

Education Value and Impact of a Pilot Peer-Led Health Promotion Program on the Management of Adolescent Overweight

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Abstract

Introduction: Obesity is the most prevalent pediatric disease worldwide. The involvement of medical students as peer-led health promoters in a multidisciplinary adolescent weight management program may enhance weight management while raising awareness of medical students about adolescent obesity. This study aimed to analyze the short- and long-term impact of a peer-led health promotion program, involving medical students, on physical activity behavior, anthropometrics, and life quality of adolescents with overweight / obesity and to evaluate perceptions of adolescents and students about the program.

Methods: Three editions (approximately six months each) of the program were conducted in consecutive years. Anthropometrics, quality of life, and physical activity behaviors of adolescents with overweight were assessed at baseline, at the end of each edition, and in the long term. Long-term participant and perceptions of students were further analyzed.

Results: In total, 30 pairs of adolescent-plus-“buddy” were enrolled in the program across the three editions, of whom 17 (56.7%) completed at least two assessments, five and two attended two and three program editions, respectively. The body mass index z-score (edition 1: $d = 0.50$, $p = 0.007$; edition 2: $d = 0.69$, $p = 0.270$; edition 3, $d = 0.10$, $p = 0.450$) and waist-to-height ratio (edition 3, $d = 0.03$, $p = 0.001$) of adolescents decreased over time, and the quality of life tended to improve among those whose body mass index z-score ($d = 0.84$, $p = 0.118$) was decreased. The number of adolescents enrolled in structured physical activity increased after participating in the program. Overall, perceptions of adolescents about the program were positive. “Buddies” considered the program very good in increasing their awareness of adolescent obesity.

Discussion: Based on the obtained results, the program had a positive modest impact on all assessed measures and showed to be a positive experience for medical students. These results further suggest that different contexts of medical education may benefit from similar interventions.

Keywords: Adolescent; Exercise/psychology; Mentoring/methods; Patient Education as Topic/methods; Pediatric Obesity/prevention & control; Students, Medical

Keypoints

What is known:

- Obesity is the most prevalent pediatric chronic disease worldwide and physical activity is a crucial component of this unstable energetic balance.
- The peer-led method, educating young people by young people, might be more effective compared to traditional approaches.

What is added:

- Peer-led health promotion programs involving medical students may have a positive impact on the management of adolescents' overweight.
- The involvement of medical students can enrich their competences in this specific field as well as raise their social engagement and communication skills.

Introduction

Pediatric obesity is the most prevalent pediatric disease across the world and is one of the biggest current public health challenges. Portugal is among the five European

countries with the highest prevalence of pediatric obesity. Although a recent review of the literature has suggested a decreased trend of pediatric overweight / obesity in Portugal, its prevalence is still worrisome and ranges from 20%-40%.¹

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The repercussions of this condition are multiple, in the medium and long-run, and associated with an increased risk of premature death and years lived with disability.^{2,3} Obesity is also a major risk factor for type II diabetes, hypertension, dyslipidemia, sleep apnea, orthopedic pathologies, psychosocial problems (decreased self-esteem, misperception of body image, and social isolation), and quality of life.^{3,5} The most important long-term consequence of pediatric obesity is its persistence into adulthood.^{2,6}

According to the World Health Organization (WHO), overweight and obesity are defined as an accumulation of abnormal or excessive fat that presents a risk to health and its origin lies in the energy imbalance between calories consumed and those expended. The increasing prevalence of pediatric obesity is very much related to the early adoption of sedentary lifestyles (*eg* watching television, using the computer, or playing video games) and decreased physical activity or sports practice. Moreover, the increased availability of food with high energy density and the early adoption of poor eating habits further contribute to this increase.^{7,8}

Physical activity is crucial for the physical and mental health of adolescents due to its multiple benefits for musculoskeletal and cardiovascular health and the reduction of symptoms related to anxiety and depression. Adolescence is a key period for the promotion of physical activity habits, since it corresponds to a period of decreased activity, especially in girls, and there is evidence that behaviors acquired at this age tend to perpetuate into adulthood.⁹

The difficulty of tackling pediatric obesity lies in the creation of effective strategies.¹⁰ There is a need for developing new comprehensive and well-structured strategies that involve families, schools, and health professionals by political stakeholders who are capable of reversing the course of this epidemic.^{11,12} In fact, a school may be a valuable setting for implementing lifestyle interventions, targeting physical activity, diet, and/or improving weight-related behaviors.¹³

