Using the RE-AIM framework to evaluate a school-based municipal programme tripling time spent on PE

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Using the RE-AIM framework to evaluate a school-based municipal programme tripling time spent on PE

Abstract
Documenting the implementation of effective real-world programmes is considered an important step to support the translation of evidence into practice. Thus, the aim of this study was to identify factors influencing the adoption, implementation and maintenance of the Svendborgproject (SP) – an effective real-world programme comprising schools to implement triple the amount of physical education (PE) in pre-school to sixth grade in six primary schools in the municipality of Svendborg, Denmark. SP has been maintained for ten years and scaled up to all municipal schools since it was initiated in 2008. The Reach, Effectiveness, Adoption, Implementation and Maintenance framework (RE-AIM) was applied as an analytic tool through a convergent mixed method triangulation design. Results show that SP has been implemented with high fidelity and become an established part of the municipality and school identity. The successful implementation and dissemination of the programme has been enabled through the introduction of a predominantly bottom-up approach combined with simple non-negotiable requirements. The results show that this combination has led to a better fit of programmes to the individual school context while still obtaining high implementation fidelity. Finally, the early integration of research has legitimated and benefitted the programme.

Keywords: Health Promotion; Physical education; Physical activity; School setting; Implementation; RE-AIM; Process evaluation; CHAMPS-study DK

Abbreviations: PA, physical activity; PE, physical education; SP, The Svendborgproject; ATC, Age-related Training Concept; CHAMPS-study DK, Childhood Health Activity and Motor Performance School Study Denmark; RE-AIM, The Reach, Effectiveness, Adoption, Implementation and Maintenance framework
1. Introduction

Globally only a small proportion of school-aged children meet the physical activity (PA) recommendation put forward by the World Health Organization, stating that children should get at least one hour of moderate to vigorous PA a day (Hallal, Andersen, Bull, Guthold, et al., 2012; Inchley, Currie, Young, Samdal, et al., 2016; Kalman, Inchley, Sigmundova, Iannotti, et al., 2015). This is alarming since inactivity in childhood has been associated with obesity (Strong, Malina, Blimkie, Daniels, et al., 2005) and negative health consequences relating to lifestyle diseases such as cardiovascular diseases and diabetes (Andersen, Hasselstrom, Gronfeldt, Hansen, et al., 2004; I. Janssen & Leblanc, 2010). Therefore, the promotion of PA in children should be a public health priority. Schools have been identified as ideal arenas to promote PA, as they have the potential to reach children of all socioeconomic groups and most children spend a large proportion of their weekdays at school (Dobbins, Husson, DeCorby, & LaRocca, 2013; Reis, Salvo, Ogilvie, Lambert, et al., 2016). However, translating and disseminating behaviour-related programmes into a real-world context such as schools is often a challenge and there is a need for evaluations with greater attention to the context and the practical implications of programmes. (Gaglio, Phillips, Heurtin-Roberts, Sanchez, et al., 2014; Glasgow & Emmons, 2007; Heath, Parra, Sarmiento, Anderssen, et al., 2012; McGoe, Root, Bruner, & Law, 2015). The RE-AIM framework (Reach, Effectiveness, Adoption, Implementation and Maintenance) has been developed to guide evaluations with a special focus on external validity, adding attention on the translation and dissemination of programmes (Glasgow, Vogt, & Boles, 1999). RE-AIM is a widely accepted framework and has already shown useful when evaluating real-world programmes with a special focus on the implementation of new practices in a school context (Austin, Bell, Caperchione, & Mummery, 2011; Estabrooks, Dzewaltowski, Glasgow, & Klesges, 2003; M. Janssen, Toussaint, van Mechelen, & Verhagen, 2013; Smedegaard, Brondeel, Christiansen, & Skovgaard, 2017).

The Svendborg project (SP) is a real-world programme promoting PA in primary school focusing on implementing triple the amount of physical education (PE) in pre-school to sixth grade. The implementation of SP has resulted in students becoming more active during school time (Moller, Tarp, Kamelarczyk, Brond, et al., 2014) as well as a decrease in incidents of overweight and obesity (Klakk, Chinapaw, Heidemann, Andersen, et al., 2013), a reduction of cardiovascular risk factors (Klakk, Andersen, Heidemann, Moller, et
al., 2014) and improved fitness in students with low fitness levels (Rexen, Ersboll, Moller, Klakk, et al., 2014). Furthermore, SP has been maintained and subsisted over a period of nearly ten years, which clearly emphasises the value of evaluating the programme using the RE-AIM framework in order to enhance the external validity of the programme.

1.1 Aim

The aim of the present study is to apply the RE-AIM framework as an analytic tool to evaluate SP and identify important factors influencing the adoption, implementation and maintenance of SP.

2. Method

2.1 Programme description

SP has been developed, facilitated and sustained by the municipality of Svendborg, Denmark. When the planning of SP was initiated in 2006, all 19 public schools in the municipality were invited to co-develop the programme. The main focus of the programme was for schools to implement triple the amount of PE. Prior to programme initiation all schools in the municipality and Denmark had two mandatory PE lessons – adding up to 1.5 hours weekly. Ten schools showed interest, but only six had the capability (practical or economically) to prioritize the implementation of the additional amount of PE. Eventually six of the schools initiated the programme in 2008, implementing a relatively simple concept consisting of three required programme elements: (i) the students in pre-school to fourth grade were to receive 4.5 hours of PE distributed across a minimum of three days a week at programme start-up, and gradually integrating the fifth and the sixth grade over the next two years; (ii) PE teachers had to participate in a professional development course based on an Age-Related Training concept (ATC), stressing the importance of training children in a biologically relevant manner to accord with their physical and physiological maturity (Bach & Eiberg, 2010; Pryce, Willeberg, Falkentoft, & Meyhoff, 2005); (iii) the schools had to assign a programme promoter (school staff member), who was to act as a link between their school and the programme managers. Besides these three requirements, two additional elements were highly-recommended for schools to implement: (i) programme promoters should participate in collaboration meetings with programme managers and promoters from other schools, and (ii) PE
teachers should plan some of their lessons as outdoor PE. Overall, this aimed at students receiving an improved quality of PE and triple the amount of PE.

SP was developed and evolved independently of researchers, though researchers were initially allowed to follow the programme. This led to a substantial programme of research, the Childhood Health, Activity, and Motor Performance School Study Denmark (CHAMPS-study DK), being connected to SP. Through the CHAMPS-study DK a multifaceted quasi-experimental study, comparing SP schools and non-SP schools, was established in order to evaluate the effects on the physical health of children engaged in SP (Wedderkopp, Jespersen, Franz, Klakk, et al., 2012). Applying the research programme seemed appealing to the politicians of the municipality as it would document the effectiveness of the programme. Thus, in early 2008 politicians decided to allocate funds to co-finance the expenses of running the programme for all enrolled schools for three years. A timeline of SP covering the required and highly-recommended programme elements is illustrated in Figure 1. (Supplementary description of the programme can be found in Appendix A).
2.2 RE-AIM

Using the RE-AIM framework, this study documents the process of SP from its inception and ten years into the programme. This historical perspective makes it relevant to address how SP has evolved over time (Figure 1) and how the RE-AIM framework was applied to guide the analysis across this timeline (Figure 2). Each of the RE-AIM dimensions and their outcome measures are defined below and in Table 1.

![Figure 2: Visualisation of how the various RE-AIM dimensions is applied across the programme timeline](image-url)
### Table 1: Outline of the RE-AIM dimensions’ model and outcome measures

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
<th>Outcome measures</th>
</tr>
</thead>
</table>
| Reach     | The characteristics and representativeness of schools in the overall target group who were eligible to participate in the programme. | - Number of eligible schools who participated  
- Characteristics of participating schools |
| Effectiveness | The effectiveness outcomes of the programme e.g. more physical activity and health promotion of children. | - This dimension is reported elsewhere, and not included in this paper |
| Adoption  | The commitment of participating schools regarding their decision to install the programme and factors influencing that decision. | - Commitment of participating schools  
- Factors influencing school engagement |
| Implementation | The extent to which schools implemented the programme as intended and adaptations made to the programme over time | - Degree of programme elements that were delivered as designed (fidelity)  
- Adaptations made to the programme |
| Maintenance | The extent to which the schools maintained programme implementation and the programmes ability to become an integrated part of daily practice. | - Degree of programme elements that were maintained over time  
- Factors influencing maintenance |

1(Klakk, et al., 2014; Klakk, et al., 2013; Moller, et al., 2014; Rexen, et al., 2014)

#### 2.2.1 Reach

In the present study, the reach dimension reports on the characteristics of the six schools that initially became part of programme when SP was initiated at the schools in 2008. Although the main focus in this study is the adoption, implementation and maintenance dimension, reach will be described to ensure the representativeness in relation to the number of the PE teachers and schools that were part of SP. School characteristics and representativeness is assessed through data from the Danish Database of National Statistics.

#### 2.2.2 Effectiveness

Effectiveness of SP is reported elsewhere (Klakk, et al., 2014; Klakk, et al., 2013; Moller, et al., 2014; Rexen, et al., 2014), thus, this dimension is not included in the present paper.

