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Process evaluation of a school-based overweight and obesity screening strategy in adolescents

Emilie Bonsergent^{1,2}, Nathalie Thilly^{1,3}, Karine Legrand^{2,3}, Nelly Agrinier^{1,2,3}, Sabrina Tessier^{3,4}, Edith Lecomte⁵, Evelyne Aptel⁶, Jean-François Collin^{2,3}, Serge Briançon^{1,2,3} for the PRALIMAP Group^{1,2,5,6,7}

Abstract: The PRALIMAP (*PRomotion de l'ALimentation et de l'Activité Physique*) trial highlights the effectiveness of implementing a screening strategy in high schools to prevent overweight/obesity among adolescents. The strategy comprises three steps: i) body measurements to detect overweight/obese adolescents, ii) a medical interview with each adolescent identified to discuss the findings, and iii) an adapted care management consisting of seven group educational sessions. A process evaluation was conducted in the PRALIMAP trial to assess the effective implementation of the screening strategy activities, and the participation of adolescents and school professionals in them, from a qualitative and a quantitative point of view. The present paper describes the process and the implementation of the screening strategy as performed in the PRALIMAP trial, and discusses the feasibility of such an intervention in high school settings. The ability of nurses to explain the screening results improved with the addition of specialist support. The ability of adolescents to take part in the screening strategy improved when the adapted care management was conducted inside schools and could be increased even further if the waiting time between the three steps could be minimised. (*Global Health Promotion*, 2013; 20 Supp. 2: 76–82).

Keywords: overweight/obesity prevention, adolescence, screening strategy, adapted care management, high school setting

Introduction

Given the increasing prevalence worldwide over the last decade of childhood and adolescent obesity (1,2) and the risk of morbidity and mortality with which obesity is associated (1,3), prevention has become an international public health priority requiring the implementation of effective interventions. The Ottawa Charter provides a framework for health promotion measures focussing on five activities, of which three are relevant here: development of personal

skills, creation of supportive environments, and reorientation of health services (4). The contribution of each to overweight and obesity prevention alone and in combination has not been extensively explored, and results published to date have been discrepant (5–8).

The PRALIMAP (*PRomotion de l'ALimentation et de l'Activité Physique*) programme, a recent 2x2x2 factorial cluster randomised trial (2006–2010) involving adolescents in 24 high schools in the Lorraine region (North-eastern France), evaluated

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the effectiveness of three overweight and obesity prevention strategies: 'education' (implementation of diet lessons and physical activities in the school programme), 'environment' (improvement in dietary and physical activity offerings) and 'screening' (detection of overweight/obesity and, if necessary, adapted care management) (9). The intent-to-treat analysis of PRALIMAP showed that screening was the only effective strategy to prevent overweight and obesity in adolescents over two years.

The objective of this paper is to describe the process and the implementation of the screening strategy performed in PRALIMAP and to discuss the feasibility of such an intervention. We intend to provide information to help professionals who want to implement a screening strategy in a school setting.

Methods

The PRALIMAP screening strategy

Allocation

According to 2×2×2 factorial cluster randomisation, the screening strategy was implemented in 12 of the 24 state-run high schools selected in PRALIMAP over a two-year period (grades 10 and 11): Three were assigned to 'screening alone', six to 'screening and education or environment combined', and three to 'three strategies combined' (9). Among the 12 high schools assigned to screening, the initiation of the strategy spread over one year. All adolescents who were registered in the selected high schools in the grades of interest and who gave their own and parental informed consent (oral and written, respectively) were involved in screening. The PRALIMAP trial was approved by the French ethical committee and registered under the number NCT00814554 (<http://clinicaltrials.gov/ct2/show/NCT00814554>).

Intervention

The screening strategy consisted of three steps: detection of overweight and obesity, medical interview and adapted care management.