Peer-led small-group learning may be a powerful and efficacious approach for learning enhancement.¹⁴ The peer-led method is a way of educating young people by young people, one-by-one (“buddies”). Recent studies have shown that “buddies” support methods are more effective for behavioral change, skills building, self-confidence building, and anxiety reduction compared to traditional approaches. The proximity of age increases cooperation and confidence in the information transmitted, with sessions run by “buddies” considered more enjoyable than those held in the traditional way.¹⁵ This approach may show additional improvements

in healthy lifestyle promotion, especially in physical activity behavior.¹⁶

Other than its impact on other people, such as educators, “buddies” can enrich their knowledge, develop communication skills, and have the opportunity to play a positive role model.^{17,18} This empowerment leads to a consolidation of behaviors, as well as identification of solutions and share of experiences, conducing to a double gain.¹⁹ In the pediatric obesity field, this approach may have an added value since it has been suggested that health professionals still lack understanding and sensibility when dealing with adolescents with obesity and their relatives.²⁰

To the best of our knowledge, no other study has investigated the potential impact of a peer-led health approach led by medical students on the weight management of adolescents with overweight and obesity. Therefore, this pilot study may contribute to the development of new strategies to tackle pediatric overweight / obesity and sensitize future health professionals to deal with this prevalent disease.

The main objectives of this study were to analyze the short- and long-term impact of a peer-led health promotion program developed by medical students in association with a pediatric obesity clinic on physical activity behavior, anthropometrics, and quality of life of adolescents with overweight/obesity, and to evaluate adolescents and “buddies” perceptions of the program.

Methods

Healthy buddy program

The healthy buddy program was developed by the sports department of the students association (Faculdade de Medicina, Universidade de Lisboa) in association with the pediatric obesity clinic of the pediatrics department of the university hospital (Hospital de Santa Maria), in the academic years 2013-2014, 2014-2015, and 2015-2016.

As inclusion criteria were considered adolescents (12-18 years old) with overweight / obesity and a body mass index (BMI) \geq 85th percentile, followed at the clinic. Adolescents with inability to perform physical activity were excluded. For the first edition, 28 adolescents were randomly invited to participate (additionally to the regular clinical appointments), from whom only 22 adolescents agreed to participate. The equivalent same number of medical students (between the first and sixth grades) were then invited to participate as “buddies”, from among those who volunteered after the launch of the initiative.

Each edition lasted approximately six months (from December to May) with 12 sessions of two hours each and took place at the Estádio Universitário de Lisboa.

The two main goals of the program were to:

- Promote regular physical activity among the adolescents while helping them to manage their weight;
- Instigate the involvement of medical students in community projects and raise their awareness about health promotion and public health issues (in this case, adolescent obesity).

Throughout the group sessions, the adolescents and their “buddies” had the opportunity to exercise both team sports (*eg* soccer, rugby, basketball, handball) and individual sports (*eg* judo, taekwondo), under the supervision of an exercise physiologist. Pairs remained fixed until the end of the program so that each assigned student would follow only one adolescent, to promote a trustful relationship, and thus enhance the motivation and self-efficacy perception of adolescents.

Anthropometrics (height, weight, and waist circumference), body composition (body fat mass and skeletal muscle mass), and obesity-related quality of life (impact of weight on quality of life) assessments were performed at baseline and the end of each edition (short-term impact).

During January and February 2018, all adolescents were contacted by telephone and invited for a long-term reassessment at the clinic. In addition to adolescents assessments, anonymous questionnaires about the impact of participation in the program were administered to the adolescents as well as to the medical students (“buddies”) involved.

Anthropometry

All assessments were performed by the same trained professional.

Height was assessed in the orthostatic position, without shoes, with the participant back to the stadiometer (SECA 217, Hamburg, Germany) after an expiratory phase. Height was recorded in meters.

A bioelectrical impedance scale (InBody 230, Seoul, Korea) was used to assess body weight and body composition. Bodyweight was measured in kilogram and recorded to the nearest decigram (0.1 kg). Participants were placed in the orthostatic position (palms facing the thighs) while wearing underwear or light clothes and no shoes or socks. Body fat mass (BFM) and skeletal muscle mass (SMM) percentages were considered body composition measures of interest.

Body mass index was calculated as weight in kilograms divided by the square of height in meters [BMI = weight (kg) / height² (m)]. The BMI z-score (BMIZ)

was further calculated using WHO anthropometric calculator AnthroPlus v.1.0.4. A BMIZ decrease ≥ 0.25 was considered clinical efficacy.

