

ORIGINAL ARTICLE

ADOS: an educational primary prevention programme for preventing excess body weight in adolescents

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Objective: The prevalence of adolescent obesity has increased considerably over the past decade in Switzerland and has become a serious public health problem in Europe. Prevention of obesity using various comprehensive programmes appears to be very promising, although we must admit that several interventions had generally disappointing results compared with the objectives and target initially fixed. Holistic programmes including nutritional education combined with promotion of physical activity and behaviour modification constitute the key factors in the prevention of childhood and adolescent obesity. The purpose of this programme was to incorporate nutrition/physical education as well as psychological aspects in selected secondary schools (9th grade, 14–17 years).

Methods: The educational strategy was based on the development of a series of 13 practical workshops covering wide areas such as physical inactivity, body composition, sugar, energy density, invisible lipids, how to read food labels, is meal duration important? Do you eat with pleasure or not? Do you eat because you are hungry? Emotional eating. For teachers continuing education, a basic highly illustrated guide was developed as a companion booklet to the workshops. These materials were first validated by biology, physical education, dietician and psychologist teachers as well as school medical officers.

Results: Teachers considered the practical educational materials innovative and useful, motivational and easy to understand. Up to now (early 2008), the programme has been implemented in 50 classes or more from schools originating from three areas in the French part of Switzerland. Based on the 1-week pedometer value assessed before and after the 1 school-year programme, an initial evaluation indicated that overall physical placidity was significantly decreased as evidenced by a significant rise in the number of steps per day.

Conclusion: Future evaluation will provide more information on the effectiveness of the ADOS programme.

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Introduction

As in other European countries,¹ the prevalence of adolescent obesity has increased considerably over the past decade in Switzerland² and has become a serious public health problem all over Europe.³ Solid data on obesity prevalence in the teenagers' age category covering the geographic and cultural diversity of Switzerland (4 languages) and programmes in teenagers to prevent obesity are rather scanty,^{4,5} in particular, in the French speaking part of Switzerland.⁶ What is the best intervention practice for obesity prevention in children and adolescents? According to Doak *et al.*⁷ four factors are of importance:

1. Physical Activity,
2. Diet and nutrition, in particular preventing the increase in eating disorders,

3. Sustainable programmes and
4. Programmes tailored to target schools, avoiding discrimination of obese adolescents/obese teachers.

The programmes developed in the school setting are important, but there has been little enthusiasm for implementing them in Switzerland despite much effort for the last 10 years (Suisse Balance⁶). As pointed out by Story,⁸ schools are in a unique position to play a pivotal role in promoting healthy lifestyle and helping to prevent obesity. Policies to prevent childhood obesity in the European Union were reviewed by Lobstein.⁹ This included classroom health education linked to the school's food and activity practices. In addition, healthy school policies involved school cafeterias, vending machines and snack bars, plentiful school-based physical activity classes and recess activities.

Programmes in school seem to be of great interest for primary prevention for two reasons: first, the coverage is extensive and second, the educational environment justifies the integration of new information related to health,

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in particular nutrition and physical activity. Previous experiences in adjacent French speaking countries in the school setting are encouraging. One of them, carried out in two towns of the North of France, Fleurbaix and Laventie¹⁰ can be considered as a landmark study, initiated already in the 1990s. The question was the following: does the integration of nutritional education into the school curriculum change the dietary behaviour of children and family and ultimately lead to a stabilization of childhood obesity prevalence? The programme involved education and information through teachers and health professionals. In 2004, this programme was extended to 10 new cities in different areas all over France for 5 years. The results showed that over a 10-year period (1992–2002), the incidence of obesity in school children dropped substantially in boys and girls whereas in the control group the obesity rate almost doubled in girls and rose by a factor of 3 in boys; the incidence rate dropped by 4% in girls and 1% in boys in the group attending the programme. In other words, excess weight gain in children could be totally blunted by increasing nutritional and physical activity knowledge at school¹¹ and the programme completely abolished the occurrence of new cases of obesity.

In summary, primary prevention of obesity using an interventional approach appears today the most promising. Based on the above consideration, we believe that programmes including nutritional education + promotion of physical activity combined with behaviour modifications constitute the key factors in the prevention of childhood and adolescent obesity. We have developed a new educational programme in the French part of Switzerland, with the acronym ADOS, which stands for (in French) A = Adolescent, Alimentation (nutrition), Activité physique (physical activity); D = Dépendance (addiction); O = Obésité; S = Santé (health) and Sport.

What are the characteristics of the ADOS programme?

