand, 2011.
 21. Avenell A. Systematic review of the long-term effects and economic consequences of treatment for obesity and implications for health improvement. *Health Technol Assess.* 2004; 8(21):1–182.
 22. Cutler L, King B, McCarthy N, et al. Appetite for life: an evaluation of a primary care lifestyle programme. *J Prim Health Care.* 2010; 2(4):281–287.
 23. Vaillant GE. What can long-term follow-up teach us about relapse and prevention of relapse in addiction? *British J Addict.* 1988; 83(10):1147–1157.
 24. Thomas SL, Hyde J, Karunaratne A, et al. Being fat in today's world: A qualitative study of the lived experiences of people with obesity in Australia. *Health Expect.* 2008; 11(4): 321-330. doi: 10.1111/j.1369-7625.2008.00490.x. Epub 2008 Jul 28.
 25. Rollnick S, Allison J. Motivational interviewing. Chapter 7 in N Heather & T Stockwell (eds), *The Handbook of Treatment and Prevention of Alcohol Problems*, John Wiley & Sons Ltd: England, 2004.
 26. Koob GF, Volkow ND. Neurocircuitry of addiction. *Neuropsychopharmacology.* 2010; 35(1): 217-238. doi: 10.1038/npp.2009.110.
 27. Cheung YW. Substance abuse and developments in harm reduction. *CMAJ.* 2000; 162(12):1697–1700.
 28. Barr VJ, Robinson S, Marinlink B, et al. The expanded chronic care model: An integration of concepts and strategies from population health promotion and the chronic care model. *Hosp Q.* 2003; 7(1):73–82.
 29. Sellman JD. *Real weight loss: A practical guide to changing your lifestyle and achieving long-term weight loss.* Nelson, New Zealand: Craig Potton Publishing, 2008.
 30. Elmslie JL, Sellman JD, Schroder RN, Carter FA. The NEEDNT Food List: non essential, energy-dense, nutritionally-deficient foods. *N Z Med J.* 2012; 125(1350):84–92.
 31. Rikli R, Jones J. Development and validation of a functional fitness test for community-residing older adults. *J Aging Phys Act.* 1999; 7: 129–161.
 32. Prado DM, Silva AG, Trombetta IC, et al. Exercise training associated with diet improves heart rate recovery and cardiac autonomic nervous system activity in obese children. *Int J Sports Med.* 2010; 31(12): 860–865. doi: 10.1055/s-0030-1267158. Epub 2010 Nov 11.
 33. Guazzi M, Myers J, Peberdy MA, et al. Cardiopulmonary exercise testing variables reflect the degree of diastolic dysfunction in patients with heart failure – normal ejection fraction. *J Cardio-pulm Rehabil Prev.* 2010; 30(3): 165–172. doi: 10.1097/HCR.0b013e3181d0c1ad.
 34. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry.* 2003; 60(2):184–9.
 35. WHOQOL Group. Development of the World Health Organization WHOQOL-BREF Quality of

- Life Assessment. *Psychol Med.* 1998; 28(3):551–558.
36. Meakin R, Weinman J. The Medical Interview Satisfaction Scale (MISS-21) adapted for British general practice. *Fam Pract.* 2002; 19(3):257–263.
 37. Johns DJ, Hartmann-Boyce J, Jebb SA, Aveyard P. Diet or exercise interventions vs combined behavioural weight management programs: a systematic review and meta-analysis of direct comparisons. *J Acad Nutr Diet.* 2014; 114(10):1557–1568. doi: 10.1016/j.jand.2014.07.005.
 38. Mutsaerts MAQ, Kuchenbecker WKH, Mol BW, et al. Dropout is a problem in lifestyle intervention programs for overweight and obese infertile women: a systematic review. *Hum Reprod.* 2013; 28(4):979–986. doi: 10.1093/humrep/det026. Epub 2013 Feb 20.
 39. Hadziabdic MO, Mucalo I, Hrabac P, et al. Factors predictive of drop-out and weight loss in weight management of obese patients. *J Hum Nutr Diet.* 2015; 28 Suppl 2: 24–32. doi: 10.1111/jhn.12270. Epub 2014 Sep 13.
 40. Jebb SA, Ahern AL, Olson AD, et al. Primary care referral to a commercial provider for weight loss treatment versus standard care: A randomised controlled trial. *Lancet.* 2011; 378(9801):1485–92.
 41. Fildes A, Charlton J, Rudisill C, et al. Probability of an obese person attaining normal body weight. Cohort study using electronic health records. *Am J Public Health.* 2015; 105(9): e54–9. doi: 10.2105/AJPH.2015.302773. Epub 2015 Jul 16.
 42. Miller PG, Miller WR. What should we be aiming for in the treatment of addiction. *Addiction.* 2009; 104(5): 685–686. doi: 10.1111/j.1360-0443.2008.02514.x.
 43. McMillan-Price J, Brand-Miller J. Dietary approaches to overweight and obesity. *Clin Dermatol.* 2004; 22(4):310–314.
 44. Lindstrom J, Peltonen M, Tuomilehto J. Lifestyle strategies for weight control: experience from the Finnish Diabetes Prevention Study. *Proc Nutr Soc.* 2005; 64(1):81–8.
 45. Soleymani T, Daniel S, Garvey WT. Weight maintenance: challenges, tools and strategies for primary care physicians. *Obes Rev.* 2016; 17(1):81–93. doi: 10.1111/obr.12322. Epub 2015 Oct 21.
 46. Williams RL, Wood LG, Collins CE, Callister R. Effectiveness of weight loss programmes – is there a difference between men and women: A systematic review. *Obes Rev.* 2015; 16:171–186.
 47. Sabinsky MS, Toft U, Raben A, Holm L. Overweight men's motivations and perceived barriers towards weight loss. *Eur J Clin Nutr.* 2007; 61:526–531.