

Original Article

Intervention Mapping as a method for planning health promotion programs in school from a sport pedagogical view

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Abstract:

The behaviour of children has become – as several surveys tell us (e.g. the KiGGs-survey in Germany) – more and more unhealthy. So the question of an intervention arises that can change this unhealthy behaviour into a healthy one. From a sport pedagogical view the intervention in question should involve physical activity in hope for establishing a habitus of a positive attitude to sports and/or physical activities. The place or institution of that intervention could primary be school, because school is the place where children spend a huge amount of their (daily) time.

Looking for a valid and theory-based method for planning such an intervention, the Intervention Mapping method by Bartholomew, Parcel, Kok & Gottlieb (2006) cannot be overseen due to a scientific framework. Originally this approach comes from the field of workplace or worksite health promotion, but can easily and gainfully be adopted within school processes. By gearing to the six steps of the Intervention Mapping process (1. Needs Assessment; 2. Matrices; 3. Theory-Based Methods and Practical Strategies; 4. Program; 5. Adoption and Implementation Plan; 6. Evaluation Plan) one can relatively easily plan a specific health promotion program for school.

To illustrate the tool of Intervention Mapping a short and brief example is given. Therefore an intervention for a primary school in Germany is designed with the intention to decrease the amount of physical activity of overweight elementary school pupils, which should outline a fruitful linkage of the Intervention Mapping method to school settings.

Key Words: Intervention Mapping, Health Promotion, Sport Pedagogy, Physical Education

Introduction

Today's children and adolescents are assumed to be 'fat, stupid and lazy'. There are some indications that this has something to do with the decrease of physical activity. Thus, several surveys state that the behaviour of today's kids has become more and more unhealthy. Though there is hardly a reliable way to proof that children and adolescents nowadays are less 'fit' than past generations (Schlicht & Brand, 2007). But what can be proven is the change in motor fitness. Here are some examples from Germany: Rusch & Irrgang (2002) found out that in the year 2001 only one fifth of the tested children achieve the same average values than the children in 1986. They used the Munich-Fitness-Test (MFT) (Rusch & Irrgang, 2001). Bös (2003) declares that for the period of 1975 until 2000 the performance results of the tested children have a significant decrease of 10 % in average in nearly all categories of motor fitness. Klaes, Cosler, Rommel & Zens (2003), who analysed the data of several thousand children and adolescents using the MFT, state the decrease of physical fitness from 1995 until 2001/ 2002. Only 80 % of boys and 74 % of the girls of the tested 10- to 14-year-old children and adolescents achieve the average values of the control sample of the year 1995. Apparently there is lack of fitness in the category of motor fitness of today's children and adolescents that needs to be compensated. So the question of an intervention arises which can change this unhealthy behaviour into a healthy one. Thus, the aim of the paper is to outline the Intervention Mapping approach by Bartholomew, Parcel, Kok & Gottlieb (2001/2006) as a fruitful way for planning health promotion interventions in the setting 'school'.

Intervention Mapping as a method for planning health promotion programs

Originally the Intervention Mapping approach comes from the field of workspace health promotion. Although there have been sophisticated papers to the conceptual foundation and practice of health promotion, e.g. needs assessment (Green & Kreuter, 2005), program evaluation (Windsor, Clark, Boyd & Goddman, 2004), adoption and implementation (Rogers, 2003), and the use of theory (DiClemente, Crosby & Kegler, 2002; Glanz, Lewis & Rimer, 2002), the specification of the processes in designing and planning interventions needs to be spelled out (Bartholomew et al, 2001/2006). Yes, the 'literature provides helpful models [...], but it lacks specific frameworks for program development' (Bartholomew et al., 2001/2006). The idea of Intervention Mapping is to give the health educator or health promoter a manual, a guideline, or a method for designing and

developing theory- and evidence-based health promotion programs that ‘are feasible and that have a high likelihood of being effective’ (Bartholomew et al., 2006).

The method of Intervention Mapping is organised into six steps. Each step contains multiple aspects of importance to the intervention planning process:

- Step 1: First the needs assessment has to be done using the PRECEDE-model (Green, Kreuter, Deeds & Patridge, 1980; Green & Kreuter, 2005). That means the assessment of health, quality of life, behaviour, environment, and capacity, of course. Program outcomes have to be established. Bartholomew et al. (2006) use a ‘Logic Model for Needs Assessment’ (Figure 1) derived from the original PRECEED-model by Green & Kreuter (2005).

