

Summary

This thesis describes the preparation and evaluation of the adoption, implementation and continuation of the school-based Dutch Obesity Intervention in Teenagers (DOiT) programme, in order to gain insight into the facilitating factors and barriers to its nationwide dissemination.

Childhood overweight is associated with many health risks. Since those health risks track into adulthood, prevention of overweight in youth is a major public health priority. To inform public health policy and practice, it is important to monitor trends of overweight. In the Netherlands, research has shown that overweight measures of 12- to 14-year-old Dutch adolescents attending prevocational education measured in 2011 compared with adolescents measured in 2003 have increased steeply (22% vs. 13% for boys and 22% vs. 16% for girls, *chapter 3*). Hence, the worrisome increase in overweight prevalence in this segment of the Dutch population endorses the need for implementation and dissemination of effective overweight prevention programmes targeting youths.

An example of school-based overweight prevention in the Netherlands: the DOiT programme

Schools are regarded as a convenient and practical setting for implementing overweight prevention programmes as they allow access to almost all children and adolescents regardless of ethnic and socioeconomic background. The evidence-based DOiT programme is an example of such a school-based prevention programme. The programme is tailored to adolescents attending the first two years of prevocational education (12- to 14-year olds) in the Netherlands. The DOiT programme targets both sides of the energy-balance equation (energy intake and energy expenditure) in order to prevent overweight. The initial programme showed small, but relevant effects during controlled evaluation in 2003-2005. To prepare DOiT for wider dissemination in the Netherlands, we adapted the initial programme based on results of the concurrent process evaluation and additional interviews with teachers, adolescents and parents between 2009 and 2011 (*chapter 4*).

The adapted DOiT programme

The adapted programme consisted of 12 fixed theory lessons and four physical education lessons (i.e. 16 lessons equally divided over two school years), including environmental and parental components. The lessons in the first year aimed at increasing awareness and knowledge of healthy behaviours, i.e. intake of sugar-containing beverages, high-energy snacks/sweets and breakfast, screen time and physical

activity behaviour, such as active transport to school and sports participation, and improvement of those behaviours. The lessons in the second year focussed on increasing awareness and acting upon the influence of the obesogenic environment. The DOiT materials included a 'schoolbook' accompanied by separate worksheets, a student toolkit (pedometer, food/exercise diary and online computer-tailored advice) and a parental information booklet (*chapter 4*).

Facilitating implementation

To facilitate the implementation process for the adapted DOiT programme for teachers, we provided a 7-step implementation strategy with accompanying materials, such as a teacher manual, through the DOiT website. Schools were advised to appoint a DOiT coordinator. Furthermore, a contact person in the DOiT support office supported and advised implementers of DOiT throughout the school year (*chapter 4*). From 2011 onwards, the adapted programme was available for nationwide dissemination throughout the Netherlands.

Evaluation of dissemination

The impact of public health programmes, such as DOiT, depends on their actual implementation in practice. It is important to know if and to what extent a programme was implemented as intended and how this affected programme effectiveness when introduced under less controlled and directed conditions. Therefore, we evaluated the natural dissemination process at 20 schools that implemented DOiT during 2011-2013 (*chapter 5*).

Implemented or not implemented?

Our process evaluation showed that the amount of implemented lessons decreased over time and only half of the delivered lessons were implemented according to the teacher manual. Around one quarter of the teachers who worked at the implementing schools reported that DOiT had become an embedded programme in their school curriculum. Teachers were satisfied with the DOiT lessons and teaching materials, yet adolescents were only moderately satisfied with the DOiT materials. Taking into account the decrease of implementation during the two years that the DOiT programme was followed by the schools, our implementation strategy appeared insufficient in supporting teachers during two school years of implementation (*chapter 7*).

Furthermore, we identified facilitating factors and barriers to nationwide adoption, implementation and continuation of the DOiT programme. The interviewed teachers and DOiT coordinators at the implementing schools expressed various barriers including lack of programme planning, other urgent unforeseen priorities, no plan to cope with teacher turnover and high teacher workload. They also mentioned facilitating factors including involvement of the DOiT coordinator and support from the DOiT office, sufficient communication and collaboration between teachers, strong teacher motivation and flexibility of the programme (*chapter 8*).

