Australia's National
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Total Wellbeing Lifestyle Plan

Effectiveness of an online weight management program for people with chronic disease delivered through a private health insurance model

Prepared by Gilly Hendrie and Danielle Baird

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1 Background

1.1 Risk factors for chronic disease

Data from the Australian Institute of Health and Welfare suggests that, in 2017/18, one in two Australians had at least one chronic condition, and one in five had at least two chronic conditions [1]. There is growing recognition that lifestyle behaviours such as dietary intake play a crucial role in the prevention and management of chronic conditions such as obesity, type 2 diabetes, and cardiovascular disease [2].

Poor diet is a key modifiable, behavioural risk factor for chronic conditions and is among the top 5 risk factors contributing to the total burden of disease. In Australia in 2018, dietary risks contributed 5.4% to the total burden of disease, third behind tobacco use (8.6%) and overweight and obesity (8.4%) [3]. Australians generally do not eat enough healthy foods (such as vegetables, fruit, grains, lean meat and dairy) and eat too many discretionary foods (which are foods that are high in salt, fat and sugar). Inadequate vegetable and fruit consumption, in particular, is a risk factor for overweight and obesity, type 2 diabetes and cardiovascular disease [4].

In Australia, two-thirds of adults are classified as overweight or obese [5], and this is expected to increase to more than three-quarters of the adult population by 2030 [6]. With most adults struggling to control their weight, there is a need for more evidence-based, self-management programs that support healthy dietary habits and lifestyle patterns to promote longer-term, weight management and general health [7].

1.2 CSIRO Total Wellbeing Diet online

In late 2014, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Digital Wellness launched a commercial, online version of the CSIRO Total Wellbeing Diet. The dietary components were developed through clinical trials and were initially translated into a series of popular books, estimated to have delivered weight loss benefits to 290,700 Australians [8]. The online format delivers the same program as the books but through a digital platform, allowing for several enhancements, including personalized eating plans, customized weekly meal plans, food and exercise diaries, the ability to record and see progress of weight loss, a member forum, and supportive correspondence via email.

2 Total Wellbeing Lifestyle Plan Delivery

2.1 Program objectives

The Digital Wellness Total Wellbeing Lifestyle Plan is an expansion of the Total Wellbeing Diet designed to facilitate behaviour change by providing person-centred advice to support people with chronic disease to manage their health. The program is focused on supporting people to lose weight and improve their health outcomes through diet, exercise, and lifestyle changes.

The primary objectives of the Total Wellbeing Lifestyle Plan are to:

1. Achieve 5% weight loss by end of the 24-week program, and
2. Achieve improvements in clinical health markers identified in the baseline health assessment.

The secondary objectives of the Total Wellbeing Lifestyle Plan are to:

1. Increase vegetable and fruit consumption, and
2. Increase physical activity levels from baseline to the end of the program.

2.2 Mode of delivery

The Total Wellbeing Lifestyle Plan is a chronic disease management program focusing on weight control to manage and improve risk factors for obesity, type 2 diabetes, cardiovascular disease, and musculoskeletal health. The program is 24 weeks in duration and uses the menu plans, exercise plans, self-monitoring and positive psychology tools that are part of the CSIRO Total Wellbeing Diet online platform. Condition specific tutorials are included within the programs, as well as 15 coaching sessions delivered by an Accredited Practising Dietitian.

Participants were initially offered the program by their private health insurance fund. The program starts with a comprehensive health care assessment conducted by a registered nurse. Eligible participants were those with hospital cover from a private health fund, a body mass index (BMI) greater than or equal to 25, and with diagnosed risk factor(s) for chronic disease such as elevated blood glucose or HbA1c, elevated blood pressure or cholesterol, or joint pain. Eligible participants were then triaged to one of five condition specific programs within the Total Wellbeing Diet online – high blood pressure, high cholesterol, type 2 and pre-diabetes, joint pain or weight management.

The health care assessment and dietitian coaching sessions were conducted using a program specific telephone system accessed by the nurse and dietitian. The initial health care assessment was about 1 hour in duration, during which the registered nurse asked the questions related to health and lifestyle behaviours that may be impacting on the individuals' chronic disease management. A care plan was created following this assessment that was discussed and agreed upon at the first dietitian coaching session.

Fifteen one-on-one dietitian coaching sessions were offered and each was about 20 minutes in length providing participants with information and knowledge to empower them to achieve changes in their lifestyle behaviours aligned to the health targets outlined in their care plan. These behavioural changes were agreed to by the dietitian and the participant and designed to help achieve the program objectives and bring the participants health markers more in line with clinical recommendations. The first dietitian coaching session was focussed on goal setting for the program. For the series of coaching sessions, the participants were actively involved with goal setting and action plans. At the final session, data was collected via a completion assessment form that replicated the initial health care assessment, including reporting clinical health markers, lifestyle behaviours, quality of life surveys and confidence to manage health.

