Process evaluation of a school-based weight gain prevention program: the Dutch Obesity Intervention in Teenagers (DOiT)

A. S. Singh¹*, M. J. M. Chinapaw¹, J. Brug² and W. van Mechelen¹

Abstract

Health promotion programs benefit from an accompanying process evaluation since it can provide more insight in the strengths and weaknesses of a program. A process evaluation was conducted to assess the reach, implementation, satisfaction and maintenance of a school-based program aimed at the prevention of excessive weight gain among Dutch adolescents [Dutch Obesity Intervention in Teenagers (DOiT)]. Our process evaluation involved data collections by means of questionnaires among students, teachers, school board and site staff. The results indicated immense difficulties in the recruitment phase and therefore a low reach at school level. However, among adolescents of the schools that participated, the reach was high (84%). Furthermore, the classroom intervention was implemented successfully based on the number of lessons taught. Most teachers rated the DOiT-intervention positively; students rated the intervention 6.6 on a scale of 1–10. The majority of the teachers planned to implement the DOiT-intervention program in the future, as they perceived DOiT feasible for pre-vocational education students.

Background

The prevalence of obesity among youth makes it one of the most common chronic disorders in this age group [1] and a major determinant of ill-health. Therefore, development and implementation of population-based preventive measures are required [2]. Although several reviews of the literature [3–5] suggest that school-based prevention of overweight among adolescents is feasible, a recent review [6] found that the effectiveness of school-based intervention has generally been disappointing and that there is only little evidence for which intervention parts are effective and produce sustainable effects. While process evaluation data can provide us with information that enables us to identify elements of an intervention that are critical to attain their stated goals and thus their effectiveness, many interventions lack sound information on process data [7].

We conducted a process evaluation to assess the reach, implementation, satisfaction and maintenance of a school-based program, targeting individual level and environmental level factors in order to prevent excessive weight gain.

Methods

This process evaluation was part of a randomized controlled trial (RCT) evaluating the effectiveness of the Dutch Obesity Intervention in Teenagers (DOiT) on body composition, aerobic fitness, energy balance-related behaviors and determinants of these behaviors [8, 9].
The DOiT-intervention

The DOiT-intervention was developed using ‘Intervention Mapping’ [10] and aimed at preventing excessive weight gain among Dutch adolescents. Figure 1 presents the study design of the RCT. The intervention, comprising a comprehensive school-based program, focused on both individual as well as environmental level factors (Fig. 2).

RE-AIM model

The RE-AIM model posits the following process indicators: (i) reach, (ii) effectiveness, (iii) adoption by intermediaries (i.e. teachers) and users (i.e. students), (iv) implementation according to plan and (v) maintenance [11]. We used a slightly modified version of the RE-AIM framework. Process data were collected systematically during and immediately after the intervention period among both the primary target group (i.e. students) and the intermediaries (i.e. teachers, members of the school board and site staff).

Study population

Schools

First recruitment phase Schools were recruited using three methods: (i) written information was sent to ~400 schools and the co-ordinators of these schools were called to ask to participate, (ii) in journals for biology and physical education teachers, advertisements were placed to attract schools to participate and (iii) an oral presentation was given on an education day for physical education teachers.

Second recruitment phase Schools that were interested were informed by means of a presentation in which the main researcher (A.S.S) explained the demands of possible participation of the school in the DOiT-project. Inclusion criteria for the schools were as follows: (i) being able to provide three classes to participate in the study, (ii) willingness to appoint a contact person for the duration of the RCT, (iii) willingness not to change the curriculum during the study period when assigned

Fig. 1. The design of the RCT in which the effectiveness of the DOiT-intervention was studied.
Adolescents

All participating schools agreed to implement the DOiT-intervention if randomized to the intervention group. Thus, all students of the intervention schools received the DOiT-intervention. Informed consent from the students and their parents was obtained for participation in the RCT. Process data were collected only among those students who participated in the RCT.

