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Published in:
Evaluation and Program Planning

DOI:
10.1016/j.evalprogplan.2019.101674

Publication date:
2019

Document version:
Accepted manuscript

Document license:
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Citation for polished version (APA):
Nielsen, J. V., Bredahl, T. V. G., Klakk, H., Bugge, A., & Skovgaard, T. (2019). Implementation of a successful long-term school based physical education intervention: exploring provider and programme characteristics. *Evaluation and Program Planning*, 76, [101674]. <https://doi.org/10.1016/j.evalprogplan.2019.101674>

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Implementation of a successful long-term school based physical education intervention: exploring provider and programme characteristics

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Keywords: *Health Promotion; School health; Implementation; Qualitative research approaches; CHAMPS-study DK*

Abstract

There is an ongoing need for research focusing on how to implement physical activity programmes into a school setting. This includes documentation of the extent to which programmes are compatible with the basic views of providers and their local practices. The present study explores the Svendborgproject – a programme tripling the amount of physical education in six public schools, sustaining it for 10-years and documenting a decreased incidence of overweight, obesity and cardiovascular risk factors. The aim was to analyse provider and programme characteristics of the Svendborgproject to gain insights into providers motives for adopting, implementing, and maintaining the programme. Six school heads and six teachers were interviewed to explore how they perceived programme compatibility to their school's practice and their own role as providers. Both teachers and school heads found the additional lessons a valuable asset that fitted existing school values and priorities. Additionally, physical education teachers participated in a course providing new perspectives and teaching methods that aided the implementation of the programme. Lastly, school heads stressed that implementation fidelity was heavily dependent on the dedication of physical education teachers and on having simple programme requirements that made it clear what could be expected of the programme.

1. Introduction

School-based physical activity (PA) programmes have the potential to improve children's physical and mental health, as well as their academic achievements (Bangsbo, Krstrup, Duda, Hillman, et al., 2016; Dobbins, Husson, DeCorby, & LaRocca, 2013; Langford, Bonell, Jones, Pouliou, et al., 2014; Waters, de Silva-Sanigorski, Hall, Brown, et al., 2011). However, the success of school-based PA programmes is heavily dependent on effective

implementation. Thus, there is an ongoing need for research focusing on how to implement and disseminate promising programmes in everyday school practice (Durlak & DuPre, 2008; Naylor, Nettlefold, Race, Hoy, et al., 2015; Wandersman, Duffy, Flaspohler, Noonan, et al., 2008).

Studies have shown that providers of school-based programmes (school heads and teachers) consider the school as an optimal setting for PA initiatives (Clarke, Fletcher, Lancashire, Pallan, et al., 2013; Griffin, Clarke, Lancashire, Pallan, et al., 2015). However, providers are also aware of the many barriers to implementing such programmes (e.g. lack of time, of resources, of parent support and of management coordination) (Clarke, et al., 2013; Griffin, et al., 2015). Teachers in particular can find the implementation of new PA programmes demanding, as they often challenge their professional identity and add to their work load (Ballet & Kelchtermans, 2009; Griffin, et al., 2015). This often leads teachers to perceive new programmes as being threatening to the maintenance of academic standards and to their relation to pupils (Ballet & Kelchtermans, 2009; Clarke, et al., 2013; Griffin, et al., 2015). School heads can be viewed as gatekeepers, deciding whether programmes should be introduced at their school, and their commitment and motivation has been highlighted as important for the successful implementation of school-based programmes (Forman, Olin, Hoagwood, Crowe, et al., 2008; Langille & Rodgers, 2010; van Nassau, Singh, Broekhuizen, van Mechelen, et al., 2016).