The Digital Wellness Weight Management Systems are accredited by the Australian Council on Healthcare Standards. They comply with all the requirements of National Safety and Quality Health Service Standards (Second Edition, February 4, 2020) for the provision of health services, through the online platform, including nutritional and exercise coaching and initial health assessments conducted by a registered nurse.

2.3 Data analysis

Deidentified data from the initial health care assessment, surveys, and online program data were provided to CSIRO for analysis. Individuals who completed the program between July 2019 to August 2021 were included in this analysis. Data was removed if the membership period fell outside of this date range (n=273 people removed). Duplicates were identified using an individual's unique identifier. An individual's first record was retained, and duplicates removed (n=173). Data were examined for invalid values using a standard cleaning protocol where erroneous height (<1m or >3m) and weight values (<13kg or >250kg), and extreme BMI values (<13kg/m2 or >97 kg/m2) removed (n=9 removed). This left 546 participants for inclusion in this analysis.

Participants were classified as 'completers' of the program if data were available from the health care assessment at the commencement and completion of the program. Based on this definition, 179 participants were considered to have dropped out of the program. A calculation of total weight loss was possible for participants with a weight entry at week 24. A total of 367 participants were classified as completers and weight loss data available for analysis. Statistical analyses were performed using IBM SPSS statistical software package version 26.

3 Results

3.1 Participants who started the program

In this cohort, there were 546 participants who started the Total Wellbeing Lifestyle Plan. Three-quarters of the participants were female, and over half were aged between 51-70 years (average age 54 years). Three-quarters of the participants were classified as obese. More specifically, 35% were classified as Class 1 obese, 24% as Class 2 and 16% as Class 3 obese. The average starting weight of participants who started the program was 97kg and average BMI 34.7. Most participants resided in middle to higher socioeconomic status areas and identified with European or English culture. The greatest proportion of participants were assigned to the high blood pressure program (36%), followed by high cholesterol (19%), joint pain (18%) and diabetes programs (17%) (Table 1).

Table 1. Baseline demographic characteristics of participants of the Total Wellbeing Lifestyle Plan (n=546).

Characteristics		Count	Percentage of total
Gender	Female	418	76.6%
	Male	128	23.4%
Age group	18-30 years	21	3.8%
	31-50 years	188	34.4%
	51-70 years	301	55.1%
	71 years+	36	6.6%
Weight status	Overweight	124	22.7%
	Obese	410	75.1%
	Class 1 Obese	190	34.8%
	Class 2 Obese	131	24.0%
	Class 3 Obese	89	16.3%
	Missing	12	2.2%
Socioeconomic status	1: Lowest	42	7.7%
	2	91	16.7%
	3: Middle	103	18.9%
	4	129	23.7%
	5: Highest	179	32.9%
State of residence	NSW	289	52.9%
	VIC	100	18.3%
	QLD	76	13.9%
	SA	35	6.4%
	WA	29	5.3%
	Other (TAS, ACT, NT combined)	17	3.1%
Culture	European / English	489	89.6%
	Other	57	10.4%
Chronic condition program	Diabetes	94	17.2%
	High blood pressure	197	36.1%
	High cholesterol	102	18.7%
	Joint pain	99	18.1%
	Weight management	54	9.9%

Nine out of ten participants were highly motivated (scoring 5 or more out of 7) when they started the program, and 67% had attempted to lose weight many times before. At the start of the program, it was common for participants to report to be actively doing things to try and lose weight (39%) but also to be trying to avoid weight gain (19%). About a quarter of the participants were not doing anything for their weight when they started the program (27%). About a quarter of the participants reported to be satisfied or extremely satisfied with their quality of life (Table 2).

Table 2. Health-related characteristics of participants of the Total Wellbeing Lifestyle Plan (n=546).

Characteristics		Count	Percentage of total
Level of commitment	1: Lowest commitment	0	0.0%
	2	0	0.0%
	3	1	0.2%
	4	11	2.0%
	5	39	7.1%
	6	171	31.3%
	7: Highest commitment	296	54.2%
	Missing	28	5.1%
Quality of life	Extremely dissatisfied	15	2.7%
	Dissatisfied	34	6.2%
	Slightly dissatisfied	62	11.4%
	Neutral	14	2.6%
	Slightly satisfied	72	13.2%
	Satisfied	126	23.1%
	Extremely satisfied	26	4.8%
	Missing	197	36.1%
Interested in changing eating habits for health	Yes	463	84.8%
	No	4	0.7%
	Missing	79	14.5%
Weight control	I am actively doing things to try and lose weight	213	39.0%
	I am actively doing things to try and avoid weight gain	103	18.9%
	I am not doing anything in particular for my weight	148	27.1%
	I am actively doing things to try and gain weight	2	0.4%
	Missing	80	14.7%
Weight loss attempts	Yes, many times	364	66.7%
	Yes, occasionally	88	16.1%
	No, never	15	2.7%
	Missing	79	14.5%
Workplace activity	Active / On the go	109	20.0%
	Manual Labourer	2	0.4%
	Office worker (seated extended periods)	238	43.6%
	Sedentary (seated all day)	118	21.6%
	Missing	79	14.5%
Smoking status	Non-smoker	314	57.5%
	Ex-smoker	138	25.3%
	Smoker	15	2.7%
	Missing	79	14.5%

3.2 Participants who completed the program

Of the 546 participants who started the program, 179 dropped out, leaving 367 participants who completed the 24-week program. This equates to a 67% completion rate. Participants who dropped out were mostly similar in demographic characteristics to those who completed the program but tended to be more likely to be dissatisfied or extremely dissatisfied with their quality of life (14% vs 7%) and more likely to have tried to lose weight many times in the past (77% vs 62%, data not shown).