This new programme was developed based on our earlier experience in adults on obesity management with a number

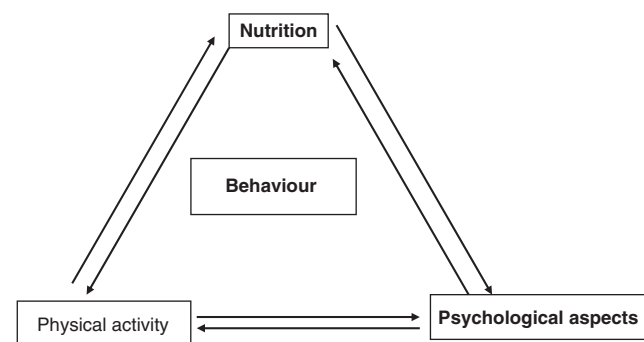


Figure 1 The triangle used to develop the educational background of the programme. The centre of gravity of the triangle represents the corner stone of any lifestyle modification: behavioural factors.

of specific characteristics that cannot be detailed here.¹² The general objective was to induce a modification of attitudes and behaviours of teenagers following individual awareness which eventually result in a more appropriate lifestyle. This was developed to extend earlier programmes on obesity management in adults.¹² The specific purpose of the pilot programme was to incorporate new educational material in selected secondary schools (from 7th grade onwards, 14–18 years). The information provided included nutrition, physical activity and psychological aspects. The purpose of the programme was not only to prevent overweight and obesity in adolescents but also to hopefully further transfer the knowledge of a healthy lifestyle to the whole family and eventually to their future offspring.

After making a review of the programme developed in teenagers, we realized that most of the earlier programmes focused either mostly on nutrition, or mostly on physical activity, or both, but rarely on psychological aspects. We based our programme on a triad which includes the three major components of obesity prevention namely nutrition, physical activity and behaviour (Figure 1). The centre of gravity of the triangle represents the cornerstone of any lifestyle modification: behavioural factors. This explains why we focused our programme on psychological and behavioural aspects.

The educational strategy was oriented in the development of highly illustrated and schematic educational booklets. This included the development of (1) a basic text for teachers (called ADOS) based on the principle of learning by integrating concepts using pedagogic illustrations and (2) the development of a series of interactive practical workshops (called ‘ADOS pratique’) based on ‘learning by doing’ and ‘learning by applying’.

The materials were first validated by biology, physical education, nutrition and psychology teachers as well as school medical officers. Teachers considered the practical educational materials innovative and useful, motivational and easy to understand. They were also presented initially to adolescents for adequacy of level, acceptability and overall judgment.

The programme was implemented in 24 classes from schools originating from three distinct areas.

The school-based programme was offered free of charge, which makes weight management more accessible.¹³ A general schematic outline of the concept used is presented in Figure 2.

The workshops (ADOS practicals)

We developed 13 workshops, which were the essence of ‘ADOS pratique’. They were based on the following themes:

- (1) Energy
- (2) Daily physical activity
- (3) Physical activity and sport

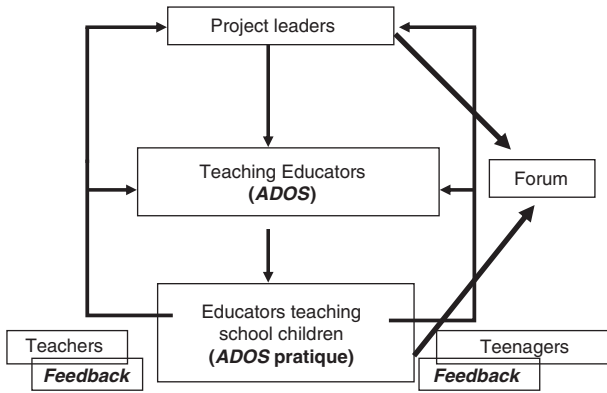


Figure 2 General outline of the conceptual educational process involving the leaders teaching to the usual teachers (with continuous feedback) as well as directly to adolescents via a number of discussion forum.

- (4) Physical inactivity
- (5) Body composition
- (6) Food and drinks: volume of food and energy density
- (7) How to read the labels on food products?
- (8) The sugars
- (9) The hidden fat
- (10) The secret of protein
- (11) How do you eat? (a) Is the duration of a meal important? (b) Do you eat with pleasure?
- (12) Do you eat because you are hungry or not?
- (13) Emotional aspects of eating

The approach used for developing the workshops was based on the following principles. First, a literature review was made, using *Medline* database; a critical review of the studies selected (including meta-analysis) allowed to pick up the evidence-based programmes with positive effect on primary prevention of obesity in teenagers.