In their ecological framework, Durlak and Dupre describe five domains that affect the implementation process: the providers, the programme, the community, the support system and the organization (Durlak & DuPre, 2008). Both the provider and programme domain have also been mentioned by others as important aspects in the investigation of the implementation and dissemination of programmes (Greenhalgh, Robert, Macfarlane, Bate, et al., 2004; Maria

Ingemarson, Bodin, Rubenson, & Guldbrandsson, 2016; Rogers, 2003; Wandersman, et al., 2008). It has even been proposed that the providers '*are the programme*' (Fixsen, Blase, Naoom, & Wallace, 2009), and that the characteristics both of the providers adopting the practice and of the programme itself are associated with barriers and incentives affecting programme implementation and maintenance (Durlak & DuPre, 2008; Greenhalgh, et al., 2004; Maria Ingemarson, Bodin, Rubenson, & Guldbrandsson, 2016; Ogden & Fixsen, 2014; Rogers, 2003; Wandersman, et al., 2008). Analysing a programme's compatibility with the basic views, practices and local context of providers is, then, an important element in the evaluation of school-based programmes. The ecological framework addresses the provider domain as the characteristics of providers of a given programme in relation to their perceived need for and benefit of that programme. Additionally, emphasis is placed on the providers perceived ability to deliver the programme in a given context and on their skill proficiency. Programme characteristics relate to the programme's fit to the existing practice and priorities of a specified setting, whereas adaptability concerns a programme's ability to be modified to fit local needs. Programme and provider characteristics are described further in Table 1.

The present study explores the Svendborgproject (SP) - a programme proved to triple the amount of physical education (PE), documenting decreased incidence of overweight, obesity and cardiovascular risk factors (Klakk, Andersen, Heidemann, Moller, et al., 2014; Klakk, Chinapaw, Heidemann, Andersen, et al., 2013) and been sustained for 10-years (Nielsen, Skovgaard, Bredahl, Bugge, et al., 2018). Previous process evaluations studies of SP have established that the programme has been implemented and maintained with high fidelity (Nielsen, Skovgaard, et al., 2018) as well as programme managers' perspective on influential implementation factors (Nielsen, Klakk, Bugge, Andreasen, et al., 2018). However, in depth provider perspective is still needed in order to support the implementation of future school-

based PA interventions. Therefore, the aim of this study is to analyse the provider and programme characteristics of SP to gain valuable insights into school heads and PE teacher's motives for adopting, implementing, and maintaining the programme.

Domain	Description
Provider characteristics	
Perceived need for programme	Extent to which the proposed programme was relevant to local needs
Perceived benefits of programme	Extent to which the programme has achieved relevant impact at the local level
Perceived ability to do what is expected	Extent to which providers feel they were able to deliver as expected in the programme setup
Perceived skill proficiency	Extend to which providers possessed the skills necessary for implementation
Characteristics of the programme	
Perceived programme compatibility	Extent to which the programme fits school priorities and values.
Perceived programme adaptability	Extent to which the proposed programme can be modified to fit provider preferences, school practices and cultural norms

Table 1: Description of provider and programme characteristics based on Durlak and DuPre (Durlak & DuPre, 2008)

2. Method

2.1 The Svendborgproject

SP has been successfully implemented and sustained by the Danish municipality of Svendborg over a period of ten years (2008-2018). The incentive for establishing SP came from the municipal authority's decision to promote additional PE in its primary schools. In Denmark, public schools are funded from taxes and organized by the local authorities in the municipality.

Politicians in Svendborg municipality decided to allocate funds to co-finance the expenses of running the programme for all enrolled schools for three years.

Six schools initially chose to become part of SP and helped co-develop the programme before initiation. Of the six schools that initiated the programme in 2008, four were located in rural areas and two in urban-suburban areas. The programme focused on improving the quality of PE and tripling the number of weekly PE lessons in state schools in the municipality. The core elements of the programme, which all schools had to implement, involved the school-children receiving a minimum of 4.5 hours of PE every week spread over at least three school days. When SP was initiated the norm in Denmark was 1.5 hours of PE every week. Additionally, the added amount of PE needed to be implemented on top of the existing schedule, which resulted in additional time in school, so that lessons in other subjects were not replaced. To support the aims of SP, the teachers involved attended a professional development course based on an Age-related Training Concept (ATC). ATC focused on children's physical, physiological, mental, and social development in order to enhance and optimize motor skills (Bach & Eiberg, 2010; Pryce, Willeberg, Falkentoft, & Meyhoff, 2005). Another aim of requiring PE teachers to participate in the professional development course was to help teachers feel qualified to handle and uphold the general quality of the added amount of PE. In addition, 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 such an extensive increase of PE. The professional development course consisted of four-modules divided over eight months. More information on the professional development course can be found in Appendix A. Furthermore, each school appointed a programme promoter to act as a local ambassador and participate in quarterly collaboration meetings between participating schools and programme managers.