The average starting weight of participants who completed the program was 96kg and starting BMI 34.6. Younger participants tended to be heavier than older participants when they started. Participants assigned to the diabetes and high blood pressure programs were 4-5kg heavier than participants of the other programs. Participants who were dissatisfied with their life, sedentary (seated all day) and had tried to lose weight many times before were also among the heaviest participants at the start of the program (Table 3 and Table 4).

Table 3. Baseline demographic characteristics and body weight of participants who completed the Total Wellbeing Lifestyle Plan (n=367).

Characteristics of completers		Percentage of total	Starting weight	Starting BMI
Total sample		100.0%	96.3	34.6
Gender	Female	76.0%	93.1	34.7
	Male	24.0%	106.6	34.2
Age group	18-30 years	3.0%	105.3	38.4
	31-50 years	28.6%	101.2	35.6
	51-70 years	60.5%	94.1	34.0
	71 years+	7.9%	92.6	33.8
Weight status	Overweight	24.0%	79.2	28.1
	Obese	72.8%	101.9	36.7
	Class 1 Obese	33.5%	89.8	32.2
	Class 2 Obese	22.6%	102.5	37.1
	Class 3 Obese	16.6%	125.4	45.1
	Missing*	3.3%	96.3	-
Socioeconomic status	1: Lowest	7.4%	96.4	34
	2	17.5%	96.5	34.7
	3: Middle	16.4%	95.7	33.8
	4	22.5%	96.7	35.2
	5: Highest	36.2%	96.2	34.4
State of residence	NSW	55.3%	96.9	34.5
	VIC	17.7%	93.1	34.4
	QLD	11.4%	97.1	35.0
	SA	7.6%	94.0	34.5
	WA	5.4%	99.9	34.1
	Other (TAS, ACT, NT combined)	2.5%	102.6	35.1
Culture	European / English	90.5%	97.2	34.8
	Other	9.5%	88.4	32.6
Chronic condition program	Diabetes	16.1%	99.1	35.0
	High blood pressure	36.0%	98.7	35.5
	High cholesterol	20.7%	92.3	33.1
	Joint pain	17.7%	94.8	33.9
	Weight management	9.5%	94.4	34.6

*Starting BMI could not be calculated because height value was missing.

Table 4. Health-related characteristics and starting body weight of participants who completed the Total Wellbeing Lifestyle Plan (n=367).

		Percentage of total	Starting weight	Starting BMI
Level of commitment	1: Lowest commitment	0.0%	-	-
	2	0.0%	-	-
	3	0.0%	-	-
	4	2.5%	99.6	35.7
	5	6.0%	96.7	33.1
	6	30.5%	94.4	33.8
	7: Highest commitment	53.4%	96	34.6
	Missing	7.6%	105.5	38.2
Quality of life	Extremely dissatisfied	2.5%	112.1	41.5
	Dissatisfied	4.4%	105.3	38.1
	Slightly dissatisfied	10.1%	97.4	35.2
	Neutral	2.7%	90.2	33.7
	Slightly satisfied	13.4%	98.8	35
	Satisfied	21.8%	91.9	33.6
	Extremely satisfied	6.0%	89.9	31.9
	Missing	39.2%	97.2	34.4
Interested in changing eating habits to improve health	Yes	77.9%	96.7	34.7
	No	0.5%	-	-
	Missing	21.5%	95.6	34.0
Weight control	I am actively doing things to try and lose weight	36.2%	95.2	34.3
	I am actively doing things to try and avoid weight gain	17.2%	97.9	34.6
	I am not doing anything in particular for my weight	24.3%	97.3	35.5
	I am actively doing things to try and gain weight	0.5%	-	-
	Missing	21.8%	95.6	33.9
Weight loss attempts	Yes, many times	61.6%	98.7	35.3
	Yes, occasionally	13.9%	90.1	32.8
	No, never	3.0%	82.9	29.8
	Missing	21.5%	95.6	34
Workplace activity	Active / On the go	22.3%	91.9	32.8
	Manual Labourer	0.3%	-	-
	Office worker (seated extended periods)	35.4%	94.2	34.4
	Sedentary (seated all day)	20.4%	105	37.1
	Missing	21.5%	95.6	34.0
Smoking status	Non-smoker	51.8%	95.8	34.6
	Ex-smoker	24.5%	97.9	34.9
	Smoker	2.2%	-	-
	Missing	21.5%	95.6	34.0

*data not shown when cell count is <10

3.3 Engagement with the program

Participants attended an average of 5 coaching sessions with the dietitian over the first 12 weeks and a total of 8 across the 24-week program. Self-monitoring is an important part of the Total Wellbeing Lifestyle Plan and participants who completed the program weighed themselves regularly, entering a weight record into the platform an average of 21 times across 24 weeks. Self-monitoring of diet and exercise behaviours was more intensive in the first 12 weeks of the program and then decreased in the second 12 weeks, meaning the average engagement across 24 weeks was lower than the average across the first 12 weeks (Table 5). On average over the 24-week program, participants weighed themselves once per week, tracked their physical activity twice per week and made seven entries into the food diary each day.