Reach/participation

Schools and teachers

From >400 schools that were approached, only 11 responded positively by phone or e-mail. The advertisements in specialist journals and the oral presentation on the continuous education day for physical education teachers raised interest in three and six schools, respectively. After being further informed about the demands of participation in the study, 18 schools were willing to participate.

The two schools that resigned declared that participation would require too much time.

Adolescents

In total, 1323 [mean age 12.7 (±0.5) years] adolescents were eligible for participation in the measurements. We received student and parental informed consent from 1108 adolescents (84%).

Implementation

Classroom intervention

When asked about the implementation of the classroom intervention, ~50% of the teachers (n = 22) reported that they implemented the intervention as described in the teachers’ manual. The majority of the teachers said that participation in the trial took more time than expected. The evaluation of the teacher’s manual was positive: >75% of the respondents rated the teachers’ manual as very good or good. Many teachers stated that they perceived time as a barrier.

Those teachers with doubts regarding the target group (i.e. adolescents) or setting (i.e. pre-vocational education schools) gave contradicting remarks regarding the applicability of the classroom intervention. Some teachers indicated that the worksheets
were too difficult, whereas others thought they were too easy for the students. Ten respondents reported that they experienced a lack of motivation among the students toward the end of the project. When asked for suggestions for improvements, some respondents proposed that DOiT should have been taught more intensively over a shorter period of time, whereas others indicated that DOiT should have been taught less intensively.

**Environmental intervention**

Two out of the ten intervention schools declined the funding we offered for two weekly hours of additional physical activity because they perceived this financial support as insufficient. The financial assistance could not solve the lack of physical education teachers to organize and supervise these activities or the insufficient capacity of the gym facilities or lack of facilities.

Three of 10 schools reported to have implemented structural changes in the canteen assortment (more healthy products); two schools reported to have plans to change the canteen assortment in the next school year; in one school, the members of the school board had changed their opinion and had decided not to outsource the school canteen to an independent entrepreneur to have more hold on the canteen assortment; two schools reported concrete plans to improve interdisciplinary collaboration (e.g. organization of a thematic week during the school year focusing on health and regular meetings to discuss overlap with content of subjects regarding health issues) and three schools reported no changes. These schools pronounced that changes in the school canteens were considered to be unnecessary ("I don't see why we need any changes. The canteen functions well...") or too difficult to realize due to constraints to existing contracts with independent entrepreneurs.

**Judgment/satisfaction**

**Adolescents of intervention schools**

Adolescents rated the DOiT-intervention (overall rating) and the layout of the intervention materials with 6.6 (on a 10-point scale) and 3.5 (on a five-point scale), respectively.

**Teachers, contact persons and members of the school board**

The majority of the teachers rated the content of the intervention materials (including the school books, worksheets, educational video and the web site) of the classroom intervention as very good or good. More than 80% of the respondents said that the intervention materials fitted the general education aims. The majority rated the school setting as good or very good for a program like DOiT, especially for secondary pre-vocational education students.

**Maintenance/intention for future implementation**

The majority of the teachers reported that they planned to implement DOiT in the future, and two-thirds would recommend implementing DOiT to other schools.

**Discussion**

The process evaluation of the DOiT-intervention program indicates immense difficulties in the recruitment phase, but a high reach among students of the schools that finally participated in the study. Furthermore, we found that the classroom intervention was implemented successfully, and a large proportion of teachers and students rated the DOiT-intervention positively. Most importantly, the majority of the teachers intended to implement the DOiT-intervention program in the future, as they perceived DOiT as feasible for pre-vocational education schools.