- **Overweight and obesity detection.** At the beginning of grades 10 and 11, weight, height and waist circumference were measured twice in a single session by high school nurses in their

offices. The body weights of adolescents were measured in underwear with an accuracy of 0.05 kg using a calibrated electronic scale. Height without shoes was measured to the nearest 0.1 cm with a stadiometer. Body mass index (BMI) was calculated as weight/height² from the means of the above two measurements. Waist circumference was measured to the nearest 0.1 cm in a standing position using a non-elastic flexible tape at the level of the navel. A positive screening was defined as the presence of an overweight or obesity *associated with* a high waist circumference. Overweight and obesity were defined according to the International Obesity Taskforce (IOTF) age- and sex-specific cut-off values for BMI (10), and high waist circumference according to the McCarthy age- and sex-specific cut-off values (11). Body measurements were also made at the beginning of grade 12 to evaluate the effectiveness of the strategy. In addition to these measurements, the Eating Attitudes Test 40 (EAT-40) and Hospital Anxiety and Depression (HAD) questionnaires were completed by adolescents. An EAT-40 score ≥ 30 was used as a cut-off value to identify adolescents with suspected eating disorders (12), and HAD anxiety and depression scores ≥ 50 identified those with suspected anxiety and/or depression (13,14).

- **Medical interview.** Nurses notified each adolescent who screened positive of an individual medical interview. During this interview, a physician working for a nutrition network and the school nurse reported to the adolescent his (or her) body measurement results, and explained the consequences of overweight/obesity and the benefits of adapted care management to reduce it. Briefly, nutrition networks are associations of professionals specialising in overweight and obesity management (physicians, dieticians, psychologists and sports educators), and located in the neighbourhood of the high school. Physicians gave each adolescent three letters containing the screening results, including EAT-40 and HAD scores, one for him (or her), one for his (or her) parents and one for the general practitioner. As recommended by Nihiser *et al.* (15), the letters included the child's BMI-for-age percentile, an explanation of the results, and recommendations for management.

Table. Themes, objectives and professionals involved in educational sessions

<i>Sessions</i>	<i>Themes</i>	<i>Professionals</i>	<i>Objectives</i>
1	Nutrition and weight	Physician and dietician	<ul style="list-style-type: none"> To get to know each other, and explain the organisation of sessions To identify nutritional representations and beliefs To explain the notions of energy balance and body mass index To provide an opportunity for adolescents to express their causes for concern, needs and expectations
2	Dietary guidelines	Dietician	<ul style="list-style-type: none"> To explain the dietary guidelines To analyse daily diet over three days
3	Dietary choices and practices	Dietician and psychologist	<ul style="list-style-type: none"> To identify factors influencing dietary choices To look for potential alternatives
4	Physical activity guidelines	Sports educator	<ul style="list-style-type: none"> To practice one hour of physical activity To explain physical activity guidelines
5	Physical activity choices and practices	Sports educator and psychologist	<ul style="list-style-type: none"> To identify factors influencing physical activity choices To look for potential alternatives
6	Strategies for change	Psychologist	<ul style="list-style-type: none"> To provide strategies for management of difficult situations To understand social interactions that build self-esteem and assertiveness
7	Nutritional change	Dietician, sports educator, psychologist and physician	<ul style="list-style-type: none"> To define objectives and conditions for nutritional change

At the end of the interview, an adapted care management, supervised by the nutrition network, was proposed to the adolescent.

- **Adapted care management.** Adolescents who accepted the proposed adapted care management were invited to participate in seven 1.5-hour group educational sessions funded by the regional health insurance system and implemented inside or outside high schools. The themes, objectives and professionals involved in each session are presented in the Table.

Main endpoints

Endpoints were body measurements, namely, BMI, overweight and obesity prevalence.

Process evaluation

As part of the PRALIMAP programme, an extensive process evaluation was conducted by a pilot group, including specialists in public health

and evaluation. It aimed to assess how the screening strategy was implemented by collecting information on its provision, its receipt and the experience of the intervention. The process evaluation included a formative evaluation performed during the implementation of the screening and a summative evaluation at the end of implementation. Its principal concerns were the effective implementation of activities related to the screening strategy on one hand, and participation on the other. Quantitative and qualitative aspects of implementation and participation were explored. Evaluation data came from activity reports, interviews and self-administered questionnaires from the three main actors: adolescents, high school professionals (particularly nurses) and professionals from nutrition networks.

Activity reports

Indicators related to quantitative aspects of implementation and participation were included in

activity reports from nurses at the end of the medical interviews and by nutrition network professionals at the end of the educational sessions.

Interviews

Adolescents who screened positive were interviewed individually one year after the beginning of the PRALIMAP programme in the first four high schools assigned to the screening strategy. The interview aimed to identify factors limiting participation of adolescents in the adapted care management. Two focus groups (collective interviews) were also carried out by the pilot group at the end of PRALIMAP in each of the 12 high schools included. The first one concerned high school professionals and the second professionals from the nutrition networks. These focus groups aimed to explore the perceptions of professionals of the quality of implementation and participation.

