

A Preliminary Investigation of a Health and Wellness Program for Overweight and Obese Adolescents

Rachel Galioto^{1*} and John Gunstad^{1,2}

¹Kent State University, Kent, OH

²Summa Health System, Akron OH

Abstract

Background: Obesity in adolescents has been difficult to treat. Preliminary evidence has demonstrated the effectiveness of residential treatment programs in producing weight loss, although the optimal method for this type of program is unknown.

Method: Five students, (13-17 years old) participated in a residential health and wellness program for the treatment of obesity.

Results: Significant improvement in BMI, cardiovascular and strength indicators and attention was found as well as uniform indication of satisfaction with the program in teaching skills for maintenance of weight loss and healthy lifestyle.

Discussion: This study adds to the evidence that residential weight-loss programs may be effective in improving the health and fitness of obese adolescents and provides preliminary evidence for the effectiveness of this type of program in the treatment of obese adolescents

Keywords: Obesity; Adolescents; Residential treatment program

Introduction

Obesity in adolescents is a major health concern in the United States, with 32% of children and adolescents aged 2 to 19 years old considered overweight or obese (age specific body mass index (BMI) > 85th percentile) [1]. The high prevalence is concerning because obese children are more likely than their normal weight peers to experience negative health outcomes such as diabetes, high blood pressure and coronary heart disease [2-4]. In addition, many negative psychological outcomes, such as depressive symptoms, lowered life satisfaction and problematic alcohol use patterns are associated with childhood obesity [5].

Obesity in adolescents has proven difficult to treat. Commonly-employed treatments include behavioral interventions, pharmacological treatments and weight-loss surgeries. Behavioral interventions in schools or specialty health care settings have been shown to produce small to moderate (0.4 – 3.3 kg/m²) changes in BMI measured 6-12 months post-treatment, while one year of pharmacological treatment combined with behavioral interventions resulted in small (0.85 kg/m² for orlistat) or moderate (2.6 kg/m² for sibutramine) reductions in BMI following treatment. Bariatric surgery has been shown to result in substantial decreases (5.0 to 10.1 kg/m²) in BMI 6-12 months post-surgery. However, weight re-gain seen one to three years post-surgery is viewed as problematic [6].

More recently, residential treatment programs have been suggested as another option for the treatment of childhood and adolescent obesity. Preliminary research has found such programs to be effective in achieving weight loss [7-9], however, little is known about the optimal approach to promote positive outcomes in these programs.

One recently established program, Mind Stream Academy, is a four-month health and wellness residential program for overweight and obese teens. It combines education with fitness, nutrition and counseling programs as well as the therapeutic techniques of Equine Assisted Psychotherapy (EAP) and Neurofeedback in a residential

environment. The purpose of the current study was to examine the potential effectiveness of the initial 16-week pilot of the program at improving weight-related measures, cognitive performance and psychological outcomes in a preliminary sample of adolescents. We hypothesized that the individuals who participated in the 16-week program would show an improvement in weight-related measures, strength, cardiovascular fitness and measures of cognitive performance.

Methods

Participants

Participants were the initial 5 adolescents (4 females) aged 13-17 years ($M = 15.6$ years) who participated in MindStream Academy's program. Baseline BMI for this sample ranged from 49.2 to 31.8 with an average of 39.9. Participants began the program March 1, 2011 and completed the program June 17, 2011.

Intervention

MindStream Academy is a co-educational boarding school for teens. The program is at least one semester (4 months) in duration. The stated goals of the program are to help teens achieve a healthy weight, get fit and build their self-esteem. These goals are achieved through experiential therapies, such as Equine Assisted Psychotherapy (EAP) and Neurofeedback, nutrition education, fitness, and family counseling. MindStream accepts all teens who want to live a healthy lifestyle, with no weight requirement. Typically, students range from

***Corresponding author:** Rachel Galioto, Department of Psychology, Kent State University, 360 Kent Hall, Kent, OH 44242, Tel: 330-672-2166; Fax: 330-672-3786; E-mail: rgalioto@kent.edu

Received November 05, 2011; **Accepted** December 19, 2011; **Published** December 23, 2011

Citation: Galioto R, Gunstad J (2012) A Preliminary Investigation of a Health and Wellness Program for Overweight and Obese Adolescents. J Obes Weig los Ther 2:108. doi:10.4172/2165-7904.1000108

Copyright: © 2012 Galioto R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

13 to 19 years of age.