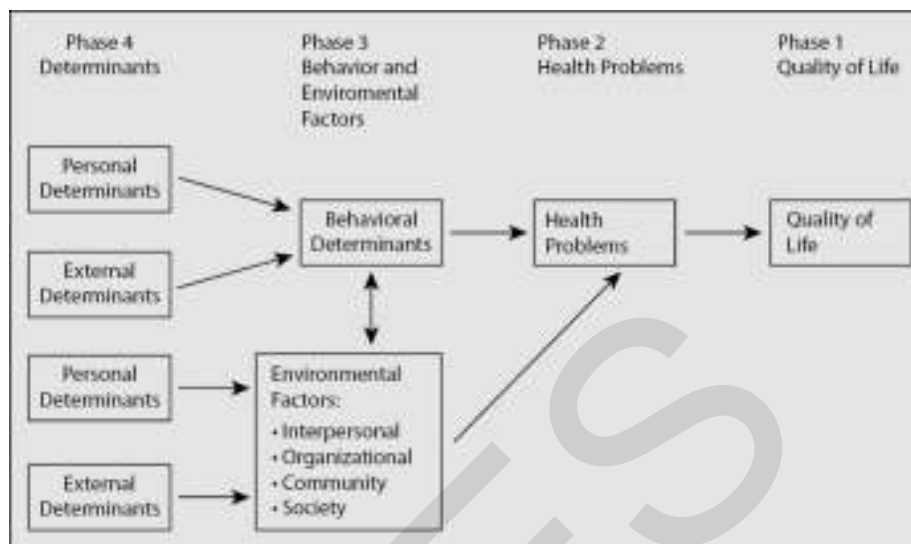


Figure 1. Logic model for needs assessment (Bartholomew et al., 2006)

- Step 2: Matrices of change objectives should be created. That means expected changes in behaviour and environment, performance objectives, and determinants should be specified and formalized.
- Step 3: Theory-based program methods have to be chosen and practical strategies have to be selected or designed. Therefore the program ideas (including interested participants) have to be reviewed. The strategies should match change objectives.
- Step 4: The program itself has to be created. That means the program materials should be developed while developing or designing documents and protocols and reviewing available materials. That means the creation of the program scope, sequence, theme, and material list, after having consulted with intended participants and implementers. Before the ‘real’ program starts, the program materials should be pretested with target groups and implementers, what can also be used to oversee the materials production.
- Step 5: The adoption and implementation plan have to be made. Therefore adoption, implementation, sustainability performance objectives, and determinants have to be specified, after having identified adopters and users, so a matrix can be generated. Then the interventions to affect program use can be designed while selecting methods and strategies.
- Step 6: The evaluation plan has to be developed. That means the descriptions of the program, program outcomes, and effect questions have to be done. Therefore a questions-based matrix and process questions should be written. Now the evaluation designs can be specified after having developed indicators and measures.

Passing all the steps and tasks within, means the health promotion intervention is ready to be ‘really’ implemented and evaluated according to the intervention design. The whole process of Intervention Mapping is displayed in Figure 2.