#### 2.2.3 Adoption
Although six schools agreed to become part of the programme there was no guarantee that school management and PE teachers would actually adopt the programme. The adoption dimension reports on schools’ commitment and relevant strategies introduced by programme managers and school heads in order to secure staff turnover and engagement. As schools were involved in programme development prior to programme implementation, the adoption dimension also focuses on how school commitment was affected during the developmental phase and through the initial implementation period. Hereby adoption reports on the period of 2007-2010 and will be documented through interviews with programme managers, interviews with school heads and programme-related documents.

2.2.4 Implementation

The implementation dimension reports on programme fidelity at the six schools. Implementation fidelity was measured as in 2011 and indicates how the schools fulfilled the three programme requirements and the two highly-recommended elements (Figure 1). Furthermore, the implementation dimension reports on the adaptation of the programme, which led to the extension of SP to all schools in the municipality and to new programme elements being added. The implementation dimension will be documented through programme manager interviews, school head interviews, teacher questionnaires and programme-related documents.

2.2.5 Maintenance

The maintenance dimension reports on fidelity, as in 2016. Fidelity will be reported in relation to the programme requirements and highly-recommended elements as described during start-up in 2008 (Figure 1) in order to establish the degree to which SP still was operationalized at the six original schools nearly ten years after initiation. In addition, the maintenance dimension report on the degree to which new added programme requirements (Figure 1) have been implemented and fulfilled at the six schools. Lastly, the maintenance dimension focuses on how SP has become part of everyday practice at the six schools. Maintenance will be reported through the use of programme manager interviews, school head interviews, teacher questionnaires and programme-related documents.
2.3 Design of this study

This study adopts a convergent mixed-method triangulation design (Greene, 2007) in order to identify important factors influencing the processes of adopting, implementing and maintenance of SP. Six sources of data have been collected: archival records, programme-related documents, semi-structured group interviews with programme managers, semi-structured single interviews and highly-structured interviews with school heads; and questionnaires aimed at PE teachers. Data sources covering the various RE-AIM dimensions in focus is outlined in Table 2.

<table>
<thead>
<tr>
<th>Data sources</th>
<th>Data collection period</th>
<th>RE-AIM dimension (data representation year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-structured group interviews with programme managers (N=2)</td>
<td>2015</td>
<td>-</td>
</tr>
<tr>
<td>Semi-structured single interviews with sitting school heads (N=3)</td>
<td>2016-17</td>
<td>-</td>
</tr>
<tr>
<td>Highly-structured single interviews with sitting school heads (N=3)</td>
<td>2016-17</td>
<td>-</td>
</tr>
<tr>
<td>Semi-structured single interviews with former school heads (N=3)</td>
<td>2016-17</td>
<td>-</td>
</tr>
<tr>
<td>Highly-structured single interviews with former school heads (N=3)</td>
<td>2016-17</td>
<td>-</td>
</tr>
<tr>
<td>Teacher questionnaires</td>
<td>2016</td>
<td>-</td>
</tr>
<tr>
<td>Programme-related documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- school strategy reports (N=5)</td>
<td>2014</td>
<td>-</td>
</tr>
<tr>
<td>- internal evaluations (N=2)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>- collaboration minutes (N=21)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Archival records on national and school statistics</td>
<td>2008</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 2: Description of the various data-sources used in this study, the time data was collection and how the various data-sources inform on the RE-AIM dimensions

2.4 Documents

Internal programme documents were included to describe the history and development of the programme. All the documents included are on public record ([Dataset] & Nielsen, 2017). The documents contained i) collaboration minutes (N = 21) describing the joint implementation process of programme managers and schools; ii) internal evaluations (N = 2) of the implementation process and an evaluation collating experiences from all participant schools on how to implement the programme; iii) individual school strategy reports (N = 5) describing how each school implemented the programme during the initial years. Altogether, documents provided experiences covering the period of 2008-2016. Additional data included archival records from the municipality reporting on school statistics and from Statistics Denmark containing national population data on the size of Danish municipalities, parents’ level of education, disposable household income and student quotient in school classes.

2.5 Interviews

Two group interviews with municipal programme managers were conducted and six single interviews with school heads. Two different interview guides were created, one for programme manager and one for school heads (example can be found in Appendix B). Both interview guides were based on the reach, adoption, implementation and maintenance dimensions of the RE-AIM framework. The questions were framed in an open-ended manner within the context of the programme and were based on the language and terms presented in the programme documents.

Interview participants were chosen through purposeful sampling (Kelly, 2010), which ensured key respondents with sufficient knowledge of SP and coordination activities across the six participating schools. All respondents received a letter of information prior to the interviews, explaining the purpose. All respondents
signed written informed consent. All interviews were audio-recorded and performed by the first author (JVN) in private rooms at the workplace of the interviewees.

2.5.1 Programme managers

Five programme managers have been engaged in the programme over the last ten years. Three of the five programme managers were invited and agreed to participate in two face-to-face semi-structured group interviews. The two programme managers not included in the study sample were only temporarily involved in the programme during the initial years and were considered not to possess comprehensive insight into SP. Two of the managers included were still working on the programme – one was part of the development of the programme, the other was employed a year into the programme, and both had been a central workforce of the programme. The third manager was no longer affiliated with the municipality but had been the one to introduce the idea and was considered the founder and initial driving force of the programme. Group interviews were chosen, as it was deemed that the interviewees could support each other in recollecting the process since programme start-up in 2008. Each group interview lasted approximately 90 minutes.

2.5.2 School heads

In collaboration with one of the active programme managers, a list of former and current school heads, deputy heads and heads of departments across the six schools was created. School heads most likely to yield relevant and useful information due to their current or former engagement to the programme were highlighted and invited to participate in the study. In some cases, deputy heads were chosen to take part, if they were assessed to have better insight into the programme and the implementation process than the head of their school. School heads were interviewed individually, as they represented different schools and could each provide different perspectives and nuances of the implementation process.

Of the seven heads invited, six agreed to participate. Initially a short highly-structured interview (approximately 10 minutes) was performed to determine if programme elements were delivered as designed (fidelity). The highly-structured questions were sent to the respondents prior to the interview. Immediately after the highly-structured interview, a 45-minute semi-structured interview was conducted to cover the
process of adopting, implementing and maintaining the programme. The two interview methods were combined in a single visit in order to minimize disruption for the respondents and to allow the highly-structured interview to provide a basis for the subsequent more open interview. Two of the interviewees were acting as school heads and three had been school heads at an SP school during the project’s initiation in 2008 but were now either retired or had moved to a new school in another municipality. The remaining head occupied a post as deputy head and had done so since the start of the programme.

2.6 Questionnaires

A questionnaire to determine to which degree programme requirements and highly-recommended elements (Figure 1) were delivered as designed (fidelity) were developed for PE teachers. The questionnaire was designed to measure both implementation fidelity and maintenance fidelity. The questionnaire was developed based on a list of identified programme elements and implementation strategies. The list was developed by the first author (JVN) through analysis of programme manager interviews and programme documents and was approved to comprise fidelity of the programme by the sitting programme managers.

Several steps were taken to heighten the content validity of the questionnaire. Initially the questionnaire was reviewed by the second author (TS) and last author (HK), who had in-depth knowledge of both the RE-AIM framework and SP. Secondly programme managers were asked to review all questions in relation to their ability to capture programme fidelity as they had detailed knowledge of programme content and structure. The questionnaire was also adapted to the target group by having two PE teachers correct any ambiguous or difficult questions. The two PE teachers had no connection to SP and were solely involved to ensure that the questions were phrased to fit the target group, thereby making it more likely for PE teachers to understand and answer the questions.

The questionnaire was designed and collected electronically through the survey system SurveyXact (example can be found in Appendix C). The use of electronic surveys made it possible to activate additional questions on specific answers, thereby ensuring that participants did not receive irrelevant questions – e.g. if teachers answered that they had participated in the professional development course, they would get additional questions about the usability of the course. The full questionnaire contained 86 items rated either in yes/no
answers or on a 4-point Likert scale ranging from agree to disagree. The 86 items covered four overall themes: a) general information regarding employment, b) working at a school taking part in SP, c) content and structure of PE lessons, and d) the professional development course. At the end of each theme teachers were also invited to make any supplementary comments to their answers. Finally, the questionnaire study was presented to all school heads, and they were given the opportunity to submit objections and proposals for its distribution. There were no objections, and the questionnaire was distributed by the school heads to all teachers who had delivered PE lessons at their individual school during the programme timeline (Figure 1). The questionnaire was online for three weeks.

School heads identified 46 PE teachers across the six schools. Of these, 35 (76%) answered the questionnaire, all of these reporting on maintenance fidelity. The only teachers invited to answer questions relating to the implementation fidelity were those who reported that they were employed at their school and had been teaching PE during the implementation fidelity measuring point in 2011. There were 23 teachers who fitted this criterion and who answered the questions regarding implementation fidelity. Both answers on implementation and maintenance represents and is equal distributed across all six schools.

2.7 Data analysis

2.7.1 Qualitative data analysis

Programme manager and school head interviews were transcribed verbatim and names were anonymized and analysed together with documents using qualitative content analysis (Schreier, 2014). The first author (JVN) thoroughly familiarized the document and interview data prior to the coding of the material. This familiarization was done by reading the material while taking notes and identify overall core patterns in the data. Based on these core patterns, a coding-frame related to each of the RE-AIM dimensions in question was developed. Subsequently, the first author (JVN) trial-coded a large portion of both the document and interview data according to the coding-frame. The results from the trial-coding were discussed among authors in order to reach consensus on which information related to which RE-AIM dimension. Following this, the first author (JVN) adjusted and refined the coding-frame. Subsequently all data that had been used in the trial-coding were re-coded with the new coding-frame together with the rest of the interview and document data. In the final step
of the analysis the first author (JVN) thoroughly read the coded material and selected main quotations relating to factors that influenced the adoption, implementation and maintenance of SP to prepare the findings for presentation. Examples of quotations from both interviews and documents across RE-AIM dimensions can be found in Appendix D.