Waist circumference (WC) was measured by a circumference measuring tape (SECA 203, Hamburg, Germany) with the participant standing, 1 cm above the iliac crest and at the end of a normal expiration. Waist-to-height ratio (WHtR) was further calculated by dividing waist circumference (cm) by height (cm) [WHtR = waist circumference (cm) / height (cm)]. Waist-to-height ratio is a simple method that does not take gender, age, and race into consideration in the assessment of cardiovascular risk and is more sensitive and reliable than waist circumference *per se* during the growth spurt.²¹

Quality of life

Quality of life was assessed by a self-reported questionnaire (impact of weight on quality of life, IWQOL - kids), comprising 27 items in four domains (physical comfort, self-esteem, social life, and family relationships). This questionnaire, previously validated and translated to Portuguese, was developed specifically for adolescents with excess weight in the age range of 11-19 years.^{22,23}

Perceptions of participants and “buddies” about the program

The long-term assessment of perceptions of adolescents and “buddies” about the program was appraised by the questionnaire (2018).

Perceptions of adolescents about their participation in the program were assessed by questions that were grouped into two major topics:

- Physical activity behaviors, before and after their participation in the program;
 - Perception of the program impact (5-point Likert scale), followed by an open-ended question on whether and how the healthy buddy project had influenced them.
- “Buddies” questionnaire was sent by e-mail and aimed to assess their views on the factors contributing positively or negatively to the program (5-point Likert scale) and accomplishments of the program objectives (5-point Likert scale). It also assessed their perception of how the program had influenced them as future physicians (personally and professionally) and their suggestions for future editions (an open-ended question).

Statistical methods

Data were recorded in a Microsoft Excel database (version 14.0.7197.5000, 2010, Microsoft Corporation) and subsequently analyzed using IBM SPSS statistics



software (version 22.0 (IBM, New York, USA). Only participants with valid data on two assessment points (including long-term) were considered in the analyses. Changes in anthropometrics, body composition, and quality of life across time were analyzed using paired samples t-test. The effect size was further calculated (Cohen's d).

Differences in the quality of life between adolescents who had a BMIz decrease ≥ 0.25 (clinical efficacy) and those who did not, as well as gender differences were analyzed using an independent sample t test. A p value less than 0.05 ($p < 0.05$) was considered statistically significant.

Results

Across the three editions, a total of 48 adolescents were enrolled in the program, from whom 30 (62.5%) adolescents completed the program (edition 1, $n = 15$; edition 2, $n = 7$ plus three who participated in the previous edition; edition 3, $n = 8$ plus six who participated in the previous editions), and 22 (45.8%) adolescents completed at least two assessments, thus were included in the analyses. However, a long-term analysis was conducted based on 17 adolescents (four years follow-up $n = 9$, three years follow-up $n = 5$, two years follow-up $n = 3$). The study flow diagram is presented in Fig. 1.

No statistically significant differences between the

genders were found at baseline. Participants baseline characteristics are tabulated in Table 1.

Overtime changes in anthropometrics and body composition

Participants body mass index z-score changes over time are illustrated in Fig. 2.

A statistically significant reduction in BMIz was observed in edition 1 ($d = 0.50, p = 0.007$). Although not statistically significant, BMIz showed a descending trend in editions 2 and 3 (edition 2, $d = 0.69, p = 0.270$; edition 3, $d = 0.10, p = 0.450$) and at long-term ($d = 0.29, p = 0.095$).

Furthermore, a significant decrease in the WHtR was found in edition 3 ($d = 0.03, p = 0.001$) and at long-term ($d = 0.02, p = 0.011$).