Table 5. Engagement with the program of participants who completed the Total Wellbeing Lifestyle Plan (n=367).

Engagement	Weeks 1-12	Weeks 13-24	Across 24 weeks	
Dietitian coaching	5	3	8	sessions attended
Weight tracker	1.3	0.5	0.9	entries per week
Exercise diary	3.0	0.9	2.0	entries per week
Food diary	10.3	4.8	7.5	entries per day

3.4 Weight loss of completers

The average weight loss of participants who completed the program was 6.9kg, equivalent to 7.1 percent of starting body weight. Weight loss in kilograms was greater for participants who were heavier at the start of the program (but not as a percentage of starting body weight). Participants who were classified as Class 1 obese at the start of the program lost 6.5kg, those who were Class 2 lost 7.4kg and those classified as Class 3 lost 8.3kg (Table 6).

As a percentage of starting body weight, weight loss increased with increasing levels of self-reported commitment to the program at the start. Weight loss was also higher in those who seemed new to weight loss programs. For example, those who weren't doing anything to manage their weight when they started the program lost 7.5kg compared to 5.8kg for those who were actively doing things to lose weight (equivalent to 7.7% vs 6.3% of starting body weight), and those who had never tried to lose weight lost 8.1kg compared to 6.5kg for those who had tried many times (equivalent to 9.7% vs 6.7% of starting body weight, Table 7).

Table 6. Weight loss (in kilograms and percentage of starting weight) of participants who completed the Total Wellbeing Lifestyle Plan by demographic characteristics (n=367).

		Weight loss	
		Kilograms	**Percent body weight**
Total		6.9	7.1
Gender	Female	6.5	7.0
	Male	8.1	7.6
Age group	18-30 years	1.8	2.5
	31-50 years	7.1	7.0
	51-70 years	7.2	7.5
	71 years+	6.2	6.5
Weight status	Overweight	5.4	6.8
	Obese	7.2	7.1
	Class 1 Obese	6.5	7.2
	Class 2 Obese	7.4	7.1
	Class 3 Obese	8.3	6.7
	Missing	11.6	10.3
Socioeconomic status	1: Lowest	8.3	8.6
	2	6.5	6.8
	3: Middle	7.5	7.7
	4	6.7	7.0
	5: Highest	6.4	6.6
State of residence	NSW	6.5	6.6
	VIC	7.1	7.7
	QLD	8.5	8.7
	SA	5.7	6.2
	WA	7.1	7.0
	Other (TAS, ACT, NT combined)	9.9	9.5
Culture	European / English	7.0	7.1
	Other	6.4	7.3
Chronic condition program	Diabetes	6.5	6.8
	High blood pressure	7.5	7.4
	High cholesterol	6.2	6.6
	Joint pain	7.1	7.6
	Weight management	6.5	6.8

Table 7. Weight loss (in kilograms and percentage of starting weight) of participants who completed the Total Wellbeing Lifestyle Plan by health-related characteristics (n=367).

		Weight loss	
		Kilograms	Percent body weight
Level of commitment	1: Lowest commitment	-	-
	2	-	-
	3	-	-
	4	4.6	4.9
	5	5.1	4.9
	6	6.7	7.0
	7: Highest commitment	6.9	7.3
	Missing	9.9	8.8
Quality of life	Extremely dissatisfied	3.0	3.6
	Dissatisfied	6.1	5.8
	Slightly dissatisfied	6.3	6.6
	Neutral	6.3	7.1
	Slightly satisfied	5.8	6.0
	Satisfied	7.1	7.5
	Extremely satisfied	5.7	6.4
	Missing	7.9	7.9
Interested in changing eating habits to improve health	Yes	6.5	6.8
	No	-	-
	Missing	8.2	8.2
Weight control	I am actively doing things to try and lose weight	5.8	6.3 6.3
	I am actively doing things to try and avoid weight gain	6.5	6.6
	I am not doing anything in particular for my weight	7.5	7.7
	I am actively doing things to try and gain weight	-	-
	Missing	8.1	8.1
Weight loss attempts	Yes, many times	6.5	6.7
	Yes, occasionally	6.3	6.8
	No, never	8.1	9.7
	Missing	8.2	8.2
Workplace activity	Active / On the go	6.6	7.1
	Manual Labourer	-	-
	Office worker (seated extended periods)	6.3	6.7
	Sedentary (seated all day)	6.7	6.5
	Missing	8.2	8.2
Smoking status	Non-smoker	6.6	7.0
	Ex-smoker	6.5	6.7
	Smoker	-	-
	Missing	8.2	8.2

