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ORIGINAL RESEARCH

Evaluation of a community-based weight management program for overweight and obese adolescents: The Loozit study

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Abstract

Aim: To evaluate a community-based weight management program for overweight and obese adolescents aged 13–16 years.

Methods: The present study was a group-based intervention over five months conducted in Australian community health centres. Program evaluation questionnaires were completed by adolescents and their parents. Seven semi-structured group sessions were held for adolescents: weekly for four weeks and then at two, four and five months. The program sessions focused on healthy eating, increasing physical activity, decreasing sedentary behaviour and increasing self-esteem. Adolescents' anthropometry, blood pressure and fasting blood biochemistry were measured. Adolescents completed validated questionnaires on diet, physical activity and self-esteem.

Results: Twenty-two overweight and obese adolescents were recruited with a median body mass index (BMI) z-score 2.30. Recruitment strategies were identified and a high retention rate (91%) was achieved. The program was well received by adolescents. Parents reported their adolescents were making healthier food choices and increasing physical activity. At treatment end there were clinically significant improvements in self-perception scores for physical appearance and romantic appeal ($P < 0.05$), waist circumference (median 100.1 cm vs 97.1 cm; $P < 0.0001$) and HDL cholesterol (median 1.10 mmol/L vs 1.20 mmol/L; $P = 0.02$), but not BMI or BMI z-score.

Conclusions: The Loozit weight management intervention is one of the first to involve adolescents in the evaluation of the program and to operate at a sustainable intensity in an accessible community setting. The present study provides valuable insights into the elements of a program that is acceptable to adolescents.

Key words: adolescent, community-based, obesity, weight management.

INTRODUCTION

The prevalence of overweight and obesity among children and adolescents has been high since the mid-1980s in most developed economies, making this one of the most common chronic disorders of childhood and adolescence.[1] Overweight and obese adolescents suffer a range of immediate and longer-term health and psychosocial problems[2] and obese adolescents have a 70–80% risk of becoming obese adults.[3] For these reasons, effective management of overweight and obesity during adolescence is a priority.

Since the early 1980s, there have been just 13 published randomised controlled trials of obesity management among

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adolescents,[4–16] of which four are pharmacological studies.[7,10,11,16] Almost all were performed in a tertiary care setting and all involved intense behavioural management support including one-on-one therapist consultations and group sessions, and physical activity sessions held several times a week. While such studies provide guidance as to the efficacy of treatment interventions for adolescents in resource-intensive settings, these interventions are costly to operate, making them difficult to sustain. Therefore, there is a need for the development and evaluation of interventions which operate at a sustainable intensity in accessible, community-based settings.

A major challenge when targeting adolescent health is to ensure easy access and retention. When adolescents are asked their views of an ideal health service, their suggestions include group programs, youth-specific services, confidentiality, respect and location in a setting that is informal and with welcoming staff, findings which are highly relevant to the development of a successful adolescent weight management program.[17] Community health centres are readily accessible by adolescents and offer a multidisciplinary approach and competence in group programs. However, information is needed on whether a community-based weight management program is acceptable to young people and enables them to manage their weight.

A group-based adolescent weight management program has been designed and used for several years in two tertiary medical care settings in Sydney, Australia. However, the applicability of such a lifestyle intervention in a community-based setting has not been evaluated. Therefore, the purpose of the present study was: (i) to evaluate the 'Loozit' community-based adolescent weight management program and (ii) to use this information to improve the program prior to the planning of a randomised controlled trial.

METHODS

Ethics approval was obtained from the Human Research Ethics Committees of The Children's Hospital at Westmead and the Sydney West Area Health Service. Informed written consent was obtained from both parents and adolescents following explanation of the study protocol.

Participants

Overweight/obese adolescents (body mass index (BMI) z-score range 1.0–3.5) aged 13–16 years were eligible for inclusion. Severely obese adolescents (BMI z-score > 3.5) and adolescents with secondary causes for overweight/obesity, significant medical illness, or on medications that affect weight, were excluded.

Recruitment

Local papers ran articles on the program following a press release. Letters were sent to school principals of schools (government and private) within a 15-km radius of the two community health centres that were utilised for this intervention. Primary care physicians in the local region were informed of the present study through faxes. Of the 51 responses received, 43% ($n = 22$ adolescents) met the eligibility criteria and were willing to participate in the present study. The most successful methods of recruitment for eligible participants were primary care physicians (41%), school newsletter (27%) and local newspaper articles (23%).