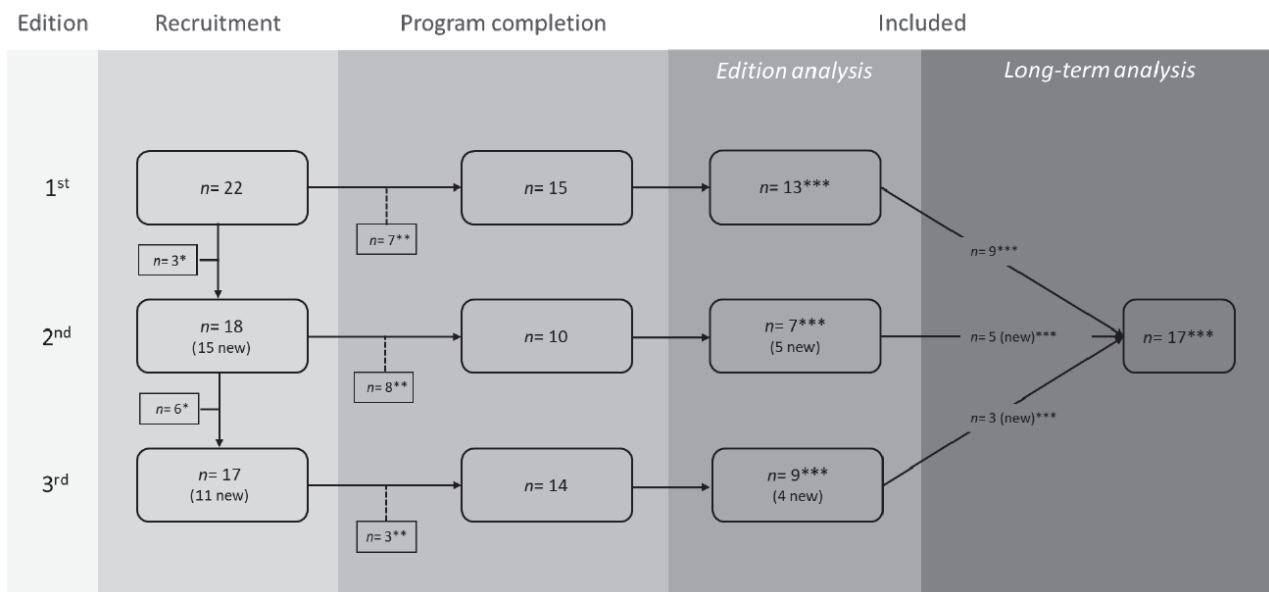
Insufficient data on body composition (body fat mass and skeletal muscle mass) in editions 1 and 2 prevented statistical analysis at those points. Nevertheless, in the long-term, skeletal muscle mass and body fat mass showed ascending and descending (not statistically significant) trends in edition 3, respectively.

Changes in anthropometric and body composition over time are presented in Table 2.

Overtime changes in quality of life

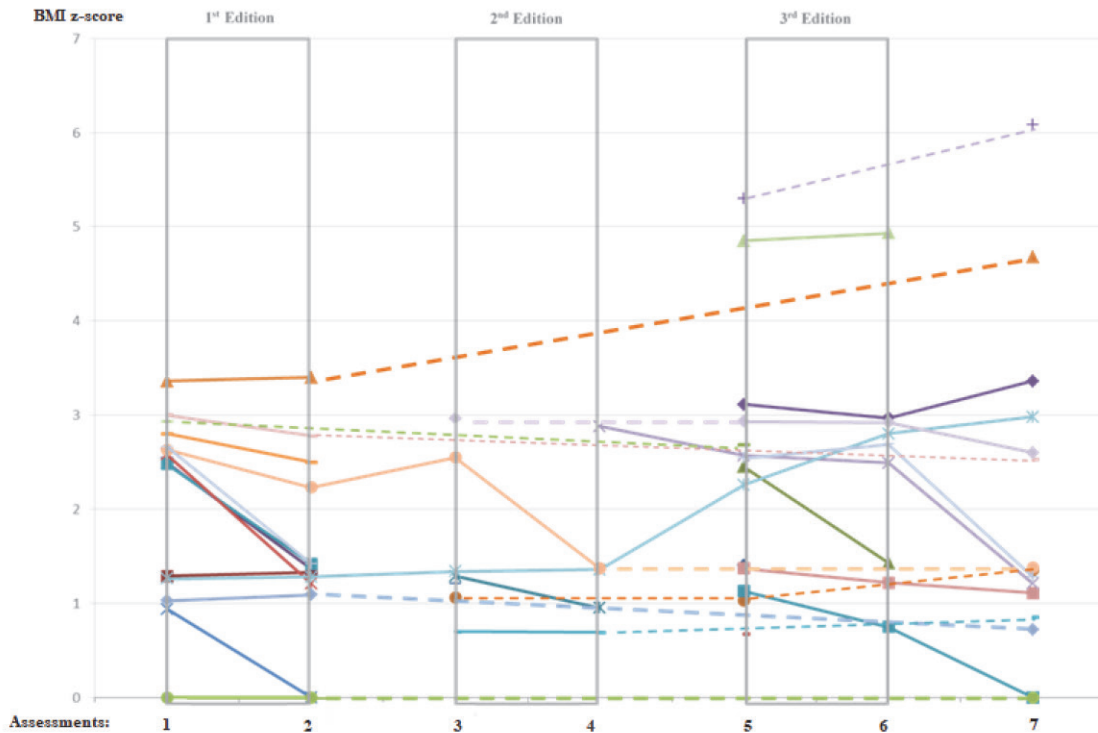
Insufficient data on quality of life from editions 1 and 2 limited the statistical analysis.

A significant improvement in quality of life (total score) was observed in edition 3 ($d = 0.41, p = 0.037$), but not in the long-term ($p = 0.759$).



* Number of adolescents who have participated in more than one program edition.
 † Number of adolescents who have dropped out.
 ‡ Number of adolescents with valid data in (at least) two assessment times.
 First, second and third editions were conducted in the academic years 2013-2014, 2014-2015, and 2015-2016, respectively.