Second, the development and implementation of the workshops were made, using practical examples of daily living. For example, workshop called 'Food and drinks: volume of food and energy density' was based on the evidence presented by Swinburn and Egger,¹⁴ showing the important impact of energy density and portion size in the control of body weight and by Maffeis *et al.*¹⁵ showing a relationship between relative fat intake and obesity after controlling for a number of confounding factors or not. A sample of workshops with the specific objectives, the content and the expected outcome is presented in Table 1.

Educational strategy

To implement the ADOS programme in the school setting, we decided to use the following approach: first, assuming that the teachers were not specialists in nutrition, physical activity and psychology, we educated the teachers by organizing workshops. The teachers involved are generally in the field of biology, chemistry, sciences and sport science.

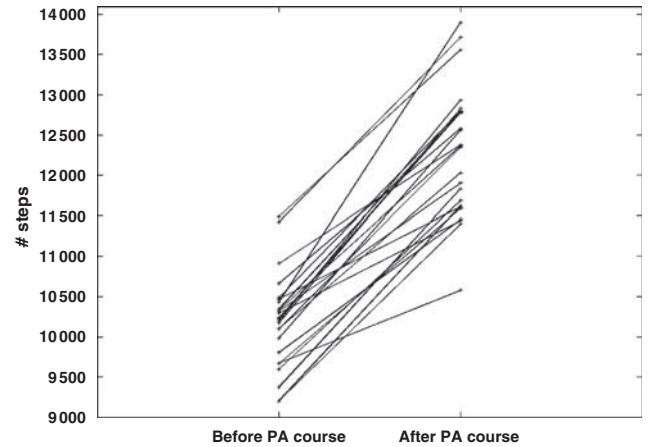


Figure 3 The positive effect of the ADOS programme on daily spontaneous physical activity (PA) as estimated by electronic pedometer (1-week average before ADOS vs after ADOS); each line represents the changes in mean SPA for a class.

Then, the educated teachers can transfer their knowledge to the teenagers through the practical workshops. These are integrated into normal semesters' curriculum. The teachers have the ADOS book as a basic reference. For particularly difficult issues that may come out during the school semester, the teachers and the adolescents have the opportunity to contact the leaders by email and phone. In addition, at the semester outset, a forum for students is organized, which consists of first showing a relevant provocative movie ('*Supersize me*' by Morgan Spurlock), and then replying subsequently to practical questions in a living forum. Numerous issues were raised from the teenagers related to the nutritional, medical and behavioural aspects of the movie and the ADOS programme. The characteristics of the colleges involved and the sample participating in the programme are listed below:

- Location: French part of Switzerland (Romandie about 1/3 of Switzerland)
- Number of colleges: 9; number of classes: 66
- Total Number of teenagers studied: 1300
- Age: 7–10th grade (14–18 years)

Evaluation of the ADOS intervention programme

The criteria used for evaluating interventions constitute a key factor for any programme and has been set out by Kumanyika *et al.*¹⁶ The following factors are listed in the form of specific questions: '1. Does the intervention address dietary habit, physical activity patterns and television viewing of children? 2. For interventions that include physical activity, does the intervention include activities inside and outside the school? 3. Does the intervention seek to change behaviours by changing the physical, economic or socio-cultural environment? 4. Is the programme sustainable over

Table 1 A summary of descriptive information on seven selected workshops (out of 13) with the anticipated outcome