Treatment intervention: the Loozit program

The Loozit program is based upon a cognitive behavioural approach in a group setting using behavioural principles to change dietary and activity behaviours and social cognitive approaches to modify self-efficacy, motivation, perseverance and self-regulation.[18] Seven 75-minute afternoon sessions were held at the community health centre: weekly for the first four weeks and then one session each at two, four and five months. Specific dietary and activity goals were based on national clinical practice guidelines[19] and recommendations for physical activity in children, and included regular meals, eating together as a family, the importance of breakfast, water as the main beverage, increased consumption of vegetables and salads, low fat food choices including low fat dairy foods, decreased frequency of take-away foods, increasing physical activity to 60 minutes per day and reducing screen time (TV, computer, DVD, hand-held games). Building self-esteem and dealing with stress were also addressed in the sessions.

Evaluation of the Loozit program

At two and five months, adolescents completed program evaluation questionnaires on which aspects of the group sessions they rated most highly, made suggestions for improvements to the program, and indicated their degree of satisfaction with the program. Parents completed questionnaires at two months on the aspects of the program they felt were most helpful for their child and indicated how satisfied they were with the program.

Staffing

The project manager, a dietitian experienced in leading groups of young people, recruited subjects and obtained consent, led the adolescent group sessions, and administered questionnaires on physical activity and self-esteem during the measurement session. Anthropometric measurements were performed by a trained anthropometrist.

Measures at the start and end of the five-month program

Anthropometry

All anthropometric measurements were determined using standard procedures[20] and calibrated instruments. Weight

was measured with portable scales (Tanita HD-316, Tanita Corp., Tokyo, Japan) to the nearest 0.1 kg, with shoes and heavy clothing removed. Height was measured using a portable stadiometer. Waist circumference, a measure of central fat distribution, was measured at the level of the narrowest point between the lower costal (rib) border and the iliac crest using a nonextensible steel tape. BMI (weight/height^2) and waist measurements were expressed as z-scores based upon age- and sex-specific reference values.[21–22]

Metabolic profile

Systolic and diastolic blood pressure was measured using an automated blood pressure monitor (Dinamap 1846 SX, Critikon, FL, USA) under standardised conditions.[23] Fasting blood was analysed for total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides, insulin and glucose. The blood analyses occurred at a single nationally accredited pathology laboratory.

Self-report questionnaires

The Self-Perception Profile for Adolescents, a questionnaire validated for this age group, was used to assess self-esteem.[24] It provides both a measure of global self worth and perceived competence in eight specific domains (Table 1). The Short Fat Questionnaire assesses behaviour related to dietary fat intake, and has been validated for Australian adults.[25] Respondents are given a 'fat intake behaviour score' which is divided into three categories: 'low fat intake' (score 0–17), 'moderate fat intake' (score 18–27) and 'high fat intake' (score 28+). Two additional questions were added to this questionnaire to assess soft drink consumption. The Adolescent Physical Activity Recall Questionnaire (APARQ) assesses a range of physical activity and sedentary behaviours, and has been developed and validated for use with adolescents.[26] Stage of pubertal maturation was self-assessed using the standard Tanner scale.[27]

Table 1 The median (range) values of the Self-Perception Profile for Adolescents at the start and end of the program

	Program start (n = 22)	*Program end (n = 20)*	P-*value**
Scholastic competence	2.9 (2.0–4.0)	2.8 (1.6–4.0)	0.844
Social acceptance	3.20 (1.8–4.0)	3.4 (2.2–3.8)	0.220
Athletic competence	2.2 (1.0–3.6)	2.4 (1.6–3.4)	0.065
Physical appearance	2.0 (1.0–2.6)	2.2 (1.0–3.2)	0.048
Job competence	3.0 (1.3–3.8)	3.0 (2.5–3.6)	0.070
Romantic appeal	2.4 (1.3–3.0)	2.4 (1.0–3.8)	0.041
Behavioural conduct	2.8 (1.8–3.4)	2.8 (2.0–4.0)	0.170
Close friendship	3.5 (1.0–4.0)	3.6 (1.0–4.0)	0.115
Global self-worth	2.5 (1.0–3.8)	3.0 (1.0–4.0)	0.192

**P*-values for Wilcoxon Signed Ranks tests to examine differences between the start and end of the five-month program.

Statistical analysis

Data were analysed using SPSS for Windows version 11.5.1 (SPSS Inc., Chicago, IL, USA) and are presented as median and range. Because of the small numbers of participants, the Wilcoxon Signed Ranks test, a nonparametric test, was used to examine differences in variables between the start and the end of the five-month program. As the present study was designed as a short-term effectiveness trial, it was not powered to detect clinically significant differences between the start and end of the program. No formal adjustment was made for multiple tests because the present study was exploratory in nature, and therefore it was important to both investigate all possible associations between variables and avoid type II errors.[28]

RESULTS

Characteristics of participants

Data are presented on the 22 adolescents (five male) who were recruited to the present study (Table 2). At the start of the present study, all except one of the girls had reached menarche, and by the end of the program, all had reached menarche. At the start of the present study all of the boys were at least in Stage 3 (puberty).