Figure 1. Study flow diagram.



First, second and third editions were conducted in the academic years 2013-2014, 2014-2015, and 2015-2016, respectively. Assessments 1, 3 and 5 correspond to the first assessment in each edition, and assessments 2, 4, and 6 to the last assessment. Assessment 7 corresponds to the long-term assessment conducted between January and February 2018.

Figure 2. Body mass index z-score changes (per participant), over time.

Table 1. Characteristics of adolescents at baseline			
	Males	Females	<i>p</i>
	(n = 12)	(n = 10)	
Age (years)	13.8 (± 1.3)	14.1 (± 1.4)	0.484
Weight (kg)	81.7 (± 20.9)	84.6 (± 16.3)	0.684
Height (m)	1.643 (± 0.10)	1.618 (± 0.07)	0.441
BMI (kg/m ²)	29.84 (± 4.70)	32.11 (± 5.09)	0.232
BMI z-score	2.04 (± 1.26)	2.20 (± 1.29)	0.733
WC (cm)	100.2 (± 9.2)	98.0 (± 9.9)	0.544
WHtR	0.60 (± 0.41)	0.61 (± 0.52)	0.333

BMI - body mass index; WC - waist circumference; WHtR - waist-to-height ratio. Values presented as mean ± standard deviation. A *p* < 0.05 was considered statistically significant.

No statistically significant changes were observed in the long-term in domains of physical comfort (edition 3, *p* = 0.194, *p* = 0.662), social life (edition 3, *p* = 0.182, *p* = 0.288), and family relationships (edition 3, *p* = 0.058, *p* = 0.726). In the self-esteem domain, a significant improvement was observed in edition 3 (*d* = 0.56, *p* = 0.022), but not in the long-term (*p* = 0.964).

No statistically significant differences in quality of life were found between adolescents who accomplished a BMIz decrease ≥ 0.25 (clinical efficacy) and those who did not. However, an improvement was noted in the quality of life of successful participants (*d* = 0.84, *p* = 0.118).

Perceptions of adolescents (long-term)

Among the 17 adolescents who completed the long-term assessment, 16 (94.1%) considered that the program contributed positively to their current sports / fitness behavior. However, nine (52.9%) adolescents did not agree with the statement: I found a sport / physical activity that I still play today.

According to the adolescents, positive aspects of the program (higher rate) included trying new sports that they ended up enjoying (*n* = 17), feeling healthier (*n* = 14), getting motivated to exercise (*n* = 14), understanding the advantages of being physically active (*n* = 13), forming new friendships (*n* = 12), diet improvement (*n* = 11), getting motivated to lose weight (*n* = 10), feeling more confident about themselves (*n* = 10), improving their relationships with others (*n* = 9), and feeling less anxious or stressed (*n* = 7). Less positive aspects of the program were pointed out by a few, and according to them: the activities performed were not motivating (*n* = 1), the relationship created with their “buddy” was not strong enough (*n* = 2), they felt ashamed while participating in sports sessions (*n* = 1), and there was a need for a specific session on healthy eating (*n* = 1).

The perceptions adolescents about the impacts of the healthy buddy program are summarized in Fig. 3.

Table 2. Overtime changes in body composition

	n	BMI z-score	p	WHtR	p	BFM (%)	p	SMM (%)	p
		Mean ± SD		Mean ± SD		Mean ± SD		Mean ± SD	
First edition	1	13	2.04 (± 1.01)	0.007	0.58 (± 0.4)	0.075	-	-	-
	2		1.54 (± 0.98)		0.57 (± 0.3)		-	-	
Second edition	3	7	1.47 (± 0.78)	0.270	-	-	-	-	-
	4		1.09 (± 0.33)		-		-		
Third edition	5	9	2.58 (± 1.07)	0.450	0.63 (± 0.3)	0.001	40.28 (± 4.01)	0.856	33.30 (± 3.40)
	6		2.47 (± 1.24)		0.62 (± 0.5)		40.63 (± 1.41)		33.80 (± 1.76)
Long-term	B	17	2.21 (± 1.27)	0.095	0.60 (± 0.5)	0.011	39.37 (± 6.75)	0.227	33.25 (± 3.75)
	7		1.77 (± 1.73)		0.59 (± 0.6)		37.11 (± 8.83)		35.21 (± 5.32)

B - baseline; BFM - body fat mass; BMI - body mass index; SD - standard deviation; SMM - skeletal muscle mass; WHtR - waist-to-height ratio. Values presented as mean ± standard deviation. Differences between first and last assessment in each edition, and between baseline and final assessment (long-term) performed with paired-sample t-test. A *p* < 0.05 was considered statistically significant.