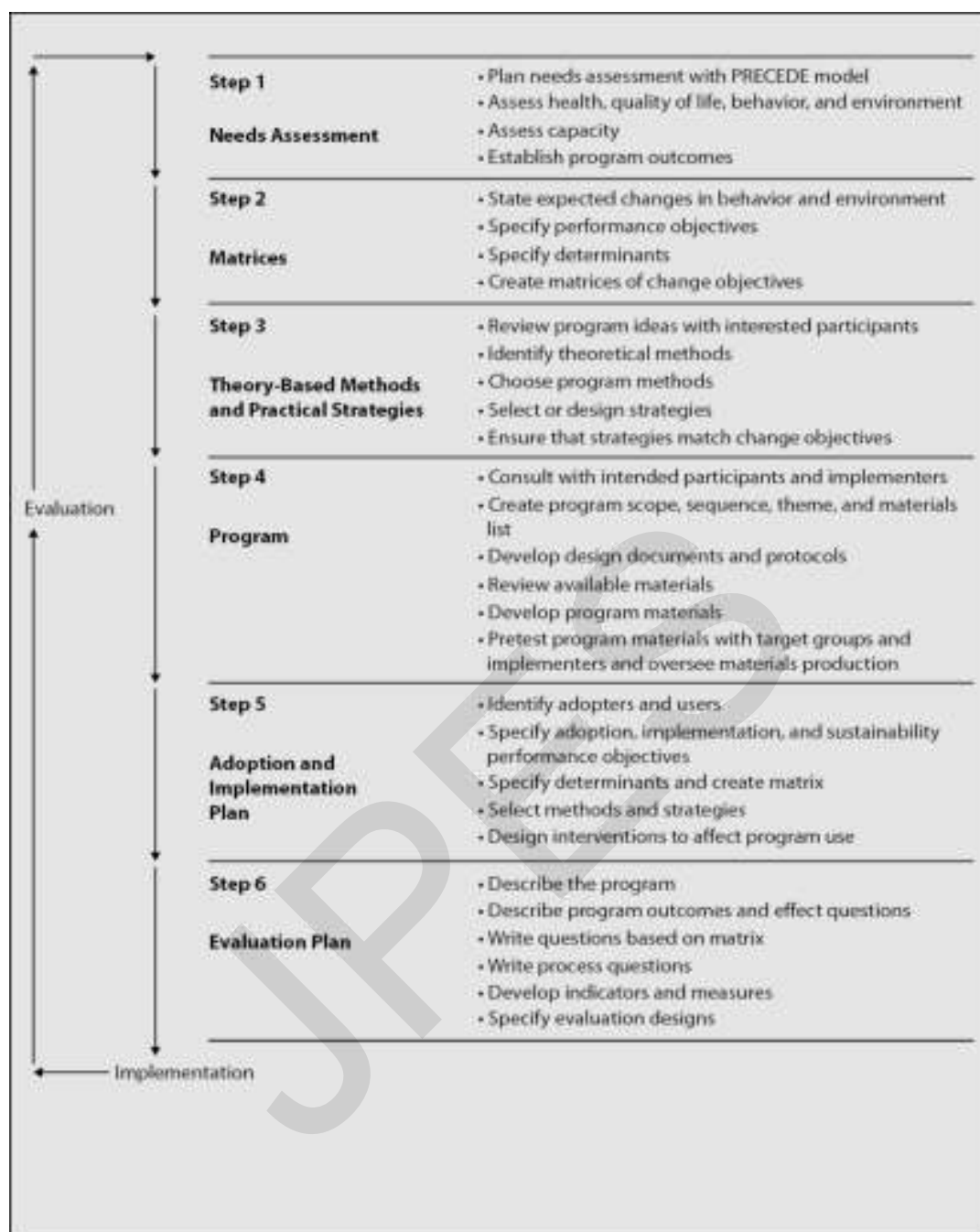


Figure 2. Intervention Mapping (Bartholomew et al., 2006)

Bartholomew et al. (2006) promote four examples of using their Intervention Mapping approach in form of case studies performed by several researches. Schaalma & Kok (2006) created a school HIV-prevention program in the Netherlands. Markham, Tyrrell, Shegog, Fernández & Bartholomew (2006) created a program for asthma management for inner-city children. Mullen, DiClemente & Bartholomew (2006) created a program to help postpartum women to stay off cigarettes (Project PANDA). Fernández, Gonzales, Tortolero-Luna, Partida & Bartholomew (2006) created a program to decrease breast and cervical cancer for U.S Hispanics farmworker woman. Another best practice example from the field of workplace health promotion can be found at Kwak, Kremers, Werkman, Visscher, van Baak & Brug (2006). The authors used Intervention Mapping in the development, implementation and evaluation of weight gain prevention at the worksite.