The typical day at MindStream begins with a period of physical activity, followed by a healthy breakfast. After breakfast, participants have individual counseling and students meet with their teachers for academic sessions. These sessions are then followed by lunch. In the afternoon, all students participate in a martial arts or cardiovascular fitness session which is then followed by a combination of academics, nutrition classes and team sports. Dinner follows these sessions. In the evening, students finish schoolwork and are allowed free time. Other optional activities include creative writing, culinary classes, fitness classes such as Zumba, animal care, and various field trips.

Caloric intake is calibrated individually for each participant based on gender, height and weight. A registered dietician (RD) develops all the meal plans and the nutrition education curriculum. The course is designed to teach students how to select and lightly prepare their own food, the importance of portion sizes, making good food choices when eating out, how to substitute ingredients in recipes and how to navigate the grocery stores and understand food labels. Topics covered concern for the overall health of the individual including the major components of wellness and how it relates to food and nutrition. Students also gain hands on experiences with culinary tasks. The goal of the course is to provide knowledge and skills necessary to make healthy lifestyle choices and encourage positive changes in nutrition and health behaviors.

The fitness program at MindStream is staged by certified personal trainers, dance, martial arts and yoga instructors. The program combines classroom instruction and field application of basic knowledge of proper exercise programming and technique. It is designed to help students improve their overall body movement, and to learn to enjoy it. Physical activity is approximately 2 hours daily.

Equine Assisted Psychotherapy (EAP) is a solution-focused therapeutic approach which takes place in a group setting with certified EAP specialists and other students. All sessions involve a goal or task to accomplish and basic rules for accomplishing those goals. EAP looks to teach affection, assertiveness, problem solving skills, and improve self esteem, teamwork, and communication skills.

Neurofeedback is a non-invasive therapeutic and behavioral technique that has the goal of train brain functioning in order to improve self-regulation. The biofeedback program includes diaphragmatic breathing and monitoring of heart rate variability, which has been found effective for treatment for many forms of stress and anxiety. Therapies are administered by certified counselors who have been trained by a licensed professional psychotherapist.

The counseling program was created by a team of licensed professional counselors and has been run at elementary and middle schools on the East Coast. Through these programs, students are taught life skills which can be applied to work, school and personal life. Students are expected to learn to become a better friend, helper and person by relating to others in ways that will create friendships and ultimately develop a more caring and friendly school.

Family involvement is crucial to the success of the teen in the program. Families provide a support system for the teen. Families of the students participate in bi-weekly phone/Skype counseling sessions, and attend family weekends during the program.

The Continuum of Care program is a follow-up plan for the student to ensure that the changes that occur in the student's life will last a lifetime. Follow-up includes monthly phone calls from the MindStream staff, a wellness weekend retreat at MindStream, a fitness plan, nutrition tools and education and counseling.

Measures

The outcomes assessed included a wide range of physical, performance and psychological measures. Outcome measures consisted of the following categories; weight-related, cardiovascular, strength and cognitive measures. Furthermore, satisfaction and psychological outcome data was also collected through a questionnaire.

Body composition

Body composition measures included weight, BMI, and total body circumference ht-related measures included weight, BMI, total body circumference. Total body circumference was measured by summing measurements from the neck, upper arm, forearm, chest, waist, hips, thigh and calf.

Cardiovascular measures

Indications of cardiovascular health included resting heart rate and heart rate recovery measured by the three-minute step test. The three-minute step test requires participants to step up and down on a step for three minutes. The dependent variable is HR measured one minute after the completion of the step test.

Strength

Measures of strength included lower and upper body strength as measured by the one-minute chair to stand and standing sandbag clean to press tests. In the chair to stand test, participants are given one minute to perform as many squats as they can. Lower body strength is measured by the number of squats completed in one minute. In the sandbag clean to press test, participants are given one minute to perform as many presses as they can. Upper body strength is measured by the number of presses completed in one minute.