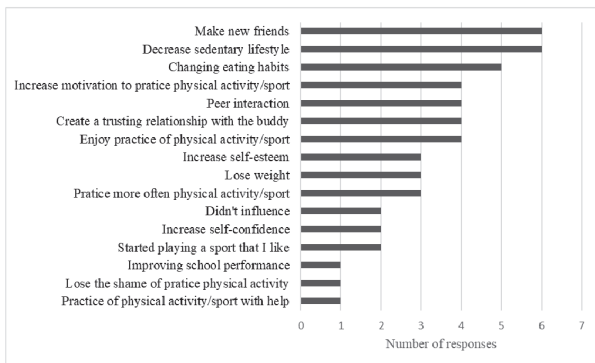


Figure 3. Perceptions of adolescents on the influence of the healthy buddy program in their life.

Characteristics of “buddies”

The questionnaire was sent to 48 “buddies” but was only answered by 33 (68.8%), including the 30 “buddies” from adolescents who completed the program.

Most “buddies” (n = 25, 76%) participated in one edition only, and one (3%) and seven (21%) “buddies” participated in two and three editions, respectively. The distribution of the “buddies” rate of responses in each edition was relatively similar (edition 1 - 34%, edition 2 - 37%, edition 3 - 29%). A total of 12 (36.4%), nine (27.3%), seven (21.2%), three (9.1%), and two (6.0%) respondents were in the second, third, fourth, fifth years, and on either first or sixth year of college at the time of their first participation, respectively.

Perceptions of “buddies” (long-term)

According to “buddies”, factors that may contribute positively to the program included the fact that:

- Activities were shared with the “buddy” n = 32;
- Opportunity for the adolescent to experience new sports n = 32;

- Opportunity for the adolescent to find a sport / physical activity that he or she can practice in the future n = 32;
 - Motivation for adolescents to practice physical exercise n = 32;
 - Environment experienced during the sessions n = 31
 - Small size of the group n = 27;
 - Increasing awareness about the advantages of practicing sports or physical exercise n = 27;
 - Performance of the “buddies” n = 25;
 - Opportunity for making new friendships n = 20.
- On the other hand, factors that were perceived as less positive included:

- Short program duration n = 18;
- Non-engaged parents, not much motivated for the program n = 14;
- Dates and times n = 13;
- Lack of motivation among adolescents to lose weight n = 12;
- Very demanding physical activities n = 30;
- Little variety of exercises / sports n = 29;
- Physical activity / sport poorly adapted to individual preferences n = 23;
- Difficulty of empathy in the relationship n = 20;
- Localization n = 18;
- Little interaction among the adolescents within the group n = 16.

In total, 31 (94%) “buddies” answered yes to the question: would you recommend the healthy buddy program to a colleague?

Regarding goal achievement, most “buddies” have assessed the program as very good and a strategy for physical activity promotion (n = 21) and behavioral change (n = 16), and good as a strategy of weight management (n = 14) and changing eating habits (n = 14.)

The majority of “buddies” perceived a very good impact

of the program on their awareness about pediatric obesity ($n = 18$), and training in terms of relationships and interpersonal communication ($n = 18$), and only five “buddies” perceived a very good impact of the program on their current clinical practice. The influences of the program on clinical practice reported by the “buddies” included:

- Knowing how to communicate about food and exercise;
- Understanding the importance of detecting early signs of obesity in children;
- Greater ease in identifying adolescent problems based on what they learned in communication with the adolescent participants.

A summary of “buddies” suggestions for program

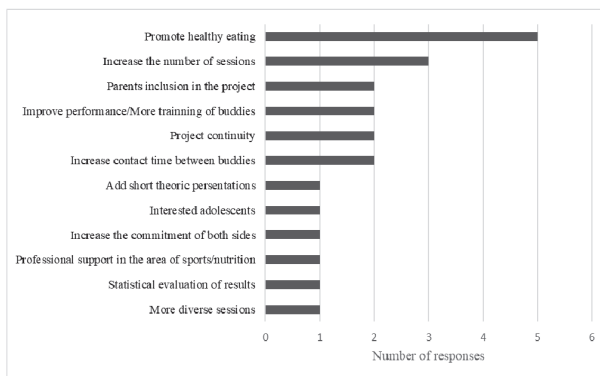


Figure 4. “Buddies” suggestions for program improvement.

improvement is presents in Fig. 4.

Discussion

This study aimed to analyze the short- and long-term impact of the healthy buddy program, as a peer-led health promotion program involving medical students, on physical activity behavior, anthropometrics, and quality of life of adolescents with overweight / obesity and evaluate adolescents and “buddies” perceptions about the program.