2.7.2 Quantitative data analysis

STATAv15 were used to handle questionnaire data and produce descriptive statistics, proportions on implementation and maintenance fidelity. Due to the paucity of responses, Likert scale values were collapse resulting in two categories of “agree” and “disagree”.

2.8 Ethical considerations

Written informed consent, also containing consent for publication, was collected from all participants at the beginning of each interview. The programme of research was approved by the Danish Research Ethics Committee (Project-ID: S-20080047 and S-20140105).

3. Results

The present study has analysed SP and the outcome measures of each of the RE-AIM dimensions in question in presented in the following sections and summarized in Table 3.
### Dimension | Outcome measures | Results
---|---|---
Reach | - Number of eligible schools who participated | - All 19 schools in the municipality were eligible and 6 chose to participate in SP
| - Characteristics of participating schools | - Municipality size and average household income matched the Danish normal. Schools were either located in rural (n=4) or urban-suburban (n=2) areas. Child per teacher ratio was lower (18.7) than the Danish average (20.1)
Adoption | - Commitment of participating schools | - Participating schools found PA as something that was already a part of their individual school culture
| - Factors influencing school engagement | - To diminish a top-down approach school representatives were included in the development of the programme while programme managers delivered close supporting dialogue. Additionally, teachers were promised a professional development course to aid the implementation.
Implementation | - Degree of programme elements that were delivered as designed (fidelity) | - Required and highly-recommended elements were all implemented with high fidelity.
| - Adaptations made to the programme | - Three years into the programme two additional requirements were added and all schools in the municipality became part of the programme.
Maintenance | - Degree of programme elements that were maintained over time | - Three requirements showed high fidelity and two showed mediocre fidelity. The two showing mediocre fidelity were participation in the professional development course (26/35) and PE lessons consisting of minimum three hours of ATC-related content (17/35). The two highly-recommended elements both showed high fidelity.
| - Factors influencing maintenance | - The programme has become an integrated part of the schools’ identity. At the municipality level, the linkage to research provided legitimacy and political support of the programme.

**Table 3: Results related to each outcome measure of the RE-AIM dimensions**

3.1 Reach

Of the six schools that initiated the programme in 2008, four were located in rural areas and two in urban-suburban areas. Of the non-participating schools, five were rural and eight urban or suburban. There was no significantly difference in parental education level between participating and non-participating schools. In Denmark, public schools are funded from taxes and organized by the local authorities in the municipality. Data from the Danish Database of National Statistics (www.statistikbanken.dk, 2017) show that the population of the Svendborg municipality was 59,138 and the average disposable household income was 190,708 Danish
kroner (25,500 Euro) at programme initiation in 2008. In Denmark, the average size of municipalities was 55,437 people and average disposable household income was 195,039 Danish kroner (26,200 Euro). No national data could be located on teacher/student ratios in 2008, but in 2009 the average number of children per teacher was 18.7 in Svendborg and at the national level it was 20.1.

3.2 Adoption

Interviews with programme managers and school heads reveal that all six participating schools found PA and PE a meaningful element and something that was already a part of their individual school culture during the developmental phase.

_The school has always had a strong physical activity profile, We have committed physical education teachers and good facilities for sports activities. We have made a clear strategy regarding our physical education i.e. a guide to teachers, students and parents, so everyone knows the common guidelines regarding physical education at our School._

[strategy report - school 3]

By including schools that were interested in the programme and inviting teacher and school leader representatives to develop the programme, managers wanted to diminish a top-down approach. The overall idea was to tailor the programme to the school context. However, programme manager interviews reveal that the teachers involved in the programme development phase were sceptical at first. Teachers were focused on practicalities, such as whether they would have enough space in the gym, would need additional equipment or if time could be allocated for the additional PE. Programme managers engaged in close dialogue with the teachers, trying to get them to think more innovatively e.g. how they could use the facilities already available but in new ways. Through these discussions, teachers realised that the added PE would enable them to give greater attention to students with difficulties, as SP would ensure that they had time to focus on a learning
perspective and go beyond just doing activities. Programme managers report that, once teachers realized this potential, they became highly committed to SP.

... there were not much enthusiasm in the beginning... eventually it came...
but it was a required condition to have those more or less frustrating talks about content and the implications of the programme... because we did not define the programme in advance... we were to develop it together [with the teachers]... You have to be patient in that process...

[Programme manager 3]

School head interviews reveal that the co-involvement in the early stages of the programme was important for the programme to be implemented. All school heads also indicate the importance of demonstrating a general positive attitude and support for the programme to teachers and parents. Interviews with school heads show that many of the schools and teachers found it motivating to have the researchers following the children and documenting whether the programme and their PE lessons were effective.

Then came the entire research programme... it was exciting for the teachers as they were eager for their students to be measured again... To see whether they could track any progress... it was a different... a special school day...
I think it was a boost, they were really excited... [School head 2]

3.3 Implementation

Implementation reports on the fidelity of required and recommended elements (Figure 1) in 2011. Table 4 shows implementation fidelity of both required and recommended elements. Additionally, implementation also reports how the programme has been adapted over time.

3.3.1 Additional PE over a minimum of three days
Document analyses and interviews with school heads show that the 4.5 hours of PE were scheduled at all schools from pre-school to 6th grade (Table 4). Interviews with school heads also reveal that schools handled the implementation of the required elements differently, which resulted in some schools choosing to have the 4.5 hours divided over three days a week while others chose to arrange PE every day. However, teacher questionnaires’ show that two teachers disagreed to provide 4.5 hours of PE a week (Table 4). These teachers point out that time spent on changing and showering should not be included in the actual time being physically active during PE. Therefore, the amount of active PE could, according to some teachers, have been less than 4.5 hours.

3.3.2 Participation in the professional development course
Teacher questionnaires show that all but one teacher had participated in the professional development course (Table 4). Documents and interviews with school heads show that having PE teachers participate in the course was a high priority for all schools.

3.3.3 Appointing a programme promoter
Documents and interviews with school heads reveal that all schools chose a programme promoter prior to programme initiation (Table 4). Although some schools changed promoter during the years, all schools had a programme promoter assigned during the whole implementation process. PE teachers were chosen as programme promoters at some schools and at others the school head acted as promoter. In some cases, school heads and a PE teacher chose to act as programme promoter simultaneously.

3.3.4 The highly-recommended elements
Documents and interviews showed that programme promoters participated in collaboration meetings with the programme managers and the promoters from the other schools (Table 4). These collaboration meetings helped the flow of information from schools to programme managers and vice versa. Programme managers and school heads also made it clear that the promoters were a driving force aiding the implementation of the programme. Regarding outdoor PE, documents show that all schools arranged outdoor PE during all seasons (Table 4).
This is supported by the teacher questionnaires, which show only one teacher disagreeing on planning outdoor PE. Both documents and interviews show that the use of outdoor PE was essential to cope with the intense pressure on facilities when tripling the amount of PE.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Reporting data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 hour of PE minimum three days a week</td>
<td>Documents: All schools</td>
</tr>
<tr>
<td>PE teachers have participated in professional development course</td>
<td>-</td>
</tr>
<tr>
<td>Schools have assigned a programme promoter</td>
<td>All schools</td>
</tr>
<tr>
<td><strong>Highly-recommended elements</strong></td>
<td></td>
</tr>
<tr>
<td>Planning outdoor PE</td>
<td>All schools</td>
</tr>
<tr>
<td>Programme promoters participate in collaboration minutes</td>
<td>All schools</td>
</tr>
</tbody>
</table>

**Table 4: Implementation fidelity (2011)**

3.3.5 Programme adaptation

In 2011, programme managers and the participating schools conducted a systematic internal evaluation of SP, showing enthusiasm and positive feedback from all parties. At the same time the municipality of Svendborg held a major conference promoting the programme and highlighting the research findings (Figure 1). Positive responses from participating schools alongside the research results showing SP to be effective dominated the discussion as to whether it was possible to include more schools in the programme. Programme manager interviews and documents revealed that there were three schools in particular among those set up as control schools by the researchers that were eager to become part of the programme. Programme managers used this momentum to consolidate political support from the city council, which resulted in all schools in the municipality once again being invited to become part of the programme. All schools said yes. Alongside the inclusion of the new schools, an adapted concept was introduced adding two new programme elements to the original three – i) three hours of the PE must include ATC-related content and ii) students would get 20 minutes
of high intensity activity in each PE session (Figure 1). Programme manager interviews and documents reveal that these adaptations were very much based on feedback from school promoters, who proposed more detailed descriptions for how SP should be adapted. During this process, programme managers also consulted with the researchers and tried to adopt their recommendations in the new programme requirements.

*We were evaluating the programme... and we actually got feedback from the school promoters suggesting that the programme might have gotten a little diluted over time... because in that first concept they [the requirements] were rather vaguely described... So, they actually asked us to describe the programme requirements in more detail... and in this process of evaluating what had been good and bad we also adopted the research results... [Programme manager 3]*

3.4 Maintenance

Maintenance reports on the fidelity of required and recommended elements (Figure 1) in 2016. Table 5 shows maintenance fidelity of original and new requirements as well as recommended elements. Additionally, maintenance reports how the programme became an integrated part of daily school practice.