The participation rate among schools was extremely low: non-responders indicated that obesity prevention had no priority in the school policy and that participation in the RCT (e.g. repeated measurements combined with the moderate changes in the curriculum) was rather demanding. It must be considered that the research setting wherein the DOiT-project took place requested additional time. Thus, the sample of the schools participating in our study likely consists of a selected group, with teachers and school board members who were highly motivated with regard to school-based obesity prevention.
Before students were informed about participation in the study, we brainstormed with teachers about possible barriers that might discourage participation. We learned that recruitment via teachers might be most effective and that the layout and content of materials informing the students about participation needed to be tailored to the target group of lower pre-vocational school students. During the measurements at schools, we discovered that being measured (i.e., body weight, height, skin fold thickness, waist and hip circumference) in underwear was the main reason for adolescents to refuse participation in the anthropometric measurements. Therefore, we paid special attention to privacy during anthropometric measurements. These strategies apparently worked well. The challenge is to encourage school leaders to participate, rather than students to enroll. School leaders may be more willing to participate when the program is offered without the additional research burden. Since the overweight epidemic has gained more public attention during the last years, it may very well be that willingness to participate would at present be higher.

The evaluation of the implementation of the classroom intervention among teachers indicated that teachers implemented the DOiT-intervention largely as intended. Teachers’ main critique of the intervention program was that its implementation required more time than expected. Time constraints are a commonly expressed problem in the school setting in general and certainly also related to health promotion projects as indicated by other comparable studies in this field [12, 13]. Teachers perceived the detailed manual as very helpful. This may support successful implementation.

With regard to the environmental intervention, our findings suggest that changes in school canteens and vending machines are difficult to induce. With the increased outsourcing of the management of school canteens, schools reduce their potential to directly support healthy eating via environmental changes. Possible additional explanations are insufficient awareness of the magnitude of the obesity epidemic and too many external restrictions.

The fact that two out of the ten intervention schools declined the financial support we offered for additional lessons physical activity shows that financial support is not the universal solution to all problems. Financial support might be more helpful if accompanied by structural organizational changes. National regulations initiated and enforced by the national government on (i) more physical education lessons and accessibility of physical activity opportunities after school hours and (ii) availability of foods and soft drinks in schools may be required for sustained environmental changes in the school system.

Teachers and members of the school boards pointed out that profound changes concerning the school environment are difficult on the short term but that they perceived DOiT as helpful in initiating healthy changes. Experts in the field [14] and recent review studies [15, 16] point out that such environmental changes may be a key to successful obesity prevention.

Both students and teachers expressed appreciation of the intervention and the intervention materials. Although there is certainly room for improvement of the intervention, the overall rating of the intervention materials was positive. Among teachers, this finding was confirmed by their positive intentions for future implementation. The application of the Intervention Mapping protocol [10] ensured that the intervention was developed in close collaboration with and tailored to the needs and preferences of the key stakeholders, teachers and students in particular. Their positive feedback on the intervention possibly reflects this development process.

Limitations of our study are that we collected no process evaluation data among control schools or parents. In addition, the questionnaires used for the process evaluation were not validated. Direct observational data and the use of qualitative methods during the lessons could have provided more objective insight in the implementation and its barriers.

**Conclusion and recommendations**

The results of our process evaluation indicate reasonable acceptability among both the target group
(i.e. students) and the intermediaries (i.e. teachers). The findings of the present process evaluation show that (i) the intervention was implemented largely according to plan and was appreciated by students and teachers, (ii) the DOiT-program has merits and is implementable and (iii) further dissemination may be considered if the main barriers for implementation can be addressed successfully.

In order to obtain high-quality process evaluation data, we recommend a structured approach in the development and planning of the evaluation of interventions and taking into account objectively measured data on environmental changes.

Extra attention should be paid to the feasibility and implementation of the environmental modifications in school-based intervention programs.

Improvement of future interventions might benefit from:
- examination of reasons why schools refuse to participate in the RCT/implement an intervention aimed at the prevention of obesity and thereby increasing the odds of adequate dissemination of the intervention;
- decreasing time teachers spend on the implementation of the intervention (e.g. shorter duration of the intervention, fewer lessons and instead of a 1-year intervention period a 2-year intervention period); it is, however, not sure that such a less teacher-intensive implementation will lead to similar results;
- embedding the intervention in local and/or national school health policy initiatives in order to ensure a stronger support for schools in their role as health-enhancing institution.

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**Conflict of interest statement**

None declared.

**References**


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