School as a place for health promotion interventions

In the past years there have been a lot of initiatives that have intended to the theme of health promotion in German schools. One can cite 'Bewegte Schule' (engl.: 'School on the move') or 'Gesundheitsfördernde Schule' (engl.: 'Health promoting school') as an example. The concept of 'Bewegte Schule' is that pupils should develop an attitude and behaviour towards a conscious handling of their body, which should lead to a healthy lifestyle (Regensburger Projektgruppe, 2001; Thiel, Teubert & Kleindienst-Cachay, 2002). Some of the few existing studies show positive effects particularly in the motor category of coordination (Müller & Petzold, 2002; Obst-Kitzmüller, 2002; Ungerer-Röhrich, 2002). In the scope of health promotion there are some programs that have physical activity as the main focus. The Bundeszentrale für gesundheitliche Aufklärung (BzgA) (engl.: 'Federal Centre for Health Education') (2002) published media and material for classrooms to assist teachers in health education processes. 'Klasse 2000' (Hollerer & Bölskei, 2001) uses the media by BzgA and also invites external experts as doctors for instance. 'Opus' ('Offenes Partizipationsnetzwerk und Schulgesundheits – Gesundheitsförderung durch vernetztes Lernen') created a program to advance physical and psychosocial resources (Paulus, 2000). The project 'Tägliche Sportstunde in der Grundschule' tries to integrate at least one physical education class per school day in elementary schools (Seyda, 2006). Hence, Sygusch, Brehm & Ungerer-Röhrich (2003) postulate a lack of evaluation studies. Assured statements cannot be made according to acceptance and efficiency of health promotion initiatives.

Although there is no significant correlation between the measure of physical activity of youth and adults (Schlicht & Brand, 2007; Trudeau, Laurencelle, Tremblay, Rajic & Stephard, 1999; Twisk, Kemper & van Mechelen, 2000), there is a correlation between the behaviour concerning physical activity between children and adolescents (Janz, Dawson & Mahoney, 2000; Pate, Baranowski, Dowda & Trost, 1996). But that does not mean that efforts in health promotion of children and adolescents are to no purpose. The importance of the young generation is not outweighed because health and the correlation to physical activity have a strong value of its own in every phase of one's life. School is a part of the lifeworld (German: *Lebenswelt*) of children and adolescents (Grunder, 2001). They spent a lot of their daytime in school (6 to 8 hours), plus homework. Additionally, school is a place of allocation and determines job and career after school career.

There are plenty of variables that have to be recognized in the analysis of the relevant categories to health promotion in schools. Rolff, Bühren, Lindau-Bank & Müller (1999) posit three categories of school development: Organisational development, personal development, and teaching development. Organisational development includes school curricula, school culture, educational climate, school management, control group (making 'big' decisions), team development, parents, environment, milieu, and (inter-institutional) cooperations. Personal development includes self-assessment of teachers, supervision, communication coaching, support for principals, sitting in on classes, round-table, and discussions. Teaching development includes student-centered learning, cross subject teaching, training in methods, teams of self-learning, open learning, enhanced teaching techniques, and learning culture.

The sport pedagogical view

There is a variety of pedagogical aims which are to be achieved by sports, physical education, and physical activity in general. Educational objects are of physical, mental, and psychological and social objectives (Lumpkin, 2002). Lumpkin (2002) gives a couple of examples: The reduction of coronary heart disease, diabetes, obesity, high blood pressure, and colon cancer, and furthermore the improvement of muscular strength and endurance, flexibility, and cardiovascular endurance are physically enhanced educational objects. Weight and tones of the bodies are regulated and the body composition will improve. Overall health and fitness is promoted. Bones are straightened and movement skills will improve. Academic performance, interest in learning, judgement, self-discipline, goal-setting and achieving these goals are mentally enhanced educational objects. Self-confidence, self-esteem, and self-control are psychologically and socially enhanced educational objects. An outlet for stress is provided and peer relationships are straightened. The risk of depression reduces and a healthier lifestyle is promoted.

But the main focus of a sport pedagogue lies on increasing the measure, amount, and personal importance of physical activity in everyone's life. Lifelong sporting or lifelong physical activity is a main goal of sport pedagogues and physical educators. The physical education class is only one field of decision making and reasoning, but it is an important one. There is still an area of sport pedagogical work beyond physical education in school. There are offers of physical activities after and between classes. This should not be overseen because otherwise sport pedagogical thinking would be too restricted at all. Sport pedagogy 'deals with the functional and intentional opportunities and limitations of education to and through sport' (Haag & Haag, 2003). So the expanded trivia message is that sport pedagogy deals with physical activity and pedagogical and educational intentions in this field.