3.4.1 Maintenance fidelity

Documents and highly-structured interviews with school heads show that all six schools maintained the 4.5 hours of PE divided across a minimum of three days a week (Table 5). All schools state that they are still aware that new PE teachers must participate in the professional development course, but teacher questionnaires show that only 26/35 have participated in the course (Table 5). One of the school heads reveals that this is an ongoing challenge because new PE teachers are being appointed without having the necessary educational time to join the professional development course. Documents and highly-structured interviews with school heads show that all schools still have a programme promoter assigned, and that they still attend programme collaboration meetings (Table 5). Questionnaires show that all PE teachers include outdoor facilities in their PE lessons all
seasons (Table 5). Questionnaires also shows that the students generally receive the required 20 minutes of high intensity activity as 33/35 of teachers agree on this (Table 5). However, programme collaboration minutes reports that the teachers find it difficult to assess whether the students take part in high intensity activity or not. Regarding the requirement of PE teachers delivering a minimum three hours of ATC-related content, it is noticeable that only 17/35 of the teachers reports doing so (Table 5). Table 6 shows that several of the teachers who disagree on planning the required ATC had not participated in the professional development course, and so had not been introduced to ATC. The two teachers reporting that they perform three hours of ATC but had not attended the course (Table 6) reports that they use ATC based on material they have been given by their colleagues.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Documents</th>
<th>Interviews</th>
<th>Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 hour of PE minimum three days a week</td>
<td>All schools</td>
<td>All schools</td>
<td>30/35 teachers agree</td>
</tr>
<tr>
<td>PE teachers have participated in professional development course</td>
<td>-</td>
<td>-</td>
<td>26/35 teachers have participated</td>
</tr>
<tr>
<td>Schools have assigned a programme promoter</td>
<td>All schools</td>
<td>All schools</td>
<td>-</td>
</tr>
<tr>
<td>Students have at least 20 min high intensity activity</td>
<td>-</td>
<td>-</td>
<td>33/35 teachers agree</td>
</tr>
<tr>
<td>PE consist of minimum three hours of ATC-related content</td>
<td>-</td>
<td>-</td>
<td>17/35 teachers agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highly-recommended elements</th>
<th>Documents</th>
<th>Interviews</th>
<th>Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning outdoor PE</td>
<td>All schools</td>
<td>All schools</td>
<td>35/35 teachers agree</td>
</tr>
<tr>
<td>Programme promoters participate in collaboration minutes</td>
<td>All schools</td>
<td>All schools</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5: Maintenance fidelity (2016)

<table>
<thead>
<tr>
<th>Participated in the course</th>
<th>Planning three hours of ATC-based PE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>
3.4.2 An integrated part of daily practice

At the teacher level, questionnaires report that 30/35 of the teachers are pleased that their school is committed to being part of the programme. At the school head level, interviews reveal that SP has become an integrated part of the schools’ identity, their daily practice and a natural part of their planning of the school year.

*When the programme has existed for six, seven, eight years, it becomes part of everyday life... I do not believe that anyone are thinking ‘We are in the Svendborgproject’... It is incorporated into the schools’ way of planning... There is no question about that...*

[School head 3]

Programme manager interviews stress that the research results have given the programme legitimacy and political support, which have eventually resulted in SP progressing from being ad hoc funded to now having a robust economic base. Furthermore, the political goodwill of SP has resulted in new programmes being created in its image, for example in increased attention given to movement and its implementation in a similar programme for children in day-care.

*These days we are writing the budget for the coming year... And some new programmes, like more physical activity for children in day-care, but also our talent development programme... We stress that the programmes are related to the Svendborgproject... So, the Svendborgproject has actually become something that can help start other programmes... give some*
goodwill at the political level when these new programmes are related to it

[the Svendborgproject]...

[Programme manager 2]

4. Discussion

SP have demonstrated how a rather simple concept is able to be adopted by schools and teachers, be implemented with high fidelity and to be maintained over a period of 10 years in a real-world setting. Furthermore, the programme has become an established part of the municipality and the identities of schools. Central factors estimated to have crucial influence for the success of SP will be discussed further below.

4.1 The commitment and involvement of schools

The results show that all the six schools that chose to participate in SP had an initial interest in the promotion of PA. This has been pointed out by others as an advantage in securing implementation and maintenance of PA programmes, since it ensures that they will be better suited to the individual school context and that schools already having an awareness of how to integrating PA (Durlak & DuPre, 2008; Forman, Olin, Hoagwood, Crowe, et al., 2008; M. Janssen, Toussaint, van Mechelen, & Verhagen, 2013; Naylor, Nettlefold, Race, Hoy, et al., 2015; Pearson, Chilton, Wyatt, Abraham, et al., 2015). Furthermore, the active participation of schools and a bottom-up approach during SP have been successful strategies in securing this contextual fit. This is supported by others reporting that involving teachers in the planning and decision process help programmes to fit existing school practice and increase the probability to increase maintenance (Sulz, Gibbons, Naylor, & Higginsb, 2016). Programme managers have been trying to achieve the right mix of having a top-down approach (ensuring that schools followed programme requirements) and a bottom-up approach (involving schools in the programme decisions and finding solutions that would fit a school context). To promote this bottom-up approach, programme managers involved teacher representatives in the early stages of developing the programme. Initially teacher representatives showed scepticism towards SP. This could very well be due to the programme not being specific and clear about how it should be implemented, which has proved to be important for teachers if they are to accept new programmes (Langille & Rodgers, 2010; Pearson, et al., 2015).
Studies have shown that, when introduced to new programmes, teachers have a special concern about additional work-load and the time they have to put in (Adamowitsch, Gugglberger, & Dur, 2017; Lytle, Ward, Nader, Pedersen, et al., 2003; Naylor, et al., 2015; Pearson, et al., 2015; van Nassau, Singh, Broekhuizen, van Mechelen, et al., 2016) and worry about the risk of having to down-prioritize academic goals in order to meet new requirements (Keshavarz, Nutbeam, Rowling, & Khavarpour, 2010; Lytle, et al., 2003). This study indicated that some scepticism should be expected when involving teachers in the early stages of programme development and it is imperative for programme managers to engage in dialogue with the teachers. Through supportive dialogue, programme managers eventually helped secure teacher dedication and enthusiasm for SP. Programme managers continued this dialogue and shared decision-making with schools through regular collaboration meetings with school promoters from all six schools. This collaboration established organizational support for the schools during both the adoption and the implementation stages of SP and it is generally deemed a facilitating factor for implementation (Durlak & DuPre, 2008; van Nassau, et al., 2016).

4.2 Fidelity of programme elements

The commitment and motivation of school heads has generally been noted as crucial for successful implementation (Forman, et al., 2008; Ingemarson, Rubenson, Bodin, & Guldbrandsson, 2014; Langille & Rodgers, 2010; Masse, Naiman, & Naylor, 2013; van Nassau, et al., 2016), and is especially highlighted as important in the adoption of school-based programmes (M. Janssen, Toussaint, van Mechelen, & Verhagen, 2013; Langille & Rodgers, 2010; van Nassau, et al., 2016). The results of this study also emphasise the importance of school management’s commitment during the adoption stage, as school heads aided the implementation of SP by promoting the programme at teacher and parent level. Other studies often identify teachers as the key implementers, as they are the ones delivering a programme with a theoretical base, involving an additional focus in their existing lessons or the development of new content (Bice, Brown, & Parry, 2014; Campbell, Rawlins, Wells, Kipping, et al., 2015; Hall, Schneider, Thompson, Volpe, et al., 2014; Howie, Brewer, Brown, Pfeiffer, et al., 2014; M. Janssen, Toussaint, van Mechelen, & Verhagen, 2013; Lytle, et al., 2003). In SP, however, the original concept was fairly simple and only included requirements that school heads were able to implement – scheduling the additional PE, appointing a programme promoter and deciding
when the PE teachers could attend the mandatory professional development course. This meant that the original SP concept did not require PE teachers to change their existing lessons, nor were teachers required to develop new content based on a predetermined framework or theory. Thus, school heads can initially be identified as the key implementers of SP, which presumably renders their dedication and support even more central to securing successful implementation and maintenance fidelity. Still, it is important to emphasise that programme managers and school heads, in alignment with the experiences of others (Durlak & DuPre, 2008; Langille & Rodgers, 2010; McIsaac, Read, Veugelers, & Kirk, 2017), deemed the support of teachers and programme promoters as important in ensuring the maintenance of the implemented structures and the overall quality of the additional PE activities.

Upholding programme fidelity over time

In 2012, SP was evaluated and the concept was adapted, leading to two additional requirements containing more specific descriptions of the content of the added PE (Figure 1). Adaptation of concepts has been associated with positive results (Durlak & DuPre, 2008), and, as the new specifications were requested by school promoters (representing the teachers), it can be assumed that there was an incentive for implementing these new requirements. However, teachers report that the requirement of three hours of ATC in the PE lessons presented some difficulties when it came to implementation. This could be due to teachers still not having participated in the professional development course and simply not having the basis from which to plan ATC into their PE lessons. If correct, this would underline the importance of supporting teacher practices and of qualification courses as a key factor for securing implementation fidelity (Adamowitsch, Gugglberger, & Dur, 2017; Durlak & DuPre, 2008; Forman, et al., 2008; Naylor, et al., 2015). However, teachers that had participated in the professional development course also reported difficulties in implementing the added attention to ATC. This might be due to ATC only being recommended as a teacher’s aid until the new requirements were introduced, and teachers may not directly have used ATC, or at least not to such an extent as the new requirements demanded. In other studies, it has proven effective to let providers having implementation difficulties participate in training courses once more (Durlak & DuPre, 2008), and it might be
fruitful for schools and programme managers to establish brush-up courses as a supportive element for teachers when adapting programme content.