Retention

Retention in the program was high, with 20 of the 22 recruited adolescents completing the final program measurement assessment. Two girls did not complete the last assessment because of mothers' inability to transport them to the community health centre because of work commitments. Attendance was high with 91% attending at least five of the seven group sessions.

Measures

Anthropometry

Between the start and end of the five-month program there were significant improvements in waist circumference (100.1 cm, range 79.2–114.2 cm vs 97.7, range 80.5–111.6 cm; $P < 0.0001$) and waist circumference z-score (1.40, range 0.93–1.81 vs 1.28, range 0.82–1.79 $P < 0.0001$), but not in BMI or BMI z-score (Table 2).

Blood pressure and biochemistry

Table 2 shows adolescents' blood pressure and biochemistry at the start and end of the program. There was a significant

Table 2 Median (range) values of anthropometry, blood pressure and biochemistry measures at the start and end of the program

	Program start (*n* = 22)	*Program end* (*n* = 20)	P-*value**
Anthropometry			
Age (years)	14.3 (13.0–15.7)	14.8 (13.5–16.1)	0.001
Weight (kg)	90.6 (69.9–106.8)	90.6 (70.4–106.1)	0.07
Weight z-score	3.12 (1.57–4.30)	3.10 (1.55–4.36)	0.58
Height (cm)	162.2 (154.3–186.2)	163.8 (154.1–187.0)	0.001
Height z-score	0.23 (−0.97–1.96)	0.23 (−1.05–1.98)	0.23
BMI (kg/m^2)	33.0 (26.0–41.3)	32.5 (26.0–40.9)	0.74
BMI z-score	2.30 (1.17–3.43)	2.24 (1.15–3.44)	0.33
Waist circumference (cm)	100.1 (79.2–114.2)	97.1 (80.5–111.6)	0.001
Waist z-score	1.40 (0.93–1.81)	1.28 (0.82–1.79)	<0.0001
Blood pressure			
Systolic (mmHg)	118 (103–136)	120 (90–142)	0.26
Diastolic (mmHg)	61 (49–68)	58 (48–71)	0.33
Biochemistry			
Glucose (mmol/L)	4.8 (3.7–5.6)	5.1 (4.3–5.4)	0.49
Cholesterol (mmol/L)	4.3 (3.0–6.9)	4.1 (3.5–5.5)	0.98
HDL cholesterol (mmol/L)	1.10 (0.60–1.80)	1.20 (1.00–1.70)	0.02
LDL cholesterol (mmol/L)	2.55 (1.20–5.40)	2.65 (1.60–4.60)	0.96
Triglyceride (mmol/L)	1.1 (0.60–2.70)	1.0 (0.6–2.2)	0.10
Insulin (mU/L)	17 (8–39)	18 (8–32)	0.35

**P*-values for Wilcoxon Signed Ranks tests to examine differences between the start and end of the five month program. BMI = body mass index.

increase in HDL cholesterol, but no significant changes in any of the other metabolic measures.

Self-esteem

Table 1 summarises the mean domain and global self-worth scores on the Adolescent Self-Perception questionnaire. The median score for global self-worth at the start and end of the program was around the mid-point of the scale. The adolescents' median scores for social acceptance and close friendship were high at the start of the program and remained high at the end of the program. In contrast, the adolescents' median scores for athletic competence, physical appearance and romantic appeal were all towards the negative side (less than 2.5) at the start of the program. There were significant increases in the scores for physical appearance and romantic appeal by the end of the five-month program (Table 1).

Dietary fat intake score

There was no significant change in dietary fat intake score from the start (21.5, range 11.0–29.0) to the end (22.5, range 10.0–28.0) of the five-month program. At the start of the program, 59% of adolescents had fat intake scores in the moderate range (18–27) while at the end of the program, 70% of adolescents had fat intake scores in the moderate range.

Physical activity and sedentary behaviour

At the end of the five-month program, there was no significant change in self-reported physical activity using the APARQ. At the start of the program, approximately half the total time adolescents spent in physical activity was in light-intensity physical activity (153 minutes/week, range 0–1155 minutes/week) and half in moderate- to vigorous-intensity physical activity (176 minutes/week, range 0–630 minutes/week). The total time and the proportion of time reported in light physical activity and moderate to vigorous physical activity did not change significantly by the end of the five-month program.