In terms of health promotion the main focus has to be put on physical activity, and not nutrition, medical advice, hygiene, etc. Hence, pupils should increase their amount of physical activity.

Synopsis of Intervention Mapping, school, and sport pedagogy – A brief example

To show how to use the method of Intervention Mapping can be put into practice a brief example will be given, to illustrate each step in the planning process. The place of intervention is ‘school’ and a sport pedagogical view will be taken into account. The intervention’s target was a primary school in Germany. The planning group consisted of researches and graduate students from the Department of Sport and Exercise Science of the University of Stuttgart, the primary school’s principal, and physical education, German, and biology teachers.

The aim of this paragraph is to give a concrete differentiated example and to sensitize program planners according to the Intervention Mapping approach in a specific field and from a specific view. The result is an intervention that should be concrete enough to outline an approach being able to be applied to other schools:

- Step 1: ‘The product of this first step is a description of a health problem, its impact on quality of life, behavioral and environmental causes and determinants of behavior and environmental causes’ (Bartholomew et al., 2006). The health problem could be identified as overweight, as the KiGGS-survey (‘Kinder- und Jugendgesundheitssurvey’) (Kurth & Schaffrath Rosario, 2007) displays. The survey is representative for Germany. It shows that 15 % of the german children and adolescents are overweighted. Hereditary factors are not the only determinants of the at-risk population of the 7- to 17-year-old, but also cultural attributes, language, and shared time with parents. There is a correlation between physical activity and health behaviour of children and adolescents (Starker, Lampert, Worth, Oberger, Kahl & Bös, 2007). Physical activity has a positive effect on organic capacities, growth, motor development, physical health, quality of life, personal resources, and decreases risk factors of overweight and high blood pressure. To decrease the amount of overweight pupils and to increase the amount of physical activity are the desired program outcomes, according to environmental factors (interpersonal, organisational, community, and society).
- Step 2: The intervention should take place at an elementary school. Pupils of second and third grade should be object of the intervention. The physical activity behaviour both in school and teaching classes and beyond school and teaching classes should be changed. The ‘Logic Model of Change’ (Bartholomew et al., 2006) (Figure 3) can be used for further specifications. Decrease of weight through changing physical activity behaviour should constitute the behavioural and environmental changes. The social environment of pupils is characterised by the teacher role. Teachers have a huge impact on the education of children as being a role model for instance. So Teachers should be sensitized to health promotion theories and activities in weight decrease through changing physical activity behaviour. The children in question need to spend more of their free time outside or realise more activities with their parents conjointly. Another chance lies in the way to school. Children should walk or use a bike. Accordingly they should write a physical activity diary to reflect their own behaviour. Furthermore physical education teachers should increase the actual time of physical activity during physical education class. There have to be multiple voluntary physical-activity offers to be established during breaks between classes and after classes in mid afternoon. Thinking further, knowledge is a factor that determinates overweight, too. So children have to be informed about positive effects of physical activity, and about the importance of attitude and self-confidence that are influenced by parents. External determinants consist of norms and support of fellow men and peer groups. The school culture and climate should be considered, too, because it determines the teacher support. Now matrices focussing on the children (Table 1) and on the teachers (Table 2) can be created.