Continuous adaptation of programmes to fit school needs can lead to better implementation. However, it is important to monitor programme adaptation and how it affects programme success (Durlak & DuPre, 2008), for the results of this study also suggest that the introduction of more stringent requirements can have a negative impact on fidelity if the supporting structures, such as solid programme coordination and a professional development course, are not in place or adjusted correspondingly.

4.3 Research linking to practice

Results show that the programme has been heavily influenced by the research associated with it, which affected programme adherence. This positive influence has been mentioned by others and support the idea that the involvement of research partnerships may aid school dedication and help to ensure implementation and maintenance (Forman, et al., 2008; Howie, et al., 2014; Lytle, et al., 2003; McKay, Macdonald, Nettlefold, Masse, et al., 2015). At the school level, research showed that the schools’ work was paying off which boosted motivation in favour of SP. Likewise the results of research had a crucial influence on the political support for SP, leading to its extension to all schools in the municipality and to the decision to secure programme funding. This supports the notion that research can help secure political backing, which is vital to uphold the programme’s infrastructure and secure programme maintenance, fidelity of required elements, and programme expansion (McKay, et al., 2015). Lytle et al. found that programmes initiated through research maximized facilitators and minimized barriers when adopting programmes. However, when research left the schools, the infrastructure also left, and schools were forced to downscale or eliminate elements of the programme (Lytle, et al., 2003). It is noticeable that SP has been initiated, developed and facilitated by the municipality and schools of Svendborg, making the programme self-governing. This suggests that cooperation between research and practice can benefit both parties, as programmes like SP can gain support at both school and political level, whereas researcher can obtain valuable knowledge on how to improve and translate evidence-based programmes into effective practice by following these real-world programmes (Durlak & DuPre, 2008; Gaglio, et al., 2014; Glasgow, 2013; Green, 2008; Lobb & Colditz, 2013).
4.4 Strengths and limitations

We recognize that this study has limitations. Generally, it would have been better to document the implementation process from programme initiation in 2008 and to have synchronised the measurement of fidelity with efficacy measures. As the evaluation of this study describes processes dating back several years, interviews and questionnaire data could contain some degree of recall bias. Also, we cannot guarantee that the results might have been more objective or nuanced if data had been gathered at an earlier stage, before the programme was deemed a success. However, to strengthen our empirical foundation, we used various qualitative and quantitative data sources to ensure that each of the adoption, implementation and maintenance dimensions was supported by a second data source (Table 2).

One of the strengths of this study is the extensive focus on implementation processes and the contextual descriptions of SP. This focus, set alongside the fairly simple programme requirements of SP, should improve the possible transferability to other schools or municipalities. However, it is important to mention that the results of this study only record the promotion of PE and are therefore not necessarily applicable to promoting PA in other forms. If PA is to be implemented during recess playtime or integrated into academic subjects (such as maths), different types of implementation concerns may possibly become relevant.

Finally, it is important to acknowledge that the present study only represents teachers through questionnaires. Additional research is needed centring on teacher, children and parents’ perspective when implementing these real-world programmes.

4.5 Lessons learned

One lesson learned from this study is that introducing a relative simple concept (implementing three times more PE in primary schools, having a school promoter and having PE teachers attend a professional development course) to six of nineteen schools in a municipality has the potential to be successfully
implemented, to be extended into additional schools and to become a part of the municipality’s main branding strategy.

Another lesson learned is, that having interested schools achieve success with the programme helps to establish the foundation for political support and to develop strategies that can aid programme implementation at other schools. These supportive structures and practical suggestions from fellow schools regarding the implementation of the programme could very well be valuable resources for schools with less interest or experience regarding PA.

The final lesson learned is that even though the research has not been an active part of the decision-making, our results indicate that the research linkage was crucial and had an impact on various stakeholders. In SP, the research aided the initiation and sustainability of the programme and motivated teacher dedication and dissemination to the rest of the schools in the municipality.

5. Conclusion
This study provides description and documentation on the process of adopting, implementing and maintaining an effective real-world programme promoting more PE in primary school. When initiating school-based programmes, it might be beneficial for health promoters and politicians to introduce a bottom-up approach combined with simple non-negotiable requirements. It seems that this balance of bottom-up and top-down leads to a better fit of programmes to individual school context while still obtaining high implementation fidelity. However, in the aim of continually adapting the programme to fit the needs of the school, it is important to ensure that the supportive structures adapt accordingly to achieve fidelity. The linkage to research can benefit programme implementation at different levels at different stages and help to ensure the decision to initiate, expand and maintain programmes.

Competing interests
The authors declare that they have no competing interests

Funding

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References


# Appendix A: The TIDieR (Template for Intervention Description and Replication) checklist*

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Where located</th>
<th>Other † (details)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BRIEF NAME</td>
<td>see below at page 3</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>Provide the name or a phrase that describes the intervention.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>WHY</td>
<td>see below at page 4</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>Describe any rationale, theory, or goal of the elements essential to the intervention.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>WHAT</td>
<td>see below at page 5</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.</td>
<td>see below at page 6</td>
<td>†</td>
</tr>
<tr>
<td>5.</td>
<td>WHO PROVIDED</td>
<td>see below at page 7</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>HOW</td>
<td>see below at page 8</td>
<td>†</td>
</tr>
<tr>
<td></td>
<td>Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>WHERE</td>
<td>see below at page 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>WHEN and HOW MUCH</td>
<td>see below at page 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TAILORING</td>
<td>see below at page 10</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>MODIFICATIONS</th>
<th>see below at page 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).</td>
<td></td>
</tr>
</tbody>
</table>

**HOW WELL**

<table>
<thead>
<tr>
<th></th>
<th>Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.</th>
<th>see below at page 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.</td>
<td>see below at page 11</td>
</tr>
</tbody>
</table>

**Authors** - use N/A if an item is not applicable for the intervention being described. **Reviewers** – use ‘?’ if information about the element is not reported/not sufficiently reported.

† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).

‡ If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete.

* This checklist has been used in conjunction with the TIDieR guide (see BMJ 2014;348:g1687) which contains an explanation and elaboration for each item.

* The focus of TIDieR is on reporting details of the intervention elements (and where relevant, comparison elements) of a study. Other elements and methodological features of studies are covered by other reporting statements and checklists and have not been duplicated as part of the TIDieR checklist. When a randomised trial is being reported, the TIDieR checklist should be used in conjunction with the CONSORT statement (see www.consort-statement.org) as an extension of Item 5 of the CONSORT 2010 Statement. When a clinical trial protocol is being reported, the TIDieR checklist should be used in conjunction with the SPIRIT statement as an extension of Item 11 of the SPIRIT 2013 Statement (see www.spirit-statement.org). For alternate study designs, TIDieR can be used in conjunction with the appropriate checklist for that study design (see www.equator-network.org).
1. Brief name

The Svendborg project is a real-world programme implementing triple the amount of physical education in pre-school to sixth grade in six of nineteen primary schools in the municipality of Svendborg, Denmark.

Please also see abstract and section ‘2.1 programme description’ in the manuscript

†: information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study. Currently undergoing review in Evaluation and programme planning

2. Why

SP has been developed, facilitated and sustained by the municipality of Svendborg, Denmark. The main focus of the programme was for schools to both improving the quality of physical education (PE) and implement tripling the amount of PE in public schools.

Please also see section ‘2.1 Programme description’ in the manuscript.

†: information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study. Currently undergoing review in Evaluation and programme planning

3. What (materials)

**The professional development course:** The physical education teachers participated in a professional development course based on an Age-Related Training concept (ATC). ATC is developed by Team Denmark (the Danish Elite Sport Foundation) who had published a description of ATC that were handed out to participants (in some cases an electronic version) (Bach & Eiberg, 2010; Pryce, Willeberg, Falkenstoft, & Meyhoff, 2005). The Age-Related Training concept stresses the importance of training children in a biologically relevant manner to accord with their physical and physiological maturity. Moreover, the course also had a focus on how to arrange outdoor physical education, which was deemed a practical necessity in coping with the extensive pressure on facilities when implementing triple the amount of PE.

Please also see section ‘2.1 Programme description’ in the manuscript.

† : information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study. Currently undergoing review in Evaluation and programme planning
4. What (procedures)

The additional PE: Schools were to implement triple the amount of weekly PE (4.5 hours versus the former 1.5). Schools were free to organize the PE as they pleased, as long as the children in question had PE minimum three days a week. The added amount of PE was not to replace other lessons or scheduled activities but resulted in longer school-days.

Collaboration: Programme managers included teacher representatives in the development of the programme. The overall idea was to diminish a top-down approach and tailor the programme to the school context. Additionally, all schools assigned a programme promoter. Either PE teachers or school heads acted as promoter, in some cases, school heads and a PE teacher chose to act as programme promoter simultaneously. Programme promoters participated in collaboration meetings with the programme managers and the promoters from the other schools. These collaboration meetings helped the flow of information from schools to programme managers and vice versa.