Attention

Measures of attention were assessed using the Qik-CPT, a computerized visual continuous performance test developed for assessing attention and impulse control. A simple visual target or non-target is presented once every two seconds. During the 21-minute test, the participant presses a button to respond to each target and does not press the button for each non-target. Specific variables of interest included Sustained Attention, Impulse Control, Response Time and Consistency of Response.

Program satisfaction

Upon completion of the program, all participants provided details regarding their experience at MindStream by completing an individual interview with a program counselor. The interview included both quantitative and qualitative items. Quantitative items were rated on a scale from 1(not at all) to 10(extremely) and included questions such as, "How prepared do you feel to maintain a healthy lifestyle and your weight loss?", "How satisfied do you feel with the program?", and "How likely are you to recommend this program to others?". The qualitative question was, "What are the most important things you learned from

attending MindStream?”. The interview was conducted on the last day of the program.

Data analysis

Related-samples Wilcoxon Signed Rank tests were used to compare baseline and 16-week measures on all dependent variables. Effect sizes were also calculated for the change in each of the dependent variables to facilitate interpretation.

Results

Weight related measures

The five participants began the program with a mean BMI of 39.9 (*SD* = 6.5), ranging from 31.8 to 49.2. The weight of participants ranged from 203 to 291 pounds (*M* = 251.2, *SD* = 38.0). Initial total circumference measures ranged from 203 to 238 inches with an average of 224.25 inches (*SD* = 13.19). After 16 weeks, average weight loss of the sample was 55.2 pounds (*SD* = 20.68) and average BMI decreased by 8.56 (*SD* = 2.03). Total body inches decreased by an average of 45.79 inches (*SD* = 8.72). Related-samples Wilcoxon Signed Rank tests revealed that participants significantly lost weight (*p* < .05), decreased their BMI (*p* < .05) and reduced total inches (*p* < .05) compared to baseline measures. See Tables 1 & 2 for physical measurements for all participants and effect size calculations.

Cardiovascular and strength

At baseline, the average resting heart rate (RHR) of participants was 84.8 (*SD* = 11.56) beats per minute (bpm) and the average HR recovery was 124.00 (*SD* = 14.09) bpm after one-minute. The average decrease in RHR at 16-weeks was 23 (*SD* = 6.75) bpm and average HR recovery dropped to 88.20 (*SD* = 17.20) bpm. At baseline, the average mile time was 22.31 minutes. After 16 weeks, the average mile time decreased to 13.02 minutes. Wilcoxon Signed Rank tests revealed significant decreases in RHR (*p* < .05), HR recovery at one minute post step-test (*p* < .05) and mile time (*p* < .05) at 16-weeks compared to baseline. See table 2 for individual scores.

At baseline, participants completed an average of 32.80 squats (*SD* = 3.27) and 21.00 presses (*SD* = 5.87). After 16-weeks, average squats increased to 63.40 squats per minute (*SD* = 18.39) and presses increased to an average of 51.80 presses per minute (*SD* = 14.52).

Table 1: Baseline and 16-week Weight, BMI and Inches.

Participant Number	1	2	3	4	5
Gender	Male	Female	Female	Female	Female
Age	16	13	16	16	17
Baseline BMI	36.2	31.8	41.6	40.8	49.2
Baseline Weight	289	203	235	238	291
Baseline Total Inches	231.50	192	223.25	225.50	238.00
16-week BMI	26.3	25.8	34	32.6	39.5
16-week Weight	206	165	192	190	234
16-week Total Inches	184.00	157.25	178.25	180	193.50
Weight Loss	83	38	43	48	57
BMI Change	-9.9	-6.0	-7.6	-8.2	-9.7
Inches Lost	47.50	34.75	45.50	45.50	44.50

Note: BMI- body mass index.

Table 2: Effect Sizes for Physical Outcome Measures.