Over the five months of the present study, there was no significant change in self-reported time spent in a range of sedentary activities. Television viewing was the most prevalent sedentary behaviour, followed by computer use, studying and sitting around talking (11.5, range 5.0–35.0; 7.6, range 0–17; 7.0, range 1.0–23.0; 3.7, range 0–22 hours/week, respectively). The mean total time spent in sedentary activity was 40.5, range 23.5–89.0 hours per week at the start of the present study and 40.0, range 21.1–115.5 hours per week at the end of the present study.

DISCUSSION

No randomised controlled trials of adolescent obesity management have been conducted in a nonschool community setting. The high retention rate to the Loozit program, the constructive comments in program evaluation questionnaires and high levels of satisfaction by adolescents and their parents are encouraging for its use. In addition, significant improvements were achieved in waist circumference and HDL cholesterol as well as in two domains of self-perception, physical appearance and self-esteem. However, given the small sample size and the relatively small number of group sessions (total seven sessions) over a five-month period, there was no change in BMI or BMI z-score.

The significant decrease in waist circumference, but not in BMI or BMI z-score is of interest. Waist circumference is a more specific marker of upper body fat accumulation than BMI and is correlated with lipid abnormalities.[29] Hence our finding of a significant increase in HDL cholesterol together with the decrease in waist circumference is not surprising. In addition, abdominal fat is more sensitive to lipolytic stimuli[30] and the intervention was of short duration.

Valuable and new insights around the provision of adolescent weight management programs were obtained. Successful recruitment strategies included faxes to local family doctors and articles in school newsletters and local newspapers. With regard to settings for interventions, in our study adolescents and their parents indicated in program evaluation questionnaires that young people would not participate in a weight management program run in a school setting because of fear of stigmatisation by other students.

The present study also tested the measurement instruments for conducting a larger study and assessed the impact of the intervention group sessions. Results from the physical and sedentary activity questionnaires, and the dietary fat questionnaire showed no significant change in these behaviours over five months. However, in program evaluation questionnaires, adolescents reported increasing their activity levels, and choosing healthier snacks, behaviour changes that were confirmed by parents. One explanation for this finding is that at the start of the program the adolescents gave socially desirable answers to the dietary fat questionnaire, in which case this could account for our inability to detect the changes that the adolescents indicated that they had made. It is possible that the validated physical and sedentary activity questionnaires used in this pilot study may not be sensitive enough to detect changes in the relatively sedentary behaviour of overweight and obese adolescents and may require modifications in order to detect early positive changes.

Therefore, for future programs, we suggest using questions recommended by the NSW Centre for Public Health Nutrition for children.[31] These questions are not solely focused on fat intake and include questions on fruit, vegetable, meat, dairy products, soft drink and water in addition to questions on take away and processed foods. We also suggest that the Children's Leisure Activities Study Survey (CLASS) questionnaire, validated in children, be used.[32] In contrast to APARQ in which adolescents are asked to give details of their participation in organised and non-organised activities, the CLASS questionnaire enables adolescents to select the activities in which they are involved from a comprehensive list of activities and sedentary behaviours.

Feedback from participants indicated that future programs should incorporate a higher number of sessions for the adolescents, possibly weekly for one school term, together with several concurrent sessions for parents during the initial phase. Follow-up ('booster') group sessions for adolescents, at least once each school term for two years, may also be valuable. Information from adult studies shows that effecting changes in eating and activity behaviours and maintaining weight loss require long-term support.[33] A major challenge for future adolescent weight management programs will be to sustain the enthusiasm and level of participation of the adolescents over two years.

Concerns have been expressed that weight management interventions may have a negative impact on self-esteem.[34–36] Over the five months of our study, there was a significant improvement in two of the three self-esteem measures that the adolescents had initially assessed as the lowest namely, physical appearance and romantic appeal. Given the absence of clear weight loss, it is important to note that participation in the Loozit program did no harm to the adolescents' self-esteem.

Strengths of the present study include the use of several strategies to evaluate the program, the practical information obtained around program design and the fact that it was based in a community healthcare setting. Limitations of the present study are that it is a scoping study not powered to detect statistically significant changes in the parameters measured, and that adolescents were self-selected for weight loss so their views of the program may thus not be representative of all obese adolescents. In addition, although every effort

was made to recruit equal numbers of men and women, it is well documented from adult studies that women are more likely to participate in weight management programs. There are no data to indicate a sex difference in weight control efficacy in adolescents.

The Loozit study demonstrates for the first time that it is feasible to perform measurement assessments and retain overweight and obese adolescents to a weight management program based in a community setting. In addition, the intervention led to significant improvements in some clinical outcomes. Adolescents' suggestions for improving the Loozit program provide valuable input for further development of the program. The findings show how important it is when developing new services or interventions to conduct evaluations alongside hard end-point appraisal. This information will enable a modified Loozit program to be evaluated in a randomised controlled trial.

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