*data not shown when cell count is <10

3.5 Achievement of five percent body weight lost

One of the primary objectives of the Total Wellbeing Lifestyle Plan was to support participants to achieve a weight loss equivalent to five percent or more of their starting weight. Overall, 62% of participants who completed the program achieved this objective (Table 8). Subgroups of participants who were slightly more likely to achieve this outcome were those assigned to the joint pain program (72% lost 5 percent or more), living in Queensland (76%) or residing in areas of moderate socioeconomic status (72%). Those classified as Class 3 obese or not doing anything about their weight before they started the program were also more likely to achieve this outcome. In both groups, 71% of participants lost 5 percent or more of their starting body weight (Table 8 and Table 9).

Table 8. Percentage of participants who completed the program and lost five percent or more of their starting body weight by demographic characteristics (n=367).

		Less than 5%	5% or more
Total		37.8%	62.2%
Gender	Female	38.5%	61.5%
	Male	35.6%	64.4%
Age groupings in 4 groups	18-30 years	63.6%	36.4%
	31-50 years	36.5%	63.5%
	51-70 years	37.1%	62.9%
	71 years+	37.9%	62.1%
Weight status	Overweight	43.7%	56.3%
	Obese	36.1%	63.9%
	Class 1 Obese	37.4%	62.6%
	Class 2 Obese	39.0%	61.0%
	Class 3 Obese	29.5%	70.5%
	Missing	33.3%	66.7%
Socioeconomic status	1: Lowest	33.3%	66.7%
	2	43.8%	56.3%
	3: Middle	28.3%	71.7%
	4	38.3%	61.7%
	5: Highest	40.5%	59.5%
State of Residence	NSW	44.1%	55.9%
	VIC	30.8%	69.2%
	QLD	23.8%	76.2%
	SA	39.3%	60.7%
	WA	31.6%	68.4%
	Other (TAS, ACT, NT combined)	22.2%	77.8%
Culture	European / English	37.6%	62.4%
	Other	40.0%	60.0%
Chronic condition program	Diabetes	42.4%	57.6%
	High blood pressure	37.1%	62.9%
	High cholesterol	42.7%	57.3%
	Joint pain	28.1%	71.9%
	Weight management	40.0%	60.0%

Table 9. Percentage of participants who completed the program and lost five percent or more of their starting body weight by health-related characteristics (n=367).

		Less than 5%	5% or more
Level of commitment	1: Lowest commitment	-	-
	2	-	-
	3	-	-
	4	44.4%	55.6%
	5	52.4%	47.6%
	6	40.2%	59.8%
	7: Highest commitment	35.4%	64.6%
	Missing	32.1%	67.9%
Quality of Life	Extremely dissatisfied	44.4%	55.6%
	Dissatisfied	37.5%	62.5%
	Slightly dissatisfied	40.5%	59.5%
	Neutral	40.0%	60.0%
	Slightly satisfied	49.0%	51.0%
	Satisfied	36.3%	63.7%
	Extremely satisfied	45.5%	54.5%
	Missing	32.4%	67.6%
Interested in changing eating habits to improve health	Yes	38.4%	61.6%
	No	-	-
	Missing	35.4%	64.6%
Weight control	I am actively doing things to try and lose weight	43.2%	56.8%
	I am actively doing things to try and avoid weight gain	41.9%	58.1%
	I am not doing anything in particular for my weight	29.2%	70.8%
	I am actively doing things to try and gain weight	-	-
	Missing	36.3%	63.7%
Weight loss attempts	Yes, many times	39.3%	60.7%
	Yes, occasionally	35.3%	64.7%
	No, never	36.4%	63.6%
	Missing	35.4%	64.6%
Workplace activity	Active / On the go	40.7%	59.3%
	Manual Labourer	-	-
	Office worker (seated extended periods)	38.0%	62.0%
	Sedentary (seated all day)	37.3%	62.7%
	Missing	35.4%	64.6%
Smoking status	Non-smoker	37.8%	62.2%
	Ex-smoker	37.8%	62.2%
	Smoker	-	-
	Missing	35.4%	64.6%

*data not shown when cell count is <10

3.6 Shift in body weight status

Among this cohort of participants of the Total Wellbeing Lifestyle Plan 73% were classified as obese at the start of the program, and at the end of the program 55% of participants were classified as obese. The percentage of participants who were classified as Class 3 obese decreased from 17% to 11%, and Class 2 obese decreased from 23% to 14% of the cohort (Table 10).