	Baseline <i>M</i> (<i>SD</i>)	16-Week <i>M</i> (<i>SD</i>)	Effect Size (<i>d</i>)
Weight Loss	251.2 0(38.00)	196 (24.83)	1.72
BMI	39.92 (6.50)	31.36 (6.12)	1.36
Inches	224.25 (13.19)	176.26 (13.16)	2.93

Note: Effect size (*d*) calculation from Cohen (1988).

Table 3: Raw Scores for Baseline and 16-Week Physical Performance Measures.

		1	2	3	4	5
RHR(bpm)	Baseline	79	70	96	97	82
	16-Week	62	49	68	80	50
	Change	-17	-21	-28	17	-32
HR Recovery (bpm)	Baseline	116	105	136	139	124
	16-Week	66	75	107	100	93
	Change	-50	-42	-29	-39	-31
Squats	Baseline	33	33	30	30	38
	16-Week	94	63	49	49	62
	Change	61	30	19	19	24
Presses	Baseline	25	28	15	15	22
	16-Week	63	62	42	31	61
	Change	38	34	27	16	39
Mile Time (minutes)	Baseline	19.30	17.50	22.20	22.26	30.30
	16-Week	8.30	9.00	15.30	16.20	16.30
	Change	(11.00)	(8.50)	(6.90)	(6.06)	(14.00)

Note: RHR- Resting Heart Rate; HR - Heart rate; bpm- beats per minute

Table 4: Effect Size (*d*) for Performance Measures.

	Baseline <i>M</i> (<i>SD</i>)	15-Week <i>M</i> (<i>SD</i>)	Effect Size (<i>d</i>)
RHR (bpm)	84.80(11.56)	61.80(12.97)	1.87
HR Recovery (bpm)	124.00(11.88)	93.20(26.43)	1.61
Squats	32.80(3.27)	63.40(18.40)	2.82
Presses	21.00(5.87)	51.80(14.52)	3.02
Mile Time (minutes)	22.32(4.90)	13.02(4.02)	2.09

Note: Effect size (*d*) calculation from Cohen (1988); RHR – Resting Heart Rate; HR – Heart Rate; bpm - beats per minute.

Related-samples Wilcoxon Signed Rank tests indicated significant improvement of performance on both squats (*p* < .05) and presses (*p* < .05). See Tables 3 & 4 for individual performances and effect sizes.

Cognition

All participants improved attention, decreased response time and improved their consistency of response on the Qik-CPT. Related-samples Wilcoxon Signed Rank tests indicated significant improvement in consistency of response (*p* < .05) and response time (*p* < .05). See Table 5.

Final interview

Of the responses to the quantitative items, all responses were positive regarding participant experiences during the program. The average responses out of 10 (Mean (*SD*)) were 8.80 (1.30) for prepared to maintain a healthy lifestyle/weight loss, 9.40 (.89) for satisfied with the program and 9.40 (.89) for likely to recommend MindStream to others. The responses to the question, “What are the most important things you learned from attending MindStream?” were uniformly positive and included responses such as “patience and balance”, “self-

confidence, positive self-esteem, and self-discipline”, and “how to react to certain problems in life.” Of the 5 participants, 4 mentioned learning fitness skills and/or routines, and nutrition and/or proper eating habits.

Discussion

This study adds to the evidence that residential weight-loss programs may be effective in improving the health and fitness of obese adolescents and provides preliminary evidence for the effectiveness of MindStream Academy for this purpose. All participants achieved substantial weight loss, size reduction and improvement in measures of cardiovascular health and strength. Furthermore, all participants demonstrated substantial improvement on measures of attention and consistency of response. Most impressively, all participants indicated satisfaction with the program and confidence in their ability to maintain a healthy lifestyle. Additional work is needed to better clarify these findings, especially examination of a larger cohort of participants and long-term outcomes (e.g. 12 months, 24 months).

Beyond improvements in physical measures, the students gave uniformly positive ratings to the program. All students said that they felt prepared to maintain their weight loss and healthy lifestyle, they were satisfied with the program and they were likely to recommend the program to others.