When the programme was initially established, researchers were allowed to follow the development, leading to a substantial programme of research: The Childhood Health, Activity, and Motor Performance School Study Denmark (CHAMPS-study DK) (Wedderkopp, Jespersen, Franz, Klakk, et al., 2012). This programme of research demonstrated that SP was effective in increasing physical activity and decreasing sedentary behaviour during school time, as well as decreasing the incidence of overweight, obesity and cardiovascular risk factors (Klakk, et al., 2014; Klakk, et al., 2013; Moller, Tarp, Kamelarczyk, Brond, et al., 2014). Besides the programme's ability to prove effective in promoting child and adolescent health and show long-term sustainability over a period of nearly ten years, the Svendborgproject also expanded to all schools in the municipality of Svendborg in 2012. This was a choice-based expansion, meaning that every school again was asked and actively had to decide if they wanted to become part of the programme.

The present study is part of the CHAMPS-Study DK and uses Durlak and DuPre's description of provider and programme characteristics (Durlak & DuPre, 2008) (Table 1) to investigate how PE teachers and school heads perceive the characteristics of SP and themselves as providers. This in order to gain valuable insights into motives for programme adoption, implementation, and maintenance of school-based PA programmes.

2.2 Interviews

School heads and PE teachers are viewed as the main providers of SP. Interview participants were chosen through purposeful sampling (Kelly, 2010), which ensured key informants with sufficient knowledge of SP and programme activities across all the six participating schools.

2.3 School heads

A list of former and current school heads, deputy heads and heads of departments across the six original schools was created in collaboration with the municipal programme managers. School heads most likely to yield relevant and useful information due to their current or former engagement in 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. Seven school heads were invited to participate in a 45-minute semi-structured interview and six agreed. The one school head who declined argued that it was due to lack of time. Of the participants, five were male and one was female. Two of the participants had been involved in the programme since initiation in 2008 -one was positioned as school head while the other occupied a post as deputy head and neither had changed position or school since the start of the programme. The remaining four participants had been school head during the programme's initiation in 2008. Of these four, one had retired, two had moved to another school in Svendborg while the last one had moved to a school in another municipality. All six participants represented different schools, thus, perspectives from all the original schools were represented.

2.4 Teachers

A list of teachers who had acted as programme promoters across the six schools was created in order to identify potential respondents. Programme promoters were chosen for interview due to their in-depth understanding of the programme and broad insight of the implementation process at their individual school. To identify additional respondents relevant for interviewing, school heads were asked to identify PE teachers who had detailed knowledge of the programme. Finally, six PE teachers (one was a pedagogue who also taught PE and had attended the ATC course) across three of the participating schools were interviewed. All the teachers had been

part of the programme and affiliated with the school since initiation. Four of the respondents were former or current programme promoters. The last two respondents had been put forward by the school head as possessing detailed knowledge of the programme. Four of the participants were male and two were female. The teachers were interviewed in pairs, resulting in three semi-structured group-interviews being conducted. Semi-structured group interviews were chosen in order to gather the teachers' collective memory and constructions across the 10-year implementation process.

2.5 Conducting the interviews

Interview questions were framed in an open-ended manner within the context of the programme and lasted approximately 60-minutes. Interview-guide questions used to explore the programme provider and programme characteristics can be found in Table 2. The application of semi-structured interviews and open-ended questions ensured that large parts of the interview were driven by the respondents' experiences and allowed the interviewer to diverge from the interview guide to follow interesting elements that arose during the interview. All respondents received a letter of information before the interviews, explaining the purpose of the interview, and they all signed written informed consent. All interviews were audio-recorded and performed in private rooms at the workplace of the interviewees. The programme of research was approved by the Danish Research Ethics Committee (Project-ID: S-20080047 and S-20140105).