Table 10. Weight status distribution of participants at the commencement and completion of the Total Wellbeing Lifestyle Plan (n=367)

		Commencement (n=367)	Completion (n=367)
Weight status	Normal weight	0.0%	8.2%
	Overweight	24.0%	33.2%
	Obese	72.8%	55.0%
	Class 1 Obese	33.5%	30.5%
	Class 2 Obese	22.6%	13.6%
	Class 3 Obese	16.6%	10.9%
	Missing	3.3%	3.5%

The movement of individuals between weight status groups was also examined. Among participants who were classified as overweight or obese at the start of the program, 45% moved into a healthier weight status category by the end of the program. Across the categories of obesity, 36% of participants (22 out of 61) who were classified as Class 3 obese moved out of this weight status category and down to a lower risk category, and 61% (50 out of 82) of those who were classified as Class 2 obese moved to a lower risk category. Among participants who were classified as Class 1 obese at the start of the program, 48% (60 of 123) were no longer classified as obese at the end of the program. Across all categories of obesity, 24% of participants were no longer classified as obese at the end of the program (Table 11).

Table 11. Shift in body weight status category over the 24-week program.

		Weight status on completion					
		Normal weight	Overweight	Class 1 Obese	Class 2 Obese	Class 3 Obese	Total
Weight status at the start	Overweight	27 (31.0%)	60 (69.0%)	0	0	0	87 (100%)
	Class 1 Obese	3 (2.4%)	57 (46.3%)	63 (51.2%)	0	0	123 (100%)
	Class 2 Obese	0	4 (4.9%)	46 (56.1%)	31 (37.8%)	1 (1.2%)	82 (100%)
	Class 3 Obese	0	0	3 (4.9%)	19 (31.1%)	39 (63.9%)	61 (100%)
	Total	30 (8.5%)	121 (34.3%)	112 (31.7%)	50 (14.2%)	40 (11.3%)	353 (100%)

*Grey shading indicates movement into a healthier weight status category.

3.7 Clinical health markers

The other primary objective of the Total Wellbeing Lifestyle Plan was to improve clinical health markers. This was assessed for those participants who had data for the outcome at the start and end of the 24-week program. Blood pressure was the most recorded outcome (n=101 participants with a measure at the start and end of the program), and the average reduction in systolic blood pressure was 4mmHg and for diastolic blood pressure the average reduction was 1.9 mmHg, equivalent to a 3% and 2% reduction respectively (Table 12).

Cholesterol levels also decreased over the 24-week program. The change in total cholesterol levels were available for 59 participants, and the average reduction was 0.3mmol/L (equivalent to 5% reduction from baseline). The average reduction in triglycerides was 0.5mmol/L which equated to 27% reduction from baseline levels (although data were only available from 16 participants). LDL cholesterol (0.2mmol/L, n=25) also reduced to a smaller extent over the course of the program. The change in fasting blood glucose was able to be calculated for only 17 participants, and the average reduction 0.8mmol/L, equivalent to a 13% reduction from baseline. The data available for HDL, LDL and triglycerides were limited to 16-25 participants and therefore need to be interpretated with caution as they may represent the more motivated participants in the cohort.

The reduction in the pain score was 2.4 units (n=87), which was equivalent to a 41% reduction from baseline levels (Table 12).

Over the course of program, about 30% of participants reported to have changed their medications (data not shown).

Table 12. Change in clinical health markers of participants before and after the 24-week Total Wellbeing Lifestyle Plan.

		Count	Commencement	Completion	Mean change (units)
Blood sugar	Fasting blood glucose	17	6.2	5.4	-0.8 mmol/L
	Random blood glucose	6			-
Blood pressure	Systolic blood pressure	101	129	125	-4.0 mmHg
	Diastolic blood pressure	101	79.3	77.4	-1.9 mmHg
Cholesterol	HDL	23	1.4	1.4	0.0 mmol/L
	LDL	25	3.4	3.3	-0.2 mmol/L
	Triglycerides	16	1.8	1.3	-0.5 mmol/L
	Total cholesterol	59	5.4	5.1	-0.3 mmol/L
Pain	Pain score	87	5.8	3.4	-2.4 units

*data not shown when cell count is <10

3.8 Behavioural outcomes

While the primary goals of the Total Wellbeing Lifestyle Plan were about weight loss and clinical health outcomes, the secondary objectives related to increased vegetable and fruit consumption and increased physical activity levels.

These results were based on participants who had data at the start and end of the program. About half of the participants (47%) had increased their fruit intake and 62% increased their vegetable intake across the 24 weeks of the program. Vegetable intake increased from an average of 3 to 4 serves per day, which equates to an increase of 35% from the start of the program. Fruit increased by 0.4 serves, equivalent to a 25% increase from the start of the program. Alcohol consumption decreased (in terms of amount and frequency) and water consumption increased during the program as well (Table 13).

Both the frequency and duration of physical activity increased during the program. Duration of activity increased from an average of 2.7 to 4.3 hours per week, and 66% of participants reported an increase in physical activity (Table 13).

Table 13. Average change in reported dietary intake and physical activity measures.