The obtained results indicated that the healthy buddy program had a positive, although not statistically significant, impact on physical activity behavior in adolescents. The obtained results showed that not only the number of adolescents enrolled in structured physical activity increased after participation in the healthy buddy program, but adolescents also increased the frequency of physical activity practices, with 77.8% of the adolescents currently performing 3-5 sessions of structured physical activity per week. A possible explanation for this increase might be a higher motivation, greater self-efficacy, and enjoyment perception in physical activity practice, due to healthy buddy participation, as suggested by other studies.²³⁻²⁵

Regarding the overtime changes in anthropometrics and body composition, the results also suggested a positive effect of the healthy buddy program on these parameters. Overall, a reduction in the BMIz and WHtR was observed, along with a tendency to body fat mass decrease and skeletal muscle mass increase. The fact that these results were not statistically significant in all editions may be explained by the small number of participants in each edition. Regarding body composition, although it was not possible to get sufficient data to study its evolution throughout all editions, the results suggested a positive impact of the program on the improvement of these parameters. We cannot, however, associate the increase in muscle mass with an effect of the intervention since it is known that this parameter increases as a function of growth.²⁶ It is important, however, to highlight that the main goal of the healthy buddy program was not weight-loss, rather it aimed to develop an interest in regular physical activity practice that might lead to the acquisition of healthier lifestyles and, in turn, weight loss and physical fitness.

In terms of quality of life, the results suggested an overall positive effect of the healthy buddy program on quality of life of adolescents, with a significant improvement in edition 3 (total score), which might have been moderated or mediated by self-esteem. As expected, this fact was most noticeable among the adolescents who succeeded to reduce their BMIz. Taken together, these two observations suggest an association between the decrease of BMIz and an improvement in quality of life, as indicated by other studies.²² The increase in self-esteem can also be explained by perceptions of adolescents about making new friendships, becoming healthier and more confident, gaining new sports experiences, and getting motivated to exercise and lose weight, which was in line with “buddies” perceptions. Moreover, adolescents and “buddies” had divergent perceptions about eating habits, with adolescents, but not the “buddies”, perceiving an improvement in this behavior. “Buddies”, on the other hand, reported perceived improvement in anxiety and stress reduction of adolescents, which was not in line with their perceptions.

Although most adolescents did not report any negative aspects of the program, some maintained that the activities performed were not motivating, the relationship created with their “buddy” was not strong enough, or that they felt ashamed while participating in sports sessions. According to them, there was a need for holding a specific session on healthy eating. The “buddies”, in turn, considered the short duration of

the program, the schedule (Saturday morning), and the parents lack of motivation to be the negative aspects of the program.

In terms of the open-ended question concerning the perception of adolescents about the impact of the healthy buddy program, the decrease in sedentary lifestyle and the opportunity of developing new friendships were the most reported aspects. These were followed by a change in eating habits, peer-to-peer interaction, the creation of a trusting relationship with the “buddy”, and a greater interest in physical activity. The increase in the participants self-esteem and motivation for the practice can be explained by the fact that the exercise was performed with the support of a “buddy”, and adolescents shared the problem of being overweight. All of these can lead, directly or indirectly, to an increase in physical activity, a change in lifestyle habits, and weight loss.

The “buddies” maintained that healthy buddy program had a positive impact on their way of looking at pediatric obesity. They further regarded the program as a very good strategy to promote physical activity, motivate behavioral change, and develop interpersonal relationships. The “buddies” maintained that the healthy buddy program influenced their clinical practice, communication skills on the promotion of healthy living habits, such as healthy eating and physical activity in adolescents, as well as their understanding of the importance of detecting early signs of obesity in children and starting behavioral change.

Regarding the limitations of the present study, one can refer to the small size of the initial sample, the withdrawals observed throughout the program, as well as the difficulties in recruiting participants for re-evaluation, which conditioned the statistical analysis, increased the risk of type II error, and probably limited the conclusions to be drawn from this study. These limitations are, however, consistent with other pilot studies on behavioral change among adolescents with obesity²⁷ and studies with long follow-up periods similar to ours.²⁸

It should further be noted that this study was conducted five years after the first edition and two years after the conclusion of the program. Therefore, it was only possible for the authors of this study to analyze data based on the existing records.

Another possible limitation is the fact that participants (adolescents) were randomly invited only in the first program edition, which may bias the results of the present study. Moreover, the exercise sessions were in the group (participants plus “buddies”), which makes it impossible to attribute the impact of the program

only to the interaction with the buddies. Moreover, we choose to include some adolescents who asked to participate in more than one program edition, based on the fact that one of the main goals of the project was to promote regular physical activity among the adolescents. This too may be considered a limitation that precludes randomization.