Self-administered questionnaires

At the end of each educational session, adolescents completed a questionnaire exploring their experience of, and satisfaction with, the session. All the completed questionnaires were used to provide information about the quality of implementation of the adapted care management.

Statistical analysis

The fieldnotes gathered during individual and collective interviews were examined. Factors limiting implementation and participation were extracted, synthesized and listed. Basic descriptive statistics were performed on questionnaires data and activity reports using SAS (SASTM v9.2, SAS Inst., Cary, NC, USA).

Results

Screening strategy implementation: quantitative aspects

Detection of overweight and obesity and the medical interview were performed according to the protocol in the 12 high schools selected. The adapted care management was entirely implemented (seven sessions organised) in eight high schools, partially implemented (one session) in one and not implemented at all in three.

Participation in the screening strategy: quantitative aspects

Among the 3191 eligible adolescents in the 12 high schools, 1387 (43.5%) did not take part in the screening strategy (42.8% refused) or did not complete it (57.2% changed high school before the beginning of grade 12) (Figure 1). The screening was positive for 15.4% of the 1804 adolescents considered (girls: 58%; mean age at baseline: 15.6 ± 0.6 years), with 11.2% overweight and 4.2% obese. Among them, 11.4% had suspected eating disorders, 26.8% suspected anxiety and 1.1% suspected depression. Eventually, 66 (25.3%) of the 261 adolescents present at the medical interview received the adapted care management, while 130 had declared during this interview their interest in such care. Among the 131 not interested, 15.1% preferred to go on a diet by themselves or to be followed by professionals of their choice, 9.9% lost weight between the detection and the medical interview, 8.3% were false positive (athletic morphology), and 3.0% reported logistical problems (time or transport).

Implementation and participation in the screening strategy: qualitative aspects (professionals' point of view)

Detection of overweight/obesity was perceived by nurses as easy to implement and of importance because it allows for adolescents to be made aware of their weight status.

Telling adolescents about a positive screening, and particularly about suspected eating disorders and anxiety or depression, was considered to be difficult by nurses. They were not trained to interpret the EAT and HAD scores or to explain the results to adolescents; however, they also reported that this announcement prompted discussion with adolescents.

High school and network professionals reported difficulties with the time at which the educational sessions had to be scheduled. Ideally, they should be planned during free school hours and suited to all the adolescents who screened positive and who were in different classes.

Network professionals highlighted the importance of the adolescents' participation in conducting the educational sessions in the school setting; however,

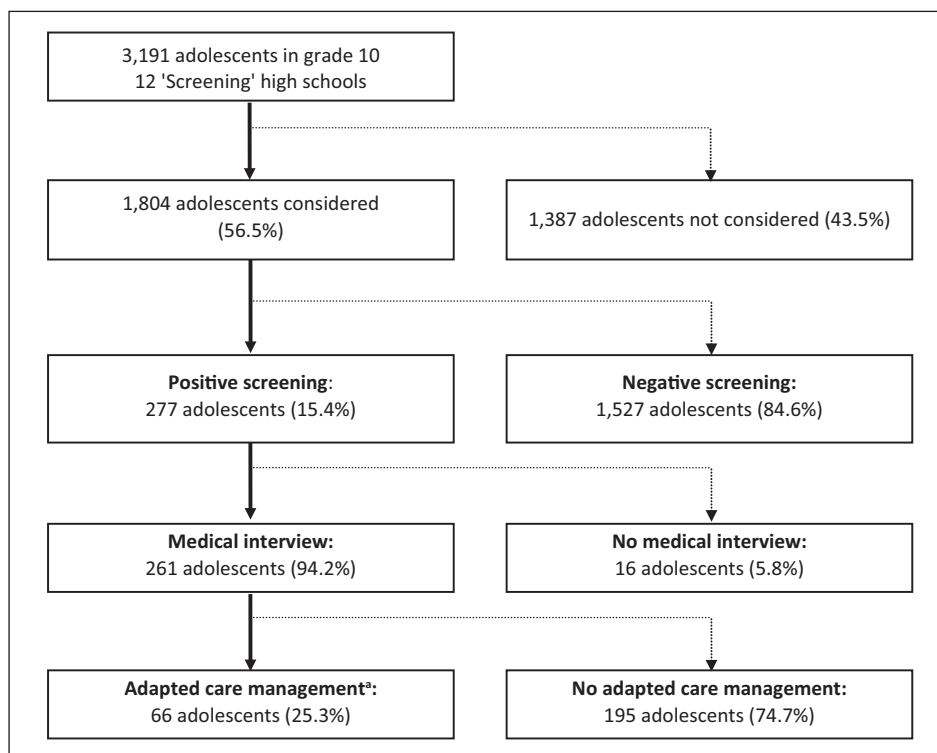


Figure 1. Participation of adolescents in the different steps of the PRALIMAP screening strategy