How implementation affected effectiveness

Implementation of the adapted DOiT programme did not lead to significant programme effects on any of the overweight measures in adolescents comparing those who attended DOiT and control schools after 20 months. However, sub-group analyses showed that the programme resulted in significant beneficial effects on consumption of sugar-containing beverages in girls (-188 ml/day) and breakfast consumption in boys (+0.3 days/week) compared to adolescent attending control schools. We observed no mediating effects of the assessed energy balance-related behaviours on overweight measures after 20 months, meaning that a change in behaviour did not lead to changes in overweight measures (*chapter 6*).

Using an exploratory implementation index, we found that adolescents attending schools with a high implementation score tended to have lower overweight measures, while associations between implementation score and behavioural changes were inconsistent (*chapter 7*).

Possible explanation for findings

Notably, our findings on the effectiveness of the adapted DOiT programme deviate from the results found during the more controlled evaluation of the initial DOiT programme in 2003-2005. There are a few possible explanations why our results differ: 1) in the present study the intervention was in its dissemination phase and, therefore, less controlled than the initial study; 2) methodological issues, such as the absence of short-term measures. It might be that early intervention effects of the adapted programme, if present, diminished after the intervention period, and were therefore not present in our study at 20-month follow-up; 3) the adaptations that we made to the initial programme were too large;

and 4) different environmental context, characterized by a high general level of awareness of overweight and obesity and its drivers (*chapter 9*).

Implications

We formulated recommendations to the implementation strategy and programme to further improve programme effectiveness, based on the process evaluation and interviews with implementers of DOiT.

Implementation strategy

Since our implementation strategy did not lead to implementation by the teachers as intended, we should reconsider the decisions made during the development process, especially regarding flexibility and support for implementation. Additional work is needed to further adjust the implementation strategy for optimal programme effectiveness (*chapter 9*).

DOiT programme

Based on our interviews with DOiT coordinators and teachers, we propose five adaptations to possibly increase programme effectiveness (*chapter 9*):

1. *Definition of core components.* The programme might benefit from indicating core implementation components of the programme so that at least teachers deliver those parts of the programme that contribute the most to effectiveness;
2. *Practical applications.* The programme might benefit from the availability of an online version as well as including practical applications during the execution of the lessons, such as videos;
3. *Tailored versions of the programme.* We need to consider additional programme adaptations by sub-group (e.g. gender, educational level);
4. *Involvement of parents.* We need to reconsider the feasibility of a parental component and what adaptations could be made in order to improve parent participation in DOiT;
5. *Adapt the school environment.* It might be important to reconsider the adaptations we made regarding the environmental component of the DOiT programme and possibly provide schools with healthy school canteen advice.

Childhood overweight prevention in different contexts

Since most school-based overweight prevention programmes only had limited success, the school setting does not seem to be the sole setting to address the overweight problem. Although challenging, prevention efforts should go beyond the schools and include other contexts and approaches for intervention efforts, such as the family and neighbourhood environments (*chapter 9*).

Conclusion

This study underlines the difficulty of translating intervention effectiveness from controlled settings to real world contexts. Although the initial DOiT programme showed promising effects during the controlled evaluation, the adapted DOiT programme was not successful in changing adolescents' overweight during less controlled dissemination. Nonetheless, the programme resulted in beneficial effects on consumption of sugar-containing beverages in girls and breakfast consumption in boys.

Based on the results of this study, implementation of the DOiT programme in its present form and with its current implementation strategy is not more effective than regular curricula in preventing overweight. As teachers were satisfied with the programme, schools can still substitute the regular biology, health education and physical education lessons dealing with healthy nutrition and physical activity behaviour with the DOiT lessons.

However, in order to significantly contribute to the prevention of overweight, further adaptations to the programme and implementation strategy are needed, and inclusion of other important contexts for youth should be considered. Future studies should continue to evaluate evidence-based programmes during less controlled dissemination to better understand if and how effectiveness is retained when disseminating evidence-based approaches into practice.