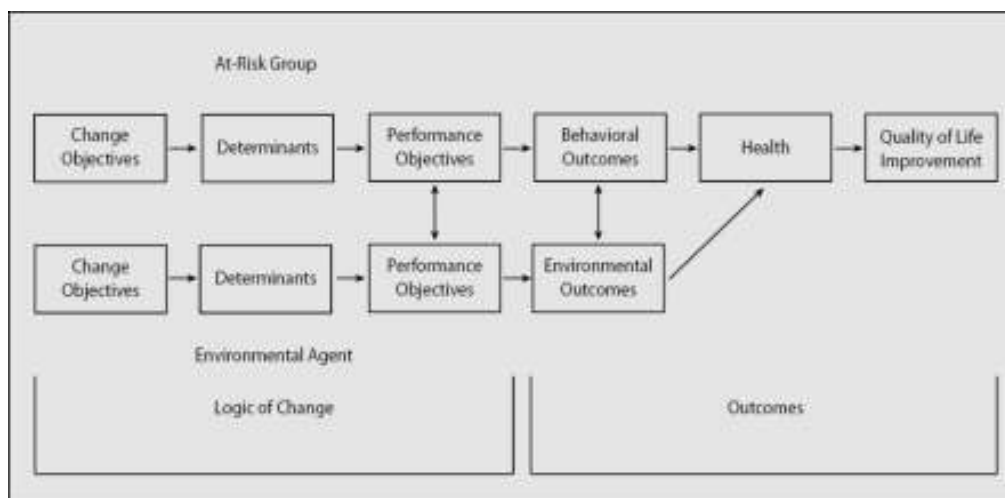


Figure 3. Logic model of change (Bartholomew et al., 2006)

Table 1. Child matrix

Child	Weight decrease of overweight elementary school pupils (7- to 10-year-old) through changing physical activity behaviour				
Changing physical activity behaviour	Personal Determinants			External Determinants	
	Attitude	Self-Confidence	Knowledge	Support	Norms
Spend free time outside	Convey a positive emotion towards being outside		Describe how fresh air leads to weight decrease	Offer activities outside	Pupils occupy with games outside
Realize activities with parents conjointly	Straighten the community spirit in families			Parents take time to be with their children	Talk about weekend activities during class
Walk or use a bike on the way to school	Convey pleasure in physical activity	Convey self-confidence towards being a 'sporty' child	Show good and save street ways to school	Create cycle tracks	
Write a physical education diary	Adopt self-responsibility		Explain why it is important to expose the problems of physical activity	Control every week	Pupils occupy with physical activity and talk about it

Table 2. Teacher matrix

Teacher	Weight Decrease of overweight elementary school pupils (7- to 10-year-old) through changing physical activity behaviour					
Changing physical activity behaviour	Personal Determinants				External Determinants	
	Attitude	Self-Confidence	Knowledge	Norms	Support	School Climate
Physical activity offer after classes	Convey positive attitude towards physical activity		Describe the multiple offers	Establish an obligatory advanced education program for teachers	Parents and children should indicate interest	Cooperation with other teachers
Physical activity offer during breaks between classes	Convey positive emotions through physical activities		List available material and devices		Pupils support	Teachers should also participate
Increase actual time of physical activity in physical education classes	Elaborate the conceptual base of physical education	Developing self-confidence for the figuration of an active teaching style		Reduce theoretical reflexion during physical education class to a sensible minimum		
Realisation of activities beyond school	Explain that there is more than school offers		Describe environmental offers beyond school		Parents organize excursions	

- Step 3: One can use the Transtheoretical Model of Change (Prochaska & Velicer, 1997). The model consists of five stages. In the first stage ('Pre-Contemplation') the task is to make the health problem clear to the elementary school pupils. This can be done using and spreading information material. In the second stage ('Contemplation stage') the pupils realize the profit of changing their behaviour because they are enlightened on the benefits of a healthy physical activity behaviour. In the third stage ('Preparation') the pupils are supported in the process of recognising their own behavioural barriers and coping with them. In the fourth stage ('Action Stage') the program starts at school. Pupils are always involved. In the fifth stage ('Maintenance') advice for further development is to be given to ensure maintenance and sustainability. The Stage Theory of Organizational Change (Beyer & Trice, 1978) can also be used to adopt a theory for the field of school. The shortened version contains four stages: Awareness (Problems are recognised), Adoption (Policies are formulated), Implementation (The innovation is implemented), and

- Institutionalization (The policy program becomes an integral part of the organization).
- Step 4: The Children should be motivated to come to school on foot or by bike. Therefore they need to know good and save cycle tracks. The police will be contacted to establish an obligatory traffic instruction for pupils. This instruction takes place once a week over a period of two months. The school has to make available enough amount of parking space for bikes. At parent-teacher conferences the parents will be informed of the planned intervention. Teachers will be informed of possible excursion places. There should be sport events organized in periodic return. The cooperation with regional sports clubs should form physical activity offers after class in the mid afternoon. There will be teacher education courses to train the teachers in hosting a mid afternoon offer. The physical activity diary will be part of grading in German class. Posters will inform pupils and visitors. They are particularly designed by pupils. The class schedule has to be changed due to the lack of time changing clothes for physical education class. Flyers, logos, posters, and sponsors are to be considered. A timetable (including pretest) with concrete dates should be made.
 - Step 5: After reflecting all relevant tasks a matrix of the implementation plan can be created (Table 3). Estimated problems during implementation can concern finances, language, ethnicity, motivation (pupils, teacher, and parents), timetable, weather, communication/ cooperation, testing, and evaluation.