The professional development course: PE teachers also had to participate in a professional development course to uphold the general quality of the additional PE lessons. The course was based on ATC and partially focused on how to arrange outdoor PE, as this was deemed a practical necessity in coping with the extensive pressure on facilities when implementing triple the amount of PE lessons. The course was ultimately to help teachers feel qualified and to provide input on how to handle the additional levels of PE. In relation, all schools arranged some of the PE courses as outdoor PE despite season or weather conditions. However shortly after the initiation of the programme a pilot-project was established to develop the course.

Research: School heads and teachers found the attachment of research motivating as they got documentation on whether the programme and their PE lessons were effective. Thus, although the research were not meant as part of the intervention, its connection to the Svendborgproject had influence and will be described in this appendix. The research-study commenced in 2008, including children from preschool (age 5) till grade 4 (age 10). Children who reported any sort of musculoskeletal problems via a parental automated text message questionnaire were monitored individually by health care personnel.

Please also see section ‘2.1 Programme description’ and ‘3.1 Adoption’ in the manuscript.
5. Who provided

The additional PE: PE teachers delivered the additional PE by themselves. At all schools, pedagogic personnel aided the PE teachers in some of the PE lessons.

Collaboration: Programme managers coordinated and inviting programme promoters from the six participating schools to the collaboration meetings.

The professional development course: The professional development course was developed through a collaboration between the municipality of Svendborg, University College Lillebaelt (the institution educating teachers) and Team Denmark (the Danish Elite Sport Foundation). The educators of the professional development courses were mainly educators from University College Lillebaelt.

Research: The research activities was led by a senior researcher, who was responsible for the employment and supervision of a number of researchers.

†: information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: *Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study.* Currently undergoing review in *Evaluation and programme planning*

6. How

The additional PE: PE teachers were to plan the additional PE lessons themselves. Pedagogic personnel that aided the PE teachers in some of the PE lessons were also menat to participate in the professional development course.

Collaboration: Collaboration meetings between programme promoters and programme managers were face-to-face meeting. The meetings were coordinated by the programme managers and were organized every third month.

The professional development course: The pilot-project ran from late-2008 to mid-2009 and contained 40 hours (divided across four modules). PE teachers (mainly the ones chosen as programme promoters) and pedagogic personnel across all schools in the programme participated. Through the pilot-project possible theory and exercises were tried out and participants were given group assignments to reflection on how the programme could be implemented on their school. In mid-2009 the professional development course was completed and available for all PE teachers and pedagogic personnel that had not already participated in the pilot-project. The professional development course consisted of different practical themes like how to teach ATC outdoor or in relation to ball games. School heads were the ones deciding when the teachers could attend the course.

Research: One of the programme managers were also assigned to be the gatekeeper between researchers and the schools. This was done to ensure that the visits from the researchers would run smoothly and coordinate the information that the schools received.

†: information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study. Currently undergoing review in Evaluation and programme planning
7. Where

The additional PE: The additional PE were mainly delivered at the individual school. Due to pressures on the local facilities outdoor activities and excursions to nearby nature were planned (woods, lakes, seaside etc.). Some schools visited local sports clubs (eg. basket, gymnastics, kayak) once or twice a year.

Collaboration: Collaboration meetings were held at the workplace of the programme managers in Svendborg municipality.

The professional development course: The professional development course for PE teachers were held at either one of the local schools that were part of the programme or University College Lillebaelt (located in the municipality of Svendborg).

Research: Most of the measures were made on the schools. For a few of measurements (like DEXA) children were driven to Odense (about 50 km.)

8. When and how much

The additional PE: The additional PE were implemented in mid-2008 and all schools still have 4.5 hours of weekly PE (red. spring 2018)

Collaboration: The collaboration meetings were held every third month.

The professional development course: The professional development course consisted of four-modules divided over eight months. The courses were available from mid-2009. The course was held was placed after the teachers normal working hours.

Research: All children were surveyed in 2008 (baseline) with questionnaires, physical examinations and physical testing. Some tests were performed regularly, others only once or a few times. In the first three years of the study some procedures were repeated twice yearly. In addition, all children were followed once a week with a parental automated text message (SMS-Track) questionnaire.

For a general overview of the timeline of the programme see figure 1

† : information is also described in our article:


9. Tailoring

The schools who chose to be part of the Svendborg project were also asked to join a working group to adjusted initial ideas and suggestions on programme content into a plan best suited to the schools of the municipality. The content suggested was initially outlined by Team Denmark and the programme managers. Another aim of this process was to establish core programme elements that had to be implemented at all participating schools. However, the working group was not limited by the content but could develop additional aspects. Furthermore, programme managers acknowledged schools as autonomous partners and assisted them in adjusting the concept to their specific institutional context. Acknowledging autonomy encouraged the schools to find their particular way of implementing core programme elements and, in the process, tailoring them to their individual conditions.

Although schools were encouraged to adapt the programme to their specific school, the schools were also required to implement specified, obligatory components (three times more PE, PE teachers participating in the course and having a programme promoter) to be part of SP.

†: information is also described in our article: Nielsen JV, Klakk H, Bugge A, Andreasen ML and Skovgaard T: Implementation of triple the time spent on physical education in pre-school to 6th grade: a qualitative study. Currently undergoing review in Evaluation and programme planning
10. Modifications

The professional development course: In 2016 the professional development course change from having four modules across eight moths to having 6 modules across eight months. Also, the courses was placed during teachers worktime and preparation time.

For additional adaptations made please see section ‘3.3.5 Programme adaptation’ in the manuscript.

†: information is also described in our article:


11. How well (planned)

Please see section ‘3.3 Implementation’ as well as table 3 in the manuscript.

12. How well (actual)

Please see section ‘3.4 Maintenance’ as well as table 4 in the manuscript.
Appendix B
This is an example of the interview-guide used in one of the group-interviews with programme managers in the Svendborgproject. The full interview-guide as well as interview-guides for school heads, will be sent on request by contacting the first author.

Introduction to the interview

Introduction:
In general, we conduct the interview because we are interested in learning more about the history of the Svendborgproject. We are aware that the Svendborgproject was born and raised in the municipality and it is especially the municipal and your perspective as managers that we would like to have a better insight into. The interview will initially and mainly address the planning and structuring of the Svendborg project. Below we will also ask what consideration was given to how the plan should be implemented and the actual implementation of the project. In the end, we will talk about the process after the project was started and how it has developed and been maintained over time.
We hope that at a later date in the process you will want to talk to us if we find interesting topics that we will follow up or if we do not reach all our questions today.
The purpose of the Svendborgproject (Why)

What led to the initiation of the Svendborgproject?
- Did you observe a need for the project?
- How did the idea originate?
- What enabled the project?

Who were you aiming the SvenborgProject at?
- Who were to benefit of it?
- Should the students achieve something?
- Specific student groups or grades?
- Should the parents achieve anything?
- Specific parent groups or classes?
- Should the schools achieve anything?
- Specific groups; managers or teachers

Establishing the Svendborgproject (REACH)

How were you planning on achieving the purpose of the Svendborgproject?
- On what background did you expect the elements to meet the purpose?
- Were there any elements that you considered as more important than others in terms of accomplishing the purpose of the Svendborgproject?

How were schools and teachers recruited?
- Were all schools informed and invited to attend?
- How were the schools informed about the project (mail, meeting, telephone)?
- What information did the schools receive before choosing to participate?

How many schools did you ultimately want to recruit?
- Did you experience any restrictions regarding the recruitment of schools?
- What considerations did you have regarding the schools' involvement and capacity?

How many teachers did you ultimately want to recruit?
- Did you experience limitations in relation to the recruitment of teachers?
- What considerations did you have regarding the teachers' involvement?
Initiation of the Svendborgproject (Adoption)

How did you plan to initiate the Svendborgproject?

- What role did the school leaders play?
- Did you experience that the school leaders were equipped for the task?
- What role did the teachers have?
- Did you find that the teachers were equipped for the task?

Who did you think had the main responsibility for the initial implementation?

- What was your role in the initial implementation process?
- Did you take special initiatives to ensure implementation?
- What role did the school promoters have?
- Has the responsibility mainly been with the municipality, the school management, school promoters or the teachers?

How did you experience the school’s response to the Svendborgproject?

- How did you feel that interested schools responded?
- How did you experience that non-interested schools responded?
- How did school response affect the implementation process?

How did you plan to follow the implementation process?

- How did you follow up on the individual school process?
- What methods did you use (meetings, oral feedback, reports, questionnaires, white papers etc.)
- What was the idea behind the schools developing a individual strategy report on how they operated the Svendborgproject (for documentation of implementation)?
- Did you expect the programme to be adjusted during or after implementation?

Implementation of the Svendborgproject (Implementation fidelity)

Did you set goals for when implementation could be accepted?

- Did you set a quality-score or a set of minimum requirements for the implementation?
- Did you set a criterion regarding teachers’ participation in the professional development course?
- Did you set a criterion regarding the percentage of physical education lessons the students were receiving?
- Did you set a criterion regarding the use of the age-related training concept?
- Did you set a criterion regarding the level of intensity during physical education lessons?
- Did you set any other criterions?
The adjustment of the Svendborgproject (Adaption)
To what extent has the project changed since it was initiated in 2008?

- Has there been a change in the definition of the Svendborgproject?
  - Why?
- Have there been any changes in the vision the Svendborgproject?
  - Why?
- Have changes occurred in the requirements of being part of the Svendborgproject?
  - Why?
- What was the basis for the revision of the concept as of 2012?

What has contributed to adaption of the Svendborgproject?

- What circumstances have made these changes possible?
- What restrictions have caused changes in the programme?
- What role has the research played?
- What role have the schools played?
- What role has politicians played?

Maintenance of the Svendborgproject (Maintenance)
What did you think was the most important thing about the project?

- What is a story you tell others about the project?

Have there been any particular challenges or resistance along the way?

- Can you give an example of this?
- How did these challenges affect the programme?
- How have the challenges affected your work with the programme?

Are you aware of any threats that could affect the survival of the Svendborgproject?

- Can you give an example of these threats?
- How are you dealing with these threats?
Appendix C

This is an example of the questionnaire used at the physical educational teachers in the Svendborgproject. The full questionnaire will be sent on request by contacting the first author.
Welcome to a questionnaire about the implementation of the Svendborg project.

Initially we ask on factors influencing your school as part of the Svendborg project and being a physical education teacher at a sports school having 4.5 hours of physical education every week from pre-school to sixth grade.

We hope you can find the time to answer out the questionnaire. In this way, you help us become more aware of how you work with the Svendborg project in your physical education lessons at your school.

The questionnaire takes approx. 12 minutes to complete.

If you want to correct your previous answers along the way, navigate back and forth in the questionnaire by clicking "Previous" and "Next" at the bottom of the screen (not on the arrow keys in Explorer or similar browser).

Unfortunately, it is NOT possible to close the questionnaire without having to start over again.

To end the answer, touch "Finish" on the last page.

Thanks for your time.
General information

In the following we ask for general information about your profession and position.

1) Do you take part of the physical education at your school?
   (1) ☐ Yes
   (2) ☐ No
   (3) ☐ Do not know

2) Have you ever taken part of physical education lessons at your school in the period 2008-2015?
   (1) ☐ Yes
   (2) ☐ No
   (3) ☐ Do not know

3) At what school are you currently employed?
   (1) ☐ Issø-skolen (Kirkeby)
   (2) ☐ Issø-skolen (Stenstrup)
   (3) ☐ Nymarkskolen
   (4) ☐ Rantzausminde
   (5) ☐ Skårupskole
   (6) ☐ Stokkebækskolen (Gudme)
   (7) ☐ Stokkebækskolen (Gudbjerg)
   (8) ☐ Stokkebækskolen (Hesselager)
   (9) ☐ Thurøskolen
   (10) ☐ Tvedskole
   (11) ☐ Tåsingeskolen (Lundby)
   (12) ☐ Tåsingeskolen (Sundhøj)
   (13) ☐ Vestermarkskolen
4) What school year did you get employed at your current school?

(1) ☐ Before 2008/2009
(2) ☐ 2008/2009
(3) ☐ 2009/2010
(4) ☐ 2010/2011
(5) ☐ 2011/2012
(6) ☐ 2012/2013
(7) ☐ 2013/2014
(8) ☐ 2014/2015
(9) ☐ 2015/2016
(10) ☐ Do not know
**Being part of the Svendborgproject**

In the following we ask about you being on a school that is part of the Svendborgproject

21) **To what extend do you agree on the following statements**

<table>
<thead>
<tr>
<th>Statement</th>
<th>agree</th>
<th>partially agree</th>
<th>partially disagree</th>
<th>disagree</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am informed of my duties as a physical education teacher</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>I am professionally dressed to take care of the physical education lessons</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>I know what is expected of me as a physical education teacher</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>My work as a PE teacher is often threatened by other tasks</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>I commit to the school being part of the Svendborgproject</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>

22) **Here you are welcome to elaborate or explain your answers of the questions above**

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
23) Try to remember back in 2011, just before the merging of the schools in Svendborg Municipality – to what extend do you agree on the following statements

<table>
<thead>
<tr>
<th></th>
<th>agree</th>
<th>partially agree</th>
<th>partially disagree</th>
<th>disagree</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-school to sixth grade had 4.5 hours of weekly physical</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>education lessons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-school to sixth grade had physical education at least 3 days</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>a week</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I had a focus on planning</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>physical education lessons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outdoor</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I felt a good collaboration</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>with the school management</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>regarding the school being part of the Svendborgproject</td>
<td></td>
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</tbody>
</table>
24) Here you are welcome to elaborate or explain your answers of the questions above

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Physical education lessons

In the following we ask to the content of your physical education lesson

25) At what grade do you handle physical education? (you are allowed to choose more than one answer)

(1) ☐ Pre-school
(2) ☐ 1st grade
(3) ☐ 2nd grade
(4) ☐ 3rd grade
(5) ☐ 4th grade
(6) ☐ 5th grade
(7) ☐ 6th grade
(8) ☐ Do not know
26) Please consider the following statements

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

The students in the pre-school have at least 20 minutes of high intensity in your physical education lessons

During a normal week, physical education lessons for pre-school students are spread over a minimum of 3 days

During a normal week, students in pre-school have at least 4.5 hours of physical education

27) Please consider the following statements

<table>
<thead>
<tr>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tbody>
</table>

The students in the 1st grade have at least 20 minutes of high intensity in your physical education lessons

During a normal week, physical education lessons for
1st grade students are spread over a minimum of 3 days.

During a normal week, students in 1st grade have at least 4.5 hours of physical education.

28) Please consider the following statements

The students in the 2nd grade have at least 20 minutes of high intensity in your physical education lessons.

During a normal week, physical education lessons for 2nd grade students are spread over a minimum of 3 days.

During a normal week, students in 2nd grade have at least 4.5 hours of physical education.
29) Please consider the following statements

<table>
<thead>
<tr>
<th></th>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students in the 3rd grade have at least 20 minutes of high intensity in your physical education lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During a normal week, physical education lessons for 3rd grade students are spread over a minimum of 3 days</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During a normal week, students in 3rd grade have at least 4.5 hours of physical education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
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<td>(2)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(3)</td>
<td></td>
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</tbody>
</table>

30) Please consider the following statements

<table>
<thead>
<tr>
<th></th>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students in the 4th grade have at least 20 minutes of high intensity in your physical education lessons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
During a normal week, physical education lessons for 4th grade students are spread over a minimum of 3 days. 

During a normal week, students in 4th grade have at least 4.5 hours of physical education.

<table>
<thead>
<tr>
<th></th>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
<td>31) Please consider the following statements</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

The students in the 5th grade have at least 20 minutes of high intensity in your physical education lessons.

During a normal week, physical education lessons for 5th grade students are spread over a minimum of 3 days.

During a normal week, students in 5th grade have at least 4.5 hours of physical education.

<table>
<thead>
<tr>
<th></th>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
<td>31) Please consider the following statements</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>
32) Please consider the following statements

<table>
<thead>
<tr>
<th>Ja</th>
<th>Nej</th>
<th>Ved ikke</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The students in the 6th grade

have at least 20 minutes of

high intensity in your physical education lessons

During a normal week,

physical education lessons for

6th grade students are spread over a minimum of 3 days

During a normal week,

students in 6th grade have at

least 4.5 hours of physical education

33) Here you are welcome to elaborate or explain your answers of the questions above

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
The professional development course

In the following we ask for your use of the professional development course in your physical education lessons

34) Have you attended the professional development course?

(1) Yes
(2) No
(3) Do not know

35) What school year did you attend the professional development course?

(1) 2008/2009
(2) 2009/2010
(3) 2010/2011
(4) 2011/2012
(5) 2012/2013
(6) 2013/2014
(7) 2014/2015
(8) 2015/2016
(9) Do not know
36) To what extend do you agree on the following statements

<table>
<thead>
<tr>
<th>Agree</th>
<th>Partially Agree</th>
<th>Partially Disagree</th>
<th>Disagree</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

I was looking forward to attending the professional development course

The professional development course was useful in relation to the planning of my physical education lessons

The professional development course ensured that I could handle the extra amount of physical education lessons

The professional development course was difficult to transfer to my physical education lessons

37) Here you are welcome to elaborate or explain your answers of the questions above

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
37) To what extend do you agree on the following statements

I plan a minimum of 3 hours of my physical education lessons following the principles of Age-related Training

I plan a minimum of 3 hours of my physical education lessons following the principles of Age-related Training

40) To what extend do you agree on the following statements

I plan a minimum of 3 hours of my physical education lessons following the principles of Age-related Training

I plan a minimum of 3 hours of my physical education lessons following the principles of Age-related Training
<table>
<thead>
<tr>
<th>agree</th>
<th>partially agree</th>
<th>partially disagree</th>
<th>disagree</th>
<th>Do not know</th>
</tr>
</thead>
</table>

It is difficult for me to apply the elements from Age-related Training in my physical education lessons

I am professionally qualified to apply Age-related Training in my physical education lessons

Applying Age-related Training has become an integral part of my physical education lessons

The use of Age-related Training in physical education lessons is often threatened by other tasks

41) Here you are welcome to elaborate or explain your answers of the questions above

________________________________________
________________________________________
________________________________________
________________________________________
Appendix D
This appendix contains examples of selected citations from the qualitative material. Citations are presented across the adoption, implementation and maintenance dimension of the RE-AIM framework, as these were the dimensions the qualitative data were informing on (see table 2). All citations have been identified through the coding process (see section “Qualitative data analysis”).

<table>
<thead>
<tr>
<th>RE-AIM dimension</th>
<th>Programme manager interviews</th>
<th>School head interviews</th>
<th>Document analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption: The commitment of participating schools regarding their decision to install the programme and factors influencing that decision.</td>
<td>It [satisfied physical education teachers] was like a natural part of the programme, I think ... and they got the professional development course ... and the teachers became happier, but their education [Physical education] became accepted as a big part of the school day… [Programme manager 1] And it [the professional development course] is also a quality boost for the physical education teachers, and hopefully they think it is more fun to arrange physical education… but also… what they repeatedly tell us is that it has been invaluable in that they really feel that they are highly equipped to handle it [the extra amount of physical education]! [Programme manager 2]</td>
<td>Then came the entire research programme, which was also exciting for the teachers. They were eager for their students to be measured against their progress and have shown so on … it felt like a different… a special school day, so … I think it was a boost, there was real excitement… [School head 2]</td>
<td>Note: Collaboration minutes were also part of the document data and were part of the coding process (see section “Qualitative data analysis”) in the manuscript. However, due to collaboration minutes being short phrased or in note form, no citations were drawn.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The school wishes not only to define itself as a school with additional physical education, but as a many-sided school, where our physical activity focus is to be strengthened through the Svendborg project. We wish to develop a culture of physical activity environments focusing on learning, well-being, movement and healthy living. [School strategy report]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>It is encouraging that we as part of the programme are able to be more thorough with the individual sports and we also have the opportunity to cover more and different sports [School strategy report]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The school has always had a strong physical activity profile. We have committed physical education teachers and good facilities for sports activities. We have made a clear</td>
<td></td>
</tr>
</tbody>
</table>
… and there was not much enthusiasm in the beginning… eventually it came… but it was a required condition that we had those more or less frustrating talks about what this programme implied and what it should contain… because we did not define the programme in advance… we were supposed to develop it together [with the teachers]… You have to be patient in that process… because you are developing a mutual basis and a shared language to speak from… [Programme manager 3]

I also believe… the high degree of information and the dialogue [between schools and programme managers] that we had in '08 … it really meant a lot, also regarding the information from the researchers and the dialogue with the schools and you [one of the other informants that acted as main programme managers in 08] …[Programme manager 3]

… and the news value! We may never get the same [news value] ever again, but you might get the same high engagement … And still, no one had real ownership of the programme because it was new to everyone [schools, teachers and programme mangers] … So, maybe it was just luck, you might say that it was just the right moment in time?

I think that the uniqueness in this was the involvement of physical education teachers in the beginning … I think it's like a textbook example of how you need to involve the parties involved in everyday life when doing something that promotes children's learning and well-being … And they did [the programme mangers] … [School head 3]

It was almost a legendary workgroup [teacher representatives, school heads and programme mangers developing the programme], and I think when everyone who has been in that workgroup meets today, they are like "Remember when we did that...?", "Do you remember...?" … I even dare to say that there was a euphoria in the development phase “could this programme really become something?” … [School head 4]

… Sometimes I think “Well, why did it happen?” Well, it did because they included all of them [teachers and school heads] and invited them [teachers and school heads] to work with it. [School head 4]

strategy regarding our physical education i.e. a guide to teachers, students and parents, so everyone knows the common guidelines regarding physical education at our School. [School strategy report]
| **Implementation:** The extent to which the schools implemented the various elements of the programme as intended and how the programme has been adapted over time | We were to evaluate the concept… and we actually got feedback from some of the promoters at the schools suggesting that the programme might have gotten a little diluted over time… because in that first concept they [the requirements] were described rather vaguely … So, they actually asked us to be more detailed as regards the requirements of being part of the programme… and in this process of evaluating what had been good and bad… we also adopted the research results… and in the process of the evaluation we found the new concept… | Well we realized [after the first year] that it could be implemented… It can be realized in relation to the timetables, it can be delivered by the teachers and it can hold from an economical perspective… From the beginning, we have decided that this will not cost an extra penny in any props… So, there are no extra props and no extra balls or any of such things… So, we had to think outside the box, how can we get more movement, how can we do this… | Three years have passed since the start of the programme, and we should therefore look at how it has met with the requirements in relation to the concept. 1) Do schools comply with the requirement that physical education is organized so that the 4.5 hours are distributed in minimum 3 days? 2) Is the physical education adequately adapted to the age-related training concept? 3) Is there a need for brush-up course for the teachers and pedagogues? The questions are discussed as schools report back. All schools have divided the hours for at least 3 days a week. School 3 reports that the new teachers and pedagogues should attend ATC. The other teachers and |
Interviewer: Okay, and those revisions you made to the concept, what were the reason?
Programme manager 3: Research results among others...
Programme manager 2: But also that the schools actually demanded that the concept was a little more clear and direct... so they had less... more frame and less freedom...
Programme managers 3: We had a very very soft description in the first concept, among other things, we had written that ATC should only be considered, but there was a request from the schools that ATC should be obligatory to use and that's why we actually succeeded to require that four hours of the physical education lessons must be based on ATC with a red puck and not a white puck because it would get lost in the snow... And we also got some small improvements on outdoor areas... the whole outdoor facility area has been something where improvements have been made... mainly because of the need for more space...
[School head 4]

Pedagogues use it. School 6 reports that it is important everyone attends the professional development course. Brush-up courses for every one else could be fine. Important with skilled teachers.
[Collaboration minute]

In relation to the 2010 budget agreement, funds were allocated to the schools for a continuation of the Svendborg project. The funds deposited cover a continuation of the fully-developed project, including triple the amount of physical education for all grades from preschool to sixth on the six schools.
[Collaboration minute]

Teachers have gained new knowledge and been energized. It [the professional development course] have forced teachers to reflect on the content of their physical education lessons in a new way... The physical education lessons have changed significantly - the teachers have brought a lot of new knowledge to school...
[Internal evaluation]

The spring and summer semesters were arranged so that the children had "outside days" where Physical education was planned in relation to the nature-technology lessons. With the low grades we went on excursion to the forest or
beach and with the higher grades we biked in the local area.

It's a huge puzzle to plan the additional physical education lessons. The school have mainly used the morning modules (8 am to 10 am) or from 10 am to 12 am as it has to be matched to the pedagogues working hours. All grades part of the in the programme have physical education four days a week. At least two physical education lessons is placed outdoor all year regardless of the weather.

It is informed that the current meeting structure has been evaluated. This has resulted in all existing networks stopping [including the collaboration network in the Svendborgproject] and new ones will occur based on the "rosin bread" model - Ie local networks are established as needed. If existing networks are to resurface, they should be facilitated through bottom-up initiative. It is important that the new networks still have management support, the agenda and the minutes.

### Maintenance:

**The extent to which the schools maintained programme implementation and whether the programme has become an integrated part of their daily practice**

These days we are writing the budget for the coming year… And some new programmes, like more physical activity for children from zero to six years, but also our talent development programme… it is being stressed that the programmes are related to the Svendborgproject... So, the Svendborgproject has actually become something that can help start other programmes... give some goodwill at political level when the new programme is related to it [the Svendborgproject]…

Of course, there has been some opposition along the way, from some of the director areas and so on... but when

When the programme has existed for six, seven, eight years, it becomes part of everyday life… I do not believe that anyone thinks about it anymore… thinking ‘We are in the Svendborgproject’… It is incorporated into the school’s way of doing school and planning… There is no question about that...

The way we execute the concept on our school is the same as what we started… It has not changed although, the last couple of years, we have discussed whether we should look at how we do it, if we are still think it is the way to do it… if we should
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<td>The school reform came [New Danish reform introduced in 2014 that among other things required schools to implement 45 minutes of daily physical activity] it was actually not even up for discussion that we should maintain the Svendborg project. Everyone just wanted to continue… It is still voluntary whether the schools want to be part of the programme… everyone just are… and they do not only have those 45 minutes of movement, they have the six lessons or 4.5 hours of physical education a week… We're often asked how we did this but it's just a choice we have made that this is how we do it… [Programme manager 3]</td>
<td>How is the process at the schools? Is there any need for further professional development? Are there any schools that have some special challenges? Question: “20 minutes of high intensity” can be difficult to define and it is also hard to assess if the students have high intensity.</td>
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<td>Continue or change our way of executing the concept… But every year we just confirming that this is the way we want to do it… [School head 3]</td>
<td>Knowledge and discussion of issues at the participating schools. The coming school year will continue to bring challenges and it is agreed that the collaboration network will continue the next year. A coordinating group will be set up, which is responsible for scheduling themes and timeframes for the meetings in the next school year. [Collaboration minute]</td>
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<td>The programme is an integrated part of the school day in Svendborg, so it is not something which we are still developing or question… I cannot say if they discuss at other schools, I do not know… but it has not been mentioned at the collaboration meetings, that something that was problematic, or you should rethink the programme again… the programme is an integrated part... There might be some challenges in terms of getting teachers to attend the professional development course because of new physical education teachers being hired all the time… but I that there were some follow-up courses for new teachers last year… [School head 4]</td>
<td>The last part of the professional development course is in June. There will be follow-up courses for new teachers and pedagogues - remember registration. Good feedback has been given on current courses. It is important in terms of the coming courses to get feedback to optimize and customize the courses. There is still a wish that future courses will be offered in the future, and with even more focus on outdoor activities. [School strategy report]</td>
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