	Commencement	Completion	Mean change (units)
Serves of fruit per day (n=283)	1.6	2.0	0.40 serves
Serves of vegetables per day (n=269)	3.0	4.0	1.04 serves
Glasses of water per day (n=144)	3.6	5.0	1.42 glasses
Standard alcoholic drinks per drinking day (n=203)	2.4	2.0	-0.37 drinks
Physical activity (hours per week) (n=268)	2.7	4.3	1.57 hours
Physical activity (days per week) (n=284)	3.6	4.6	1.03 days

*Includes participants who had data at the start and end of the program.

3.9 Satisfaction with the Total Wellbeing Lifestyle Plan

Most participants did not achieve their goal weight during the program (81%) and felt they still had an average of 10kg to lose. Importantly, three-quarters of the participants (75%) were interested in continued support to improve the lifestyle behaviours.

A small number of participants (n=89 of 367, 24%) completed the end of program evaluation form. This subsample of participants was largely positive about the program, with 76% reporting the program was very useful, 70% were very satisfied with the program, and 74% felt it met their expectations. At the completion of the Total Wellbeing Lifestyle Plan, 74% of participants felt confident or very confident they would be able to maintain their journey on their own (Table 14).

Table 14. Responses from evaluation question of the Total Wellbeing Lifestyle Plan (n=89).

How useful was the Total Wellbeing Lifestyle Plan?		Count	Percentage
	Not very useful	1	1.1
	Not useful	0	0.0
	Neutral	2	2.2
	Useful	18	20.2
	Very Useful	68	76.4
How satisfied were you with the Total Wellbeing Lifestyle Plan?			
	Very dissatisfied	1	1.1
	Dissatisfied	2	2.2
	Neutral	1	1.1
	Satisfied	23	25.8
	Very satisfied	62	69.7
Did the Total Wellbeing Lifestyle Plan meet your expectation?			
	Not at all	1	1.1
	A little	1	1.1
	Somewhat	21	23.6
	Yes, very much so	66	74.2
How confident are you to maintain your journey on your own?			
	Not very confident	0	0.0
	Not confident	6	6.9
	Neutral	17	19.5
	Confident	50	57.5
	Very confident	14	16.1

3.10Weight loss compared to Total Wellbeing Diet members

The CSIRO Total Wellbeing Diet online is a commercially available digital weight loss program. It is available to community members who join the program of their volition at a cost of $199 for the first 12 weeks. The program launched in 2015 and has since had over 115,000 members. Among CSIRO Total Wellbeing Diet community members (n=116,996), 41% complete the standard 12-week program and 29% (n=33,622) go on to complete 24 weeks or more.

Weight loss for the sample the cohort of Total Wellbeing Lifestyle Plan participants was compared to a sample of the CSIRO Total Wellbeing Diet community members who had been members for 24 weeks or more. The Total Wellbeing Lifestyle Plan had a higher proportion of male participants (24% vs 18% of the sample) and older participants (68% vs 55% aged 51 years+). The Total Wellbeing Lifestyle Plan participants were also more likely to be obese (73% vs 63%) and particularly a greater proportion were Class 2 and 3 obese (39% vs 30% of the sample) than for the Total Wellbeing Diet community members.

The average weight loss after 24 weeks of the Total Wellbeing Lifestyle Plan participants was 6.9kg compared to 5.9kg for the CSIRO Total Wellbeing Diet community member sample, which equates to 7.1% of starting body weight compared to 6.4% (Table 15). Among Total Wellbeing Lifestyle Plan participants, 62% achieved a weight loss of 5 percent or more compared to 56% for the CSIRO Total Wellbeing Diet community members.

On average participants on the Total Wellbeing Lifestyle Plan lost 17% more weight than the selected subsample of members of the CSIRO Total Wellbeing Diet community members. The greatest differences in weight loss between participants of the Total Wellbeing Lifestyle Plan compared to the standard online program were for women, those aged 31-50 years and those in the lowest socioeconomic status group (Table 15).

Table 15. Weight loss of the Total Wellbeing Lifestyle Plan participants (n=367) compared to a sample of Total Wellbeing Diet online members (n=33,622) by demographic characteristics and starting weight status.

		This sample (n=367)			TWD community sample (n=33622)		
			kg	%		kg	%
Total		100.0%	6.9	7.1	100.0%	5.9	6.4
Gender	Female	76.0%	6.5	7.0	82.4%	5.5	6.1
	Male	24.0%	8.1	7.6	17.6%	7.9	7.5
Age group	18-30 years	3.0%	1.8	2.5	5.1%	5.6	6.0
	31-50 years	28.6%	7.1	7.0	40.1%	5.5	5.9
	51-70 years	60.5%	7.1	7.5	50.7%	6.2	6.7
	71 years+	7.9%	6.2	6.5	4.1%	6.5	7.1
Weight status	Normal weight	-	-	-	4.4%	3.1	4.6
	Overweight	24.0%	5.4	6.8	32.3%	4.7	6.0
	Obese	72.8%	7.2	7.1	63.4%	6.7	6.7
	Class 1 Obese	33.5%	6.5	7.2	33.6%	6.1	6.6
	Class 2 Obese	22.6%	7.4	7.1	18.0%	7.0	6.7
	Class 3 Obese	16.6%	8.3	6.7	11.8%	8.2	6.6
Socioeconomic status	1: Lowest	7.4%	8.3	8.6	9.7%	6.3	6.6
	2	17.5%	6.5	6.8	14.6%	6.2	6.5
	3: Middle	16.4%	7.5	7.7	19.2%	6.2	6.6
	4	22.5%	6.7	7.0	22.1%	6.0	6.4
	5: Highest	36.2%	6.4	6.6	34.3%	5.6	6.1
Percentage achieving 5% body weight loss		62.2%			56.4%		