Topics	Objectives	Short description of the workshop	Expected lifestyle modifications
1. Energy	To better understand the concept of energy expenditure and energy balance	1. Candle burning (heat produced) 2. What amount of energy expenditure (walking, running) is required to burn the equivalent of two pieces of chocolate	To be able to reach a better equilibrium between intake and expenditure
2. Daily physical activity	(a) To assess baseline physical activity with simple, objective measurements (b) To enhance it by a progressive change in lifestyle, if required	The pedometers are distributed to teenagers. They are worn during 1 full week before and after the completion of the programme	To tune their own physical activity and to enhance it, if required, based on the feedback principle
3. Physical inactivity	To make the teenagers aware of the daily life situations during which they are totally inactive (TV, computers, video games and so on)	The teenagers fill up a questionnaire during 1 week, collecting the types and durations of sedentary activities	To decrease placidity
4. Energy density	Understanding the concept of energy density in practical terms	15 real foods from very low (salad) to very high (oil) energy density were selected by the teenagers. Teenagers had to weigh the equivalent of 100 kcal of each food and put them in a ranking order. The volume of each food is evaluated visually	To apply the concept that small volumes of energy-dense food are more perverse than large volumes of food full of water and low in fat
5. Hidden fat	(a) To acquire solid knowledge about the type of fats that are judged 'good' versus 'bad' for health (b) To track the hidden fat in food	To pour in a glass the oil equivalent of hidden fat in 15 different food items (chocolate, biscuits, cheese and so on)	To better diagnose the perversion of hidden fat in food
6. Eating behaviour: (a) Speed of eating (b) Pleasure to eat	(a) To be conscious of the process of post-prandial satiety and of the rate of food ingestion (b) To enhance sensitive consciousness during eating and to evaluate the pleasure to eat	(a) During 1 week the teenagers fill up a questionnaire measuring the duration of their meal (b) Experiencing the outstanding palatability when a piece of chocolate is melting in the mouth without being chewed immediately	(a) To slow down the rate of eating (b) To rediscover the gustative sensations developed by a simple food when the typically fast eating process is slowed down and the consciousness is enhanced
7. Eating behaviour: Hunger sensation	To (re)discover the hunger sensation and to make the teenagers aware if they eat due to hunger or due to necessity or 'envy'	To develop practical exercise for increasing the consciousness of the hunger process. Then, to fill up a questionnaire during 1 week evaluating the intensity of internal cues (hunger) vs external cues	To use the physiological sensation of hunger as the only lever for initiating a meal

time at the structural and institutional level with minimal additional inputs? 5. What is the level of involvement from the participants, parents, teachers and/or the broader community? 6. Is the intervention a primary intervention programme tailored to the needs of the local community, schools and/or families that are included in the target population? 7. To what extent does the intervention address family and individual level factors? 8. Does the intervention have multiple focal points and levels of intervention, including national, regional and community levels? 9. Does the intervention build links between sectors by involving multiple organizations/groups that may be otherwise viewed as independent? 10. Does the intervention reach all children within the community?'

We acknowledge that our pilot programme ADOS was not fully compatible with the 10 criteria but roughly half of them were met. The evaluation of the programme was based on both objective knowledge acquisition and objective increase in spontaneous physical activity. The former was based on a specific questionnaire already used for other

programmes whereas the latter used electronic pedometers. The questionnaire will not be presented in detail. Briefly, it consists a series of questions on both food and nutrition, not based on pure memorization but on integrated knowledge. In addition, it highlighted the degree of individual intention and motivation to change eating and physical activity behaviours at the programme outset. Furthermore, the potential interest, the efficiency, effectiveness and the adequacy ('friendliness') of the programme were evaluated by both school teenagers and teachers.

Physical activity evaluation by pedometers

The importance of physical activity in the prevention of obesity in children is well established.¹⁷ Evaluation was performed by means of electronic pedometers (Omron, Healthcare, Kyoto, Japan) that were provided to the teenagers free of charge. The aims were (1) to assess the usual daily rate of physical activity and (2) to make the teenagers aware—using the feedback principle—that this level can be

progressively enhanced, provided it was judged as too 'low'. The criteria for defining a 'low' level of daily physical activity was based on adult values set out by Tudor-Locke *et al.*,¹⁸ keeping in mind that the classification of level of physical activity based on number of steps in teenagers may slightly differ. Spontaneous physical activity was assessed before vs after the intervention in 500 adolescents (20 adolescents × 25 classes), for 1 full week. The compliance to pedometer was good to excellent; the main problems were technical failure of the devices in about 2%, yielding some missing data, and broken pedometers and pedometers apparently lost (?). The main results of the intervention on spontaneous physical activity measured by the device are shown in Figure 3, where the mean results per class are presented for easier inspection.

Conclusion

The real potential of this new programme still remains to be determined over a longer term. We believe that each 'building block', as limited as it may be, is useful to contribute to prevent the sharp rise in obesity in children and adolescents in Switzerland and elsewhere. There is a need for well-designed studies that analyse the impact of a range of interventions. The future will show whether this is true or not. It is anticipated that even a programme as modest as this one can have positive population benefits if it is extended to wide school coverage so that a large number of teenagers are exposed to the programme. As pointed out by Swinburn,¹⁹ 'Small changes times large volumes is the nature of both the ascending and descending trajectories of the non-communicable disease epidemics'. The future perspective will be to continuously evaluate the programme and make appropriate corrections based on both adolescent's reactions and teacher's opinions: continuous feedback from teachers and students are essential to review the materials. It is envisaged that the programme will be extended to the German and Italian speaking parts of Switzerland by translating the materials and making pertinent sociological cultural and ethnic adaptations.

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Conflict of interest

The authors have declared no financial interests.

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