PRALIMAP: *P*ROMotion de l'*A*LIMENTation et de l'*A*ctivité *P*hysique; *adolescents who participated in at least one educational session.

some nurses thought that the school was not the appropriate setting because of stigmatisation.

Nurses reported difficulties motivating adolescents to participate in educational sessions; they said the long delay between screening and the first session (five to nine months) was the main cause. However, network professionals were generally satisfied by the sequence of sessions and their duration; they were satisfied by the responses they gave to the adolescents and felt they had achieved the objectives of each session.

Implementation of adapted care management: qualitative aspects (adolescents' point of view)

Most adolescents who participated in the adapted care management were satisfied with the educational sessions (64.0% very satisfied and 32.6% satisfied). They reported a good ambience during these sessions

and they approved of their contents, the fact that professionals listened, and debates between participants. The two main factors identified as limiting their participation were: accessibility of the educational sessions when organised outside high schools, and the long delays between the medical interview and the adapted care management.

Effect of the screening strategy on the main endpoints

Over the two-year period of the programme, the weight status of adolescents was considered to have evolved more favourably in the 12 'screening' high schools compared to the 12 controls, with a lower increase in BMI (+0.6 vs +0.7 kg/m², $p = 0.030$) and a greater decrease in the prevalence of overweight and obesity (-0.6 vs -2.3%, $p = 0.039$) (16).

Discussion

The PRALIMAP trial demonstrates that a screening strategy implemented in high school effectively reduces overweight and obesity prevalence in adolescents. A few studies, conducted exclusively outside high school settings, have evaluated the effectiveness of overweight/obesity care management in adolescents, and only one showed significant improvements of anthropometric measurements (16). A screening strategy including detection of overweight/obesity and adapted care management and targeting adolescents in a high school setting had never been assessed before the PRALIMAP trial.

Among the 3191 eligible adolescents, 593 declined to take part in the screening strategy; thus, with less than 20% refusal, we can say that this strategy was relatively well accepted by parents and adolescents.

The process evaluation reported the difficulty high school nurses faced interpreting the EAT-40 and HAD results and explaining them to adolescents. In theory, it seems to be important to take into account suspected eating disorders, anxiety or depression to adapt the care management to adolescents (17). In practice, it is difficult for untrained professionals to talk about these kinds of disorders and to take them into account in group educational sessions. To overcome the first difficulty, identified at the beginning of the programme, we decided to ask a physician specialising in nutrition to accompany nurses during the medical interview. For the second, maybe some individual sessions with psychologists, in addition to collective sessions, should be considered for adolescents affected by these disorders.

Among the 261 adolescents who screened positive, only 25.3% participated in the adapted care management. This low participation rate was reported from the beginning of the PRALIMAP trial and led us to interview concerned adolescents in the first four high schools assigned to the strategy. The first factor limiting participation identified during these interviews was the place where educational sessions were organised. Getting to sessions outside high schools takes time and requires transport and is thus easier for members of more advantaged social categories. We decided then to organise the adapted care management inside high schools to facilitate participation by all adolescents, whatever

their material means. Afterwards, we observed a marked improvement in participation. The second limiting factor was the long waiting times (several months) between the three steps of the screening strategy, leading some adolescents to turn to health professionals of their choice after the body measurements or the medical interview. The long waiting times were inherent in the organisation of PRALIMAP research in which three interventional strategies were implemented and evaluated in 24 high schools, located in four administrative areas. These waiting times may be significantly reduced if, as an operational objective, the screening strategy is implemented in one high school.

In conclusion, the implementation of a structured strategy combining screening and adapted care management in a school setting is effective in reducing overweight/obesity in adolescence, but presents challenges in encouraging adolescents to participate. It requires limiting waiting times between the three steps, organising adapted care management in the high school setting and mobilising high school professionals to motivate adolescents to participate in the three steps, keeping in regular contact with them, and organising the high school educational sessions.

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Conflict of interest

All authors declared having no conflict of interest in this work.

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