The current study is limited in several ways. A primary limitation is the inclusion of just the first 5 participants. Response to a residential treatment program may vary widely across individuals and additional work is needed to identify those individuals most likely to benefit from this type of intervention. Furthermore, as this was only the initial pilot of the program, there is no long-term follow up data. It is unknown whether participants will be able to maintain their weight loss and lifestyle changes over time. Many studies in adults have shown that behavioral and pharmacological treatments for obesity, while effective in the short-term, result in substantial weight-regain after treatment has ended [10]. Few studies have examined long-term effects of weight loss treatments in adolescents, although it has been found that weight regain is common for adolescents who receive bariatric surgery [6]. Prospective studies are needed to determine longer term outcomes. Future studies should also examine potential improvements in psychological and functioning (e.g. mood, eating pathology and self-esteem), reported behavioral changes from others such as parents or teachers. Finally, no data was available on the ability of the program to improve physiological outcomes often associated with obesity, such as insulin resistance or blood pressure. Patients who undergo bariatric surgery often show improvement in these important outcomes [11,12] and a clearer determination of the relative benefits of different treatment options for adolescent obesity will require such data.

In summary, we examined the initial pilot of a 4-month health and wellness program for obese adolescents and found preliminary evidence for its effectiveness. This study serves as a starting point for the investigation and development of residential treatment programs for obesity. Further work is needed in this area to understand the optimal treatment of obesity in adolescents.

References

1. Castagneto M, De Gaetano A, Mingrone G, Tacchino R., Nanni G, et al. (1994) Normalization of insulin sensitivity in the obese patient after stable weight reduction with biliopancreatic diversion. *Obes Surg* 4: 161-168.
2. Cooper C, Sarvey S, Collier D, Willson C, Green I, et al. (2006) For comparison: experience with a children's obesity camp. *Surg Obes Relat Dis* 2: 622-626.
3. Cowan GS Jr, Buffington CK (1998) Significant changes in blood pressure, glucose, and lipids with gastric bypass surgery. *World J Surg* 22: 987-992.
4. Fagot-Champagna A, Pettit DJ, Engelgau MM, Burrows NR, Geiss LS, et al. (2000) Type 2 Diabetes among North American children and adolescents: An epidemiologic review and a public health perspective. *J Pediatr* 136: 664-672.
5. Fonesca H, Matos MG, Guerra A, Pedro JG (2009) Are overweight and obese adolescents different from their peers? *Int J Pediatr Obes* 4: 166-174.
6. Freedman DS, Khan LK, Dietz WH, Srinivasan SR, Berenson GS (2001) Relationship of childhood obesity to coronary heart disease risk factors in adulthood The Bogalusa Heart Study. *Pediatrics* 108: 712-718.
7. Huelsing J, Kanafani N, Mao J, White NH (2010) Camp Jump Start: effects of a residential summer weight-loss camp for older children and adolescents. *Pediatrics* 125: 884-890.
8. l'Allemand-Jander D (2010) Clinical diagnosis of metabolic and cardiovascular risks in overweight children: early development of chronic diseases in the obese child. *Int J Obes* 34 Suppl 2: S32-36.
9. Ogden C, Carroll M, Curtin L, Lamb M, Flegal K (2010) Prevalence of high body mass index in US children and adolescents 2007-2008. *JAMA* 303: 242-249.
10. Olshansky SJ, Passaro DJ, Hershow RC, Layden J, Carnes BA, et al. (2005) A potential decline in life expectancy in the United States in the 21st century. *N Engl J Med* 352: 1138-1145.
11. Quinlan NP, Kolotkin RL, Fuemmeler BF, Costanzo PR (2009) Psychosocial outcomes in a weight loss camp for overweight youth. *Int J Pediatr Obes* 4: 134-142.
12. Sarwer DB, Dilks RJ (2011) Invited commentary: childhood and adolescent obesity: psychological and behavioral issues in weight loss treatment. *J Youth Adolesc*.
13. Whitlock EP, O'Connor EA, Williams SB, Beil TL, Lutz KW (2010) Effectiveness of weight management interventions in children: a targeted systematic review for the USPSTF. *Pediatrics* 125: e396-418.