*data not shown when cell count is <10

4 Summary

The Digital Wellness Total Wellbeing Lifestyle Plan is a 24-week program designed to facilitate lifestyle behaviour change in people with chronic disease by providing person-centred advice to improve health. The program combines the CSIRO Total Wellbeing Diet online platform with up to 15 dietitian coaching sessions. Participants attended an average of 8 coaching sessions and the online platform was used daily for self-monitoring of diet, and weekly for self-monitoring of exercise and weight.

Of 546 participants who commenced the program, 367 completed the 24-week program (a 67% completion rate). All participants had at least one risk factor for chronic disease and a BMI that classified them as overweight or obese. In fact, most participants (73%) were classified as obese when they started, with 17% classified as Class 3 obese.

The program was largely successful in achieving its primary objectives, with 62% of participants losing 5 per cent or more of their starting body weight, and clinically relevant improvements in some in clinical health markers observed. The program was also successful in achieving its secondary objectives of healthy lifestyle behaviour change with fruit and vegetable consumption increasing by about 30% from baseline, and a similar increase in physical activity observed.

The program enjoyed high satisfaction among participants who responded to the completion survey.

Weight loss results

The average weight loss was 6.9kg or 7.1% of participants starting body weight. Heavier participants, that is those classified as Class 3 obese, lost 8.3kg, 20% more than the average weight loss on the program. Weight loss was also greater in those who reported higher levels of commitment at the start of the program, and for those who seemed new to weight loss programs. For example, those who had never tried to lose weight lost 9.7% of starting body weight compared to 6.7% for those who had tried many times.

Six out of ten participants (62%) achieved a weight loss of 5 percent or more. For the subgroup of participants classified as Class 3 obese or who were not doing anything about their weight when they started, seven out of ten participants achieved this objective. Many treatment guidelines recommend moderate weight loss of 5-10%, as a weight loss of this magnitude has been associated with improved metabolic function [9].

Among participants who were classified as overweight or obese at the start of the program, 45% moved into a healthier weight status category by the end of the program. Across all categories of obesity, 24% of participants were no longer classified as obese at the end of the program. Further to the successful weight loss outcomes for participants, three-quarters were interested in continued support to improve their lifestyle behaviours.

Improvements is in clinical health markers

Clinical health outcome data was not available for all participants. However, in those participants who had data available at the start and end of the program, improvements were observed, and for some markers the change was of a magnitude that has been associated with clinically meaningful health outcomes. For example, blood pressure decreased by an average of 4mmHg for systolic and 2mmHg for diastolic pressure (data available for 101 participants), and total cholesterol decreased by an average of 0.3mmol/L (data available for 59 participants). To put this into clinical context, a reduction in systolic blood pressure of about 5mmHg has been associated with significant reductions in mortality due to coronary heart disease and stroke [10], and a reduction of 0.5mmol/L in total cholesterol has been reported to significantly reduce coronary heart disease mortality risk [11].

Chronic pain can impact an individual's physical activity levels, mood, and quality of life. Self-reported pain among participants of this program decreased by 41% from baseline levels.

Improvements in dietary intake and physical activity levels

Higher fruit and vegetable consumption is associated with a reduced risk of cardiovascular disease [12] and is recommended for health and wellbeing [13]. About half of the participants (47%) increased their fruit intake and 62% increased their vegetable intake during the program. Vegetable intake increased by an average of one serve per day, and fruit by about half a serve per day which is significant in the context of current population intake.

The frequency and duration of physical activity increased during the program. The average physical activity increased from 2.7 to 4.2 hours per week, and 66% of participants reported an increase in their activity levels.

Considerations

The Total Wellbeing Lifestyle Plan was successful in achieving clinically significant weight loss in a cohort of adults who were overweight or obese and had at least other one risk factor for chronic disease. Six out of ten participants lost 5 percent or more of their starting body weight – which is deemed a clinically significant amount because it is associated with improved health outcomes. By the end of the 24-week program, 45% of participants had moved into a healthier weight status category. Importantly, people with more weight to lose and those without much prior experience with dieting did well. Improvements in clinical health markers were also observed however, the availability of data for these outcomes was limited, and likely to represent the more motivated participants. The usage of the platform and attendance in the dietitian sessions suggested that participants were engaged in the program. Participant feedback about the program was positive, and most indicated that they were interested to continue receiving support. Given the high levels of obesity among participants when they started, it is reasonable they would report to want extended support to achieve their weight loss goals.

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