Despite its limitations, the results of this study suggest that peer-led health promotion programs, such as healthy buddy, may be useful in managing adolescent overweight and obesity in the clinical setting while contributing to the improvement of educational and community involvement programs led by medical students.

Future similar interventions may benefit from:

- Increased number of sessions, as suggested by the “buddies”. Contact time along with the sports sessions should also be favored, in an informal environment conducive to sharing ideas and experiences, including the discussion of various topics related to obesity and adolescence.
- Inclusion of sessions focusing on healthy eating and development of strategies and solutions for healthy meals and snacks.
- Creation of a training course for “buddies” at the beginning of the program to sensitize them to the best strategies for enhancing motivation and behavioral change. The objective would be to improve their performance and teach them skills that help them deal with the challenges encountered throughout the program.
- A greater integration of parents in such programs, as suggested by the “buddies”, which seems to be particularly relevant. The family plays a fundamental role in creating opportunities for a more active lifestyle. Although there is a great need for autonomy in relation to many aspects of adolescent life in this specific age group, they still depend on their parents in many circumstances. Therefore, it is crucial to raise awareness of parents in this regard and together explore strategies to eliminate barriers that prevent adolescents from practicing and maintaining healthy behaviors.
- Consistent and continued data collection, using the same protocol, and inclusion of a control group (overweight adolescents followed at the same clinic during the same period of time) can help analyze interventions effectiveness more accurately.

Author Contributions

ISP and HF participated in the study conception or design. ISP and AVS participated in acquisition of data. ISP, AVS, HF participated in the analysis or interpretation of data. ISP, AVS,

HF participated in the drafting of the manuscript. ISP, AVS, HF participated in the critical revision of the manuscript. All authors approved the final manuscript and are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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Protection of human and animal subjects

The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki 2013).

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Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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Impacto e Valor Educativo de um Programa Piloto de Promoção da Saúde Liderado por Pares no Controlo do Excesso de Peso em Adolescentes

Introdução: A obesidade é a doença pediátrica mais prevalente em todo o mundo. O envolvimento de estudantes de medicina como promotores de saúde num programa multidisciplinar liderado por pares de controlo de peso de adolescentes pode melhorar o controlo de peso e sensibilizar os estudantes de medicina para a obesidade na adolescência. Este estudo teve como objetivo analisar o impacto a curto e longo prazo de um programa de promoção da saúde liderado por pares, envolvendo estudantes de medicina, no comportamento de atividade física, antropometria e qualidade de vida de adolescentes com excesso de peso / obesidade, bem como avaliar as percepções dos adolescentes e estudantes sobre o programa.

Métodos: Foram realizadas três edições do programa, cada uma com cerca de seis meses, em anos consecutivos. A antropometria, qualidade de vida e comportamentos de atividade física de adolescentes com excesso de peso foram avaliados no início e no final de cada edição e a longo prazo. A participação a longo prazo e as percepções dos alunos foram também analisadas.

Resultados: No total, inscreveram-se nas três edições do programa 30 pares de adolescentes-mais-“companheiros”, dos quais 17 (56.7%) completaram pelo menos duas avaliações, cinco e dois participaram em duas e três edições

do programa, respetivamente. O *z-score* do índice de massa corporal (edição 1: $d = 0,50$, $p = 0,007$; edição 2: $d = 0,69$, $p = 0,270$; edição 3: $d = 0,10$, $p = 0,450$) e relação entre o perímetro abdominal e a estatura (edição 3: $d = 0,03$, $p = 0,001$) dos adolescentes diminuiu ao longo do tempo, e a qualidade de vida tendeu a melhorar entre aqueles cujo *z-score* do índice de massa corporal ($d = 0,84$, $p = 0,118$) era inferior. O número de adolescentes inscritos em atividade física estruturada aumentou após a participação no programa. Globalmente, as percepções dos adolescentes sobre o programa foram positivas. Os “companheiros” consideraram o programa muito bom para aumentar a sua sensibilização sobre a obesidade na adolescência.

Discussão: Com base nos resultados obtidos, o programa teve um impacto positivo modesto em todas as medidas avaliadas e mostrou ser uma experiência positiva para os estudantes de medicina. Esses resultados sugerem ainda que diferentes contextos de educação médica podem beneficiar de intervenções semelhantes.

Palavras-Chave: Adolescente; Educação de Pacientes como Assunto/métodos; Estudantes de Medicina; Exercício Físico/ psicologia; Obesidade Pediátrica/prevenção & controlo; Tutoria/métodos