Table 3. Implementation matrix

Implement- tation	Knowledge	Skill	Attitude	Success Expectation	Resources	Persons
Parent- teacher conference	Teach parents essential knowledge	Sensitize and motivate parents to collaborate	Take health theme seriously and display it pro-fessionally			Teacher, parents
Physical education offer during breaks	Know safety regulations and manage conflict situations			Very high, because the children are incited		Teacher, parents, project workers
Traffic instruction	Traffic rules		Traffic instruction has to be adequate due to its importance	Very high, because pupils are proud to take part in road traffic self-reliantly	Devices and vehicle of police; practice area for traffic education	Pupils, teacher, police
Physical activity offer after classes		Motivate pupils to participate in voluntary offers	Fun in sports and physical activity			Pupils, teacher, sports club members
Teacher feedback		Give teachers an under- standing of health; Expand on problems and ideas			Info brochure	Teacher, principal, project workers
Sports events	Motivating physical activity games, not only competitive ones	Create a more diversified program		High, because pupils are physically active beyond school context	Coordinate helpers; Design timetable	Pupils, teacher, parents, celebrity athletes
Physical education diary			Knowing the personal amount of physical activity is very important	Middle to high: long period, competition with classmates	120 books	Pupils, teacher, parents

- Step 6: One can use a Pre-Post-Design to evaluate the outcome of the intervention. Both questionnaires (to assess the social and cognitive effects, and to record socio-demographic variables) and motor tests as the MFT can be used. Accordingly one can record the Body-Mass-Index (BMI). Therefore every child has to be measured in weight and height at the beginning and at the end of the intervention. The results should be published in common media.

This brief example does not claim to be highly sophisticated or 'perfect'. It is only meant to be a cause for thought to inspire further development of strategies to promote physical activity behavior in various schools. However, the planned intervention was taken into practice by the primary school in focus. Unfortunately, the evaluation could not be realized due to duty of secrecy issues (raised up by the District Council) and a lack of funding.

Conclusion

Sygyusch et al. (2003) claim a need for intervention research studies because research designs, programs and results focussing on physical activity and health are vague and lack of clear documentation. Intervention Mapping shows a relatively easy way to plan theory-based interventions in health promotion in school. But it is only a tool, a checklist, or a guideline to help planners. It is not a guarantee for a good and successful intervention, but it states suitable conditions and hints towards the possibility of creating a good health promotion program in the field of school and sport pedagogy. 'Thorough planning at the beginning of a project can lead to creative development and production processes, enhance the intervention's deliverability, and result in the desired outcomes' (Bartholomew et al., 2006).

Furthermore, Intervention Mapping cannot belie the essential problem of acquiring money to start a program actually. But a sophisticated program designed by using Intervention Mapping increases future expectations of project financing. In addition, researchers are not to be held the only ones to establish a program. Although school-placed health-related interventions were generally initiated and performed by research institutions (Draper, de Villiers, Lambert, Fourie, Hill et al., 2010; Lloyd, Logan, Greaves & Wyatt, 2011; Singh, Chin A Paw, Krempers, Visscher, Brug & van Mechelen, 2006), schools, and especially physical education teachers as experts in this field, should take the role of initiators. As Trost (2006) demands physical education teachers should 'know [...] how to plan, implement and evaluate theory-based strategies to promote physical activity behavior in school physical education'. In the end, the specific knowledge of health theory should be part of every teacher's knowledge as one goal of teacher education.

In conclusion, one can truly state that the Intervention Mapping approach is clearly a fruitful and sensible method for planning health promotion in schools while taking a sport pedagogical view into account.

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