Domain	Description	Interview Question
Provider characteristics		
Perceived need for programme	Extent to which the proposed programme was relevant to local needs	<ul style="list-style-type: none"> - What was your initially attitude towards the programme? - Did you have any possible benefits in mind when the programme was initiated? - To what degree did you find the programme relevant? - To what degree did you fell committed to the programme?
Perceived benefits of programme	Extent to which the programme has achieve benefits desired at the local level	<ul style="list-style-type: none"> - Did the programme achieve the expected benefits? - How did your attitude towards the programme and its benefits change during the implementation process?
Perceived ability to do what is expected	Extent to which providers felt they were able to do what is expected	<ul style="list-style-type: none"> - Did you experience that you had the necessary time and resources needed to implement the programme?
Perceived skill proficiency	Possession of the skills necessary for implementation	<ul style="list-style-type: none"> - Did you feel professionally equipped to become part of the programme? - Did you possess the necessary tools to perform the implementation of the programme?
Characteristics of the programme		
Perceived programme compatibility	Extent to which the programme fits school priorities and values.	<ul style="list-style-type: none"> - How would you describe your involvement in the programme? - Which of the programme characteristics would you consider has had the most impact on your daily work? - Do you consider the programme as an integrated part of your everyday practice
Perceived programme adaptability	The extent to which the proposed programme can be modified to fit provider preferences, school practices and cultural norms	<ul style="list-style-type: none"> - Have you made any changes to the programme on your school? - Do you apply the programme in the same way as when you implemented initiated it? - Do you feel that you have had influence regarding how the programme should be implementation on your school?

Table 2: Sample of interview questions across the provider and programme characteristics

2.5 Analysis strategy

School head and teacher interviews were analysed using qualitative content analysis (Schreier, 2014). Ultimately this implies a systematic description of the empirical data through coding (Schreier, 2014). Initially, the interviews were transcribed verbatim and names were anonymized. Subsequently, the first author thoroughly familiarized himself with the data prior to coding the material. This familiarization was done by repeated listening and reading of the material while taking notes. Building a coding-frame is an essential part of the qualitative content analysis, thus, a frame was constructed to hold a set of categories and subcategories (Schreier, 2014). The coding-frame represented overall aspects of the material in relation to the programme and provider characteristics (Table 1). Then, the first author trial-coded a large portion the interviews according to the coding-frame. The results from the trial-coding were discussed among the first, second and last author in order to reach consensus on which information related to which of the programme and provider characteristics. The trial-coding was used to adjust and refine the coding frame. Subsequently, all data that had been used in the trial-coding were re-coded with the adjusted coding-frame together with the rest of the interview data. In the final step of the analysis the first author thoroughly read the coded material and selected main quotations relating to the provider and programme characteristics in order to prepare the findings for presentation.

3. Results

In the present study the programme and provider characteristics of SP have been analysed. In the following section, the results across each of these dimensions are presented. Examples of

the coding frame and examples of quotations across the provider and programme characteristics can be found in Appendix B.

3.1 Perceived need for the programme

When the programme was introduced, the municipality of Svendborg had just been merged with two of the smaller surrounding municipalities. School heads emphasise that they perceived the programme as something that had the potential to promote a community spirit in the school area and between teachers from the various schools in this new municipal constellation. In addition, both school heads and teachers point out that the programme was important since there was a need for activities that could promote healthy children and counteract the rising ‘inactivity epidemic’. Teachers and school heads across all schools also stressed that the programme fitted their individual and overall school values regarding the prioritizing of PE and PA, as they perceived movement as an educational tool that could be used to aid social cohesion and self-confidence in their pupils. A school head described:

Well, I believe that a child's first communication is through their body... so, it is very important that they know how interact with each other physically... if you are not able to kick a ball or are in the way all the time, then you are put on the bench and get marginalized even from an early age... I think it means the world that they learn how to use their bodies, and enjoy using them in play with others... the social development of children is increased, I am sure of it... [School 3 – head]

3.2 Perceived benefits of the programme

Both teachers and school heads referred to the research results, reporting that the pupils became healthier, as an important benefit of the programme. However, they also reported increased self-confidence, self-belief and general motor skills in the pupils as a perceived benefit. Teachers' interviews show that even though the focus on health outcomes was relevant and important, their main purpose is to educate.

In PE lessons there is some social education build into it... because, when you are playing a game or doing exercises, the pupils need to learn to be quiet when new instructions are given and so on... but especially in relation to the social aspect... when playing the game, they have to respect the rules of the game but also respect each other, otherwise the game will collapse... and now we have gotten the opportunity to focus even more on this because we have more PE lessons... [School 3 – Teacher]

Teachers emphasised that the additional PE also resulted in more time being available to fulfil the existing curriculum as well as introducing a variety of sports, ensuring that all pupils have the opportunity to master the needed skills. Teachers perceived that this aided the pupils in becoming masters of their own body. In relation, teachers and school heads concluded that the programme has been beneficial for pupils who felt insecure in relation to movement and sports. A teacher expressed:

I think those who benefit from this [the school being part of the programme] are the children who feel very insecure regarding movement, touching a ball or using the facilities in the gym... and by having to do it several times a week, they become so much more skilled, they are actually making progress from being at a very low skill level and are clearly getting better and more confident... I do not think that the children who are already good at sports are becoming significantly better... but those who are insecure benefit greatly from the school being part of the Svendborgproject [School 6 – Teacher]

3.3 Perceived ability to do what is expected

The collaboration between municipal programme managers' and schools has been an important factor aiding the implementation of SP. The quarterly collaboration meetings between programme managers' and schools were perceived as a constant reminder that the schools were part of the programme and of the requirements that they were expected to implement. School heads reported that this resulted in healthy reflection on the reasons why they chose to retain the programme. Furthermore, the collaboration meetings aided school heads in their decision-making through the sharing of experiences, knowledge and ideas in an open forum. To implement the programme, schools had to abide by a fairly simple set of requirements that were non-negotiable and established a framework in which schools could develop their own implementation strategies. School heads found this framework an important tool to act accordingly. A school head elaborated:

There is a need for external decision-making... decisions from someone not part of the individual school culture... Because it really has been an important aspect in this programme... if we were told to develop this kind of concept and we had to figure it out ourselves... then we would never have got this far... this programme is just unique because there is a framework, there is some external control that ensures that we, as a school, are able to say that this is how it is. Now how do we act on it [School 1 – head]

Both teachers and school heads stressed that backing from politicians, programme managers' and the school board was important for their ability to implement the programme. In particular, the political decision to financially support the programme and using the programme as part of the political strategy of the municipality, have helped management to argue for the relevance of prioritizing the programme.

The thing that helps me as a school head is the strong political dedication to the programme... When politicians in Svendborg municipality prioritized this, and said that they wanted to promote it in all schools in the whole municipality, that they would give a big sum of money to support the schools... they were talking a lot about the programme, they organised conferences and similar events... it helps make the programme happen as it also sweeps away resistance [School 6 – head]

School heads have been central actors in securing that core programme requirements were implemented at their schools. However, school heads stress that the general backing of school staff has significantly aided their ability to make the changes needed to fulfil programme requirements. The commitment of PE teachers and local school programme promoters were especially important as a driver to ensure progression and maintenance. Yet, teachers emphasise that school heads and teachers were interdependent, as school management had to make the decisions as programme promoters do not feel comfortable nor had the authority to lead their peers.

You need some PE teachers who find value in the programme... who are dedicated and can see its potential ... If I were to listen to physical education teachers each day saying 'it is awful that we have these six hours of PE - The kids are tired and we cannot make it work'... Well, that would be something else, but the PE teachers love it! The vast majority of the children are fond of PE ... But the teachers' involvement is the most important...

[School 4 – head]

3.4 Perceived skill proficiency

In order to implement the programme, PE teachers were to participate in a professional development course that would assist them with new skills to plan the additional PE. In general teachers were excited to participate in the course, as it presented new ideas, perspectives and inspiration for practical exercises that could be used in their PE lessons. Even teachers reporting

that they felt relatively competent to handle the implementation of the additional PE, still benefited from attending the course, both gaining new perspectives and knowledge. Teachers in general reported that they gained new knowledge, partially due to the introduction to the ATC, but also through collaboration and knowledge exchange between teachers from different schools:

I was collaborating and learning with my colleagues... colleagues from my school but also from other schools that were part of the programme... And you got the Age-related Training Concept! So the concept was introduced in a theoretical way and we tried it out in practice, too... It changed my way of thinking and gave some new perspectives on how to prioritize when planning my lessons... it was really good... it was a fantastic course... [School 1 – teacher]

The course was also meant to ensure that the PE teachers felt qualified to handle this additional amount of PE. Both school heads and teachers perceived the course as enhancing the skills of the teachers and enabling the high-quality implementation of the additional PE lessons.

3.5 Perceived programme compatibility

All teachers and school heads stressed that the non-elite focus of the programme was important as it fitted the existing values of the schools and the inclusion of all pupils regardless of their skill level. Also, both teachers and school heads stated that although their school prioritized PE and PA prior to the initiation of the programme, their connection to the programme boosted the

prioritization of PE and PA and anchored it as a part of the school's set of values and everyday structure:

*It [the Svendborgproject] has become grounded in our set of values... I would argue that if we suddenly no longer were part of the programme, some years would pass before... well I think it would be like "we are not a part of the programme anymore - no, but we are continuing this"... because it has become part of the way we think, it makes sense, it has become an embedded part of our school and of how to be a PE teacher at our school...
[School 1 – head]*

School head interviews revealed that the prioritization of PE initially received somewhat sceptical responses from non-PE teachers. There were different reasons for this. Prior to the programme, PE was often lumped with some of the smaller subjects like music and creativity. However, when the schools became part of the programme, pupils had as much PE as they had major subjects (e.g. Math and Danish) and it was prioritized financially. This investment in PE teachers resulted in a perceived shift regarding the status of the course. School heads and teachers state that many non-PE teachers initially were concerned that the participation in the programme could undermine their individual subjects. This was a concern represented across all the six schools and, even though the added implementation of PE took the form of additional lessons added to the existing timetable and did not replace other subjects. Both school heads and teachers reported that although non-PE teachers initially showed concern they did not do much protest against the programme when it was being implemented. This was

mainly due to school heads being aware of the initial concerns, thus, they were careful not to under-prioritize other subjects and finding a balance favouring the whole school:

In my position, I had to represent the whole school... and how can this [the programme] fit into all aspects of our school?... Are we channelling too many resources into PE?... Are they [PE teachers] being prioritised financially? Are they the ones getting the bulk of qualification courses? So, we should focus on representing the whole school... [School 4 – head]

Interviews with school heads showed that the schools found various ways of prioritizing non-PE subjects while still upholding the programme requirements. In most cases this resulted in schools introducing cross-curricular lessons between PE and subjects like music (dancing and playing music) or biology (e.g. PA in nearby nature environments combined with learning about plants). Also, many of the schools had annual theme weeks (e.g. rehearsing and preparing a school play, or musical), and school heads reported that these weeks were used to encourage a special awareness of minor courses (e.g. music and creativity) that may have felt undervalued when the programme was initiated:

We have very talented arts teachers, and we have very talented music teachers... Well, being part of this programme [the Svendborgproject], such subjects will be a bit neglected... However, now that we have those skills at the school, they should be used... so, we have been able to combine movement

and music... we've taken one of our six PE lessons and simply call it dance... so we dance and through that we combine music and movement... [School 6 – head]

3.6 Perceived programme adaptability

All the interviewed school heads and PE teachers recognized that, although they fulfil the same programme requirements, all schools had their individual ways of being part of the programme. The high compatibility of the programme is associated to the high degree of adaptability to the individual school context. The opportunity to adapt the programme to individual school contexts was inbuilt at the initiation of the programme. Since schools were involved in the development of programme content, they could ensure that differences in available facilities, school size, surrounding areas (woods, lakes, urban areas etc.) as well as individual values and priorities were incorporated.

I was part of the group focusing on how we should implement it [the programme] at our school... there were much attention on schools being allowed to adapt it to their individual culture... so of course it was something new, but we focused on what it would look like at our school... because the schools are very different... [School 3 – Teacher]

This opportunity to modify the programme within the fairly simple programme requirements has also been highlighted by all school heads as easing the implementation process and ensuring maintenance. This means that the implementation process has been operationalized

through a combination of top-down decisions involving clear programme requirements and a bottom-up involvement on how to fit the programme into everyday school practice.

It is the balance between top-down and bottom-up... because it should not be top-down all the way. The framework is the top-down decision, whereas the content and the implementation of it is bottom-up... we were invited to develop the content... They [programme managers] were, like, there is a frame [the programme requirements] and that is not up for discussion. However, we would like to discuss how it could be implemented, how you want to do it at your school... how do you want to define the concept... [School 1 – head]

4. Discussion

In summary, the findings showed that both PE teachers and school heads were willing to engage in the programme as it appeared to be a valuable asset to the education of pupils and fitted existing school values and priorities. Teachers and school heads perceived benefits of the programme both regarding a general increase in the physical health of the pupils and in the perceived increase in skills and self-confidence of pupils whom teachers found insecure in relation to movement and sport. The implementation of the programme was highly dependent on dedicated attention given by PE teachers as well as school heads maintaining a balance in their prioritizing of PE and not neglecting non-PE subjects. Furthermore, PE teachers participated in a professional development course on age-related PE activities that resulted in new perspectives and teaching methods. These courses were also perceived as being supportive

for teachers' dedication and implementation of the programme. Lastly, through its simple requirements the programme supplied a structural frame ensuring that schools knew what was expected of them. Yet, the programme also allowed schools to develop their own ways to fit the requirements to their individual school practice.

4.1 Provider characteristics

If providers find a programme relevant to local needs, this directly influences their ability to implement the programme (Durlak & DuPre, 2008; Fixsen, Naoom, Blase, Friedman, et al., 2005; Rogers, 2003). Matching expectations and linking the programme to the existing values of schools further adds to the effective implementation of new programmes (Durlak & DuPre, 2008). SP initially matched the school heads' and PE teachers' existing values regarding PE and PA in school due to the opportunity to advance the skills and confidence of pupils who are insecure in relation to movement and sports. This was due to the increased amounts of PE, which allowed teachers to pursue PE activities and individual sports in greater depth. As the programme was implemented, PE teacher and school heads support of the programme was strengthened due to its ability to promote general physical health (Klakk, et al., 2014; Klakk, et al., 2013). PE teachers also highlight that they have observed an increase in the development of competence, social and basic movement skills. While the development of skills has not been investigated thoroughly in SP, others have identified this link between an added focus on PE in school and an increase in competence, social and basic movement skills (Bailey, 2006).

There is general consensus that investing in the skill development of providers is vital to facilitate the capacity for change (Durlak & DuPre, 2008; Ogden & Fixsen, 2014; Schuler, Saksvig, Nduka, Beckerman, et al., 2018). In the present study, the provision of training for PE teachers ensured both their dedication and an increased level of skill, even in

teachers who perceived themselves to be relatively competent at implementing the programme. However, despite their skill level, providers can also become a barrier to implementation as a consequence of their competing work assignments and their lack in dedication to the programme (McIsaac, Read, Veugelers, & Kirk, 2017; Schuler, et al., 2018). The decision to implement the added amount of PE as an addition to the existing timetable, thus not affecting the amount of lessons in other subjects, helped school heads to find a balance that favoured the whole school and eased concerns from non-PE teachers. Additionally, school heads also indicated that the political backing of the programme sent a clear message supporting the decision of the school to be part of SP. This kind of political support through municipal strategies and allocation of resources has the ability to aid school heads and dedicated teachers in overcoming resistance to implementation (McIsaac, Read, Veugelers, & Kirk, 2017; McKay, Macdonald, Nettlefold, Masse, et al., 2015). Lastly, it is important to emphasise that adding the PE lessons to the existing timetable also resulted in PE teachers feeling that they were still given time to teach and focus on the existing curriculum while still fulfilling the requirements. Such alignment with the existing curriculum has been highlighted as a facilitator for implementation (Bentsen, Bonde, Schneller, Danielsen, et al., 2018; Schuler, et al., 2018).

Although effective leadership and school head commitment has been identified as critical for implementation (Forman, et al., 2008; Maria Ingemarson, Bodin, Rubenson, & Guldbrandsson, 2016; Payne, 2009), school heads still emphasise the importance of having teachers backing the programme and especially of having a programme promoter with a key role throughout the entire process from initiation to maintenance. The benefits of having at least one programme promoter acting as an ambassador and encouraging the programme at the school is also supported by others (Durlak & DuPre, 2