

Chapter 9

Process evaluation of a school-based physical activity-related injury prevention programme using the RE-AIM framework

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Abstract

Objective: To describe the process-evaluation of a school-based physical activity-related injury prevention programme based on the five dimensions of the RE-AIM framework.

Design: Randomised controlled trial.

Setting: 40 Dutch primary schools.

Participants: 2,210 children aged 10-12 years.

Intervention: An one year intervention-programme targeted physical activity-related injuries and consisted of a teacher manual, informative newsletters and posters, a website, and exercises to be carried out during physical education classes.

Outcome measure: the REAIM process indicators

Results: The results showed that the participation rate of the children was 100% (reach). With regard to the effectiveness of the iPlay-programme we found a relevant reduction in injury incidence density and severity of injuries due to the iPlay-programme, especially in the less active children. Nine percent of the invited schools were willing to participate (adoption). Teachers stated to have implemented the programme elements as intended (implementation). The percentage of children and parents who followed the programme was less than expected. 52% of the teachers indicated that the current iPlay-programme could become standard practice in their teaching routine (maintenance).

Conclusion: The iPlay-programme is a successful start in the prevention of physical activity-related injuries, but further improvement of this programme on the basis of this evaluation is necessary.

Introduction

Physical activity-related injuries in primary school-aged children are an unintended consequence of participation in physical activities. As children are nowadays stimulated to participate in physical activities to prevent for example obesity, it is important to take the risk for injuries into account. Therefore, injury prevention in children is important.

Because school-based physical activity-related injury prevention programmes are scarce we developed and evaluated such a programme for children. This school-based programme, called iPlay, was developed using the Intervention Mapping protocol¹ and evaluated in a cluster randomised controlled trial including over 2,200 children².

Generally, only the controlled effects of an intervention programme are published. However, in recent years the importance of evaluating the context in which interventions are implemented is identified as critical. Evaluating factors such as translatability and feasibility are important because if intervention programmes are not adequately adopted and sustained, it is unlikely that these programmes will have any public health impact. Nevertheless, those factors have been given relatively little attention when evaluating interventions.

To evaluate the iPlay-programme for translatability and feasibility the RE-AIM evaluation framework, designed by Glasgow et al.³, was used. This framework includes the following five dimensions: reach into the target population (i.e. children), effectiveness of the intervention, adoption by target setting (i.e. schools), implementation, and maintenance of the intervention effects^{4,5}.

By describing these five dimensions not only the translatability and feasibility of a programme are identified but also its limitations. In future research, these limitations can be improved.

This manuscript describes the process evaluation of a school-based physical activity-related injury prevention programme for Dutch primary school children based on the five dimensions of the RE-AIM framework.

Methods

Design, setting and participants

This evaluation was conducted as part of a cluster randomised controlled trial on the effectiveness of the iPlay-programme for children 10-12 years old^{2,6}. Dutch primary schools were randomly invited to participate in the study and assigned to an intervention or control group. The intervention group (20 schools) received the iPlay-intervention-programme aimed at injury prevention, whereas the control group (20 schools) followed the regular curriculum during the school year 2006-2007. The Medical Ethics Committee of VU University Medical Centre approved the study design, protocols and informed consent procedures.

iPlay-programme

The iPlay-programme was developed according to the Intervention Mapping protocol¹. The

intervention focused both on children and parents and consisted of newsletters, posters, exercises, a manual and a website.

Teachers were asked to distribute among their pupils a monthly newsletter containing information on injury prevention. The children were asked to read the newsletters attentively. Moreover, parents also received each month a newsletter with information about injury prevention and strategies to reduce the injury risk in their child. They were also asked to read the newsletters attentively.

Next to the newsletters, each month posters addressing the main intervention topics regarding injury prevention were displayed in the classroom in such a way that children were able to see the poster continuously. Children and parents were stimulated to visit a website and to read more information about injury prevention.

In addition to the newsletters and posters, the iPlay-programme included short exercises aimed at improving strength, speed, overall coordination and flexibility of the children. Teachers were asked to conduct the exercises during the first and last 5 minutes of each physical education (PE) class, twice a week. There were a wide variety of exercises the teachers could choose from. Furthermore, teachers received a manual with comprehensive information about the main goals of the iPlay-programme, the time schedule and explanation of the exercises.

Data

Teachers, children and parents completed a questionnaire at follow-up (June 2007) after the iPlay-programme was completed. This questionnaire included questions to evaluate the potential of the intervention for translation and feasibility.

To evaluate the iPlay-programme this manuscript describes the five dimensions of the RE-AIM framework.

Reach was defined as the absolute number and participation rate of children who attended schools that participated in the iPlay-study. To assess the generalizability of the intervention to the real world the representativeness of the children was determined.

Effectiveness was addressed at participants' level and defined as change in injury incidence density and injury severity.

Adoption was defined as the absolute number, proportion and representativeness of schools that were willing to participate in the iPlay-study.

Implementation was addressed at school level and at participants' level. Implementation at school level was defined as the extent to which teachers successfully implemented programme elements, including adherence to the implementation plan provided. Implementation at participants' level was defined as the percentage of children and parents who followed the programme as intended. Furthermore, satisfaction with the iPlay-programme was assessed.

Maintenance was defined as the extent to which the iPlay-programme became part of the standard teaching routine.

Results

Ninety-six percent of the teachers, 95% of the children and 59% of the parents returned complete questionnaires.

Reach

A total of 40 schools, including 2,210 children, were willing to participate in the study. Of the 2,210 children, only 2 children (0.1%) were unwilling to participate in the study. Baseline characteristics of the iPlay-group compared to the total Dutch population of the same age are shown in table 9.1. Children participating in this study did not differ from the general population of Dutch 10-12 year old children on gender, BMI-class and ethnicity. Regarding the parents of the children, 16 parents indicated that they were not willing to participate.

Effectiveness

To evaluate the effectiveness of the iPlay-programme, the programme was analyzed in a trial conducted in 2006-2007. The results of the effectiveness of the iPlay-programme on injury incidence density and injury severity are described in detail elsewhere⁶. In summary, although not statistically significant the results showed a consistent favourable intervention effect on total (HR=0.81;95%CI:0.41-1.59), sport club (HR=0.69;95%CI:0.28-1.68) and leisure

Table 9.1: Baseline characteristics of the the iPlay-group compared to the total Dutch population of the same age

CHARACTERISTICS	iPlay-group N=2,208	Total Dutch population N=585,772
Gender		
Boys (%)	50	51
Girls (%)	50	49
BMI class ^a		
Normal weight (%)	82	86
Overweight and obese (%)	17	14
Unknown (%)	0.5	
Ethnicity		
Western (%)	79	85
Non-western (%)	18	15
Unknown (%)	4	

^a using cut-off values described by Cole et al.⁷; BMI = Body Mass Index

time injuries (HR=0.75;95%CI:0.36-1.55). Remarkably, the data showed that children who were less physically active had more benefit from the iPlay-programme. In the less active group the iPlay-programme reduced the total and leisure time injury incidence density with 50% (respectively HR=0.47;95%CI:0.21-1.06 and HR=0.43;95%CI:0.16-1.14). Sport club injury incidence density in this group was significantly reduced with 75% (HR=0.43;95%CI:0.07-0.75). Furthermore, children in the intervention group reported less often sporting time loss as a result of an injury than those in the control group. From these results it was concluded that, although not statistically significant, our findings are encouraging for the prevention of physical activity-related injuries in children. Therefore, we believe that this school-based injury prevention programme is promising.

Adoption

All primary schools in The Netherlands were eligible for inclusion in the study. From the 7,000 primary schools throughout the Netherlands, 520 primary schools (7%) were randomly selected from a database and invited by means of an information flyer to participate in the iPlay-study. Inclusion criteria for the primary schools were: (i) being a regular primary school; (ii) giving PE lessons twice a week; (iii) willing to appoint a contact person for the duration of the study.

Of the 520 schools 370 schools (71%) did not respond to the invitation, 105 schools (20%) were unwilling to participate and 45 schools (9%) were willing to participate in the study. Reasons for not willing to participate were mainly lack of time (55%). Other reasons were 'already participating in another project' (8%), 'injury prevention is not relevant' (10%) or 'no interest' (8%). Schools that were unwilling to participate were not different from participating schools with respect to geographic location (urban versus rural area) and professional status of the PE-teacher (certified/uncertified). Comparison of the participating and non-participating schools on other variables (e.g. school resources or staff-to-child ratio) was not possible because information on those variables was lacking.

Implementation

Almost all teachers (96%) indicated that they distributed the newsletters. Two-third of the teachers paid attention to the newsletters in the classroom during on average 11 ± 5.5 minutes per newsletter. Three quarters of the teachers displayed the posters. Sixty-eight percent paid attention to the posters (on average 7.5 ± 4.5 minutes per poster). Most of the teachers (71%) indicated that they had performed the exercises most of the time. Exercises were done each lesson by 7% of the teachers. Reasons for not performing the exercises were mainly lack of time and not enough space in the gymnasium. Teachers who performed the exercises did these exercises during an average of 9.0 ± 2.3 minutes per physical education class. Almost two-thirds of the teachers indicated that they had adapted the exercises sometimes. Furthermore, 69% of the teachers had read the manual completely. Half of the

teachers had visited the website.

More than a quarter of the children (28%) had read all newsletters they received, 19% of the children did not read a newsletter at all. About half of the children (53%) had read one or more newsletters. About the same percentages were reported regarding the posters. Sixteen percent of the children had visited the website.

Forty-one percent of the parents indicated that they had received all eight newsletters. Nine percent of the parents had not received any newsletter. From the parents who received all newsletters, 55% indicated that they had read all newsletters. Five percent had not read the newsletters at all. Furthermore, nine percent of the parents had visited the website.

Satisfaction with the iPlay-materials

The majority of the teachers (76%) were positive about the iPlay-newsletters and 15% was very positive. Teachers were also positive (68%) about the posters. The iPlay-exercises were rated as very positive by 12% and as positive by 52%. All the teachers indicated that the teacher's manual was clearly written. More than half of the teachers pointed out that the website included clear information about the elements of the iPlay-programme. Twenty-seven percent thought that the website was a good support for the iPlay-programme. More than half of the teachers (54%) indicated that it was easy to integrate the iPlay-programme in the usual teaching routine. Two-third would recommend implementing the iPlay-programme to other schools.

Sixty-five percent of the children indicated that they understood the iPlay-newsletters. Fifty-three percent thought the newsletters were educational and 35% thought that the newsletters were amusing. The overall score for the newsletters on a scale from 1 to 10 was 6.3 ± 2.4 , where 1 is the lowest score and 10 the highest score. The overall score for the posters was 6.7 ± 2.3 . Half of the children indicated that the exercises were fun to perform. Sixty-one percent thought that the exercises were easy to perform. Sixty percent of the children who visited the website indicated that the website was clear.

Eighty-five percent of the parents indicated that they had understood the newsletters. Fifty-three percent thought that the newsletters were educational and 72% thought the newsletters were fun to read. The overall score for the newsletters was 6.7 ± 1.2 . Seventy-two percent of the parents who visited the website indicated that the website was clear.

Maintenance

About half of the teachers (52%) indicated that the iPlay-programme would become standard practice in their teaching routine. Teachers indicated that extra time, commitment of the teachers, overall coordination of the programme and more variation of the iPlay-programme were needed for successful implementation of the iPlay-programme.

Discussion

Main findings

In this study the RE-AIM evaluation framework was used to evaluate the iPlay-programme. The results showed that the participation rate of the children was 100% (reach). The representativeness of the participating children was high regarding gender, BMI-class and ethnicity compared to the source population (i.e. all Dutch children aged 10-12 years old). With regard to the effectiveness of the iPlay-programme we found a substantial and relevant reduction in injury incidence density and severity of injuries due to the iPlay-programme, especially in the less active children⁶. Nine percent of the invited schools were willing to participate (adoption). Most of the schools (71%) did not respond to the invitation. The main reason for not willing to participate was lack of time. It was not possible to describe the representativeness of the participating schools due to lack of information. Teachers were positive about the iPlay-programme and stated to have implemented the programme elements as intended (implementation). The percentage of children and parents who followed the programme was less than expected. Children and parents were less positive about the iPlay-programme elements than teachers. 52% the teachers indicated that the current iPlay-programme could become standard practice in their teaching routine and 30% indicated that it could not become a standard practice (maintenance).

A limitation of this study is that the questionnaires used for the evaluation were not validated and that results are based on self-reported questionnaires. Self-report can lead to social desirability bias and over-reporting of compliance with programme elements and is a less valid means of assessing implementation quantity than other more objective methods such as observation during lessons^{8,9}. However, observation is not feasible in large studies. At the participants' level, maintenance is defined as the long-term effects of a programme. Long-term effects were not measured in the iPlay-study.

Strengths of the iPlay-programme

The iPlay-programme is to our knowledge the first school-based physical activity-related injury prevention programme for primary school children. The iPlay-intervention showed promising effects on the reduction of physical activity-related injuries, especially in the physically less active children. The results showed that injury prevention lessons should not only focus on children who participate in organized sports club activities, but on all children. Schools are a good setting for injury prevention programme because a 100% reach can be achieved. Another strength of the iPlay-programme is that it was developed in collaboration with the teachers. In order to gain insight into the needs of the teachers and children and to design a feasible intervention programme, teachers were involved in the development. Because of this collaboration, in teachers the self-reported compliance and judgment of the iPlay-programme was high.

Furthermore, low-intensity interventions such as the iPlay-programme are maybe less effective than high-intensity interventions but can also be delivered by less motivated and busy teachers and may therefore still obtain a higher impact¹⁰. The iPlay-programme is a low-intensity and 'easy to use' intervention programme. Teachers indicated that it was easy to integrate the iPlay-programme in the usual teaching routine.

Limitations of the iPlay-programme

Less than one out of the 10 invited schools was willing to participate in the iPlay-study. Probably, only highly motivated teachers participated in the study. Therefore, the effects of the iPlay-programme cannot be generalized to all primary schools in the Netherlands. The most important reason for not willing to participate was lack of time. It must be mentioned that participating in a study requires much more time because of the measurements during the school year. Possibly, this extra time for the measurements discouraged teachers to participate.

The iPlay-programme was developed using the Intervention Mapping protocol¹. This protocol provides a valuable checklist for the development of an intervention programme. Collaboration between the developers, the users of the intervention and the target population should lead to an 'ideal' intervention which is easy to implement. However, despite this collaboration 30% of the teachers indicated that the current iPlay-programme could not become a standard practice in their teaching routine. Apparently, the iPlay-programme does not completely fit the needs of the teachers.

Another limitation of the iPlay-programme is that less than half of the parents indicated that they received all eight newsletters. The parents' newsletters were handed to the children. They were asked to deliver the newsletter to their parents. The results showed that only a few parents received all newsletters. When improving the iPlay-programme one must think about another way to reach the parents.

Furthermore, children and parents were less positive about the iPlay-programme than teachers. This may be due to the fact that children and parents were less involved in the development of the iPlay-programme. To improve the iPlay-programme and thereby the compliance of children and parents with the programme, the opinion of children and parents about the iPlay-materials should be taken into account.

Recommendations and conclusions

Teachers indicated that the iPlay-programme can be adapted in the teaching routine, but improvements of the iPlay-programme are necessary.

The compliance of children and parents with the programme should be improved by for instance including them in focus group interviews. The iPlay-programme is a successful start in the prevention of physical activity-related injuries in children, but further improvement of this programme on the basis of this evaluation and in collaboration with teachers, children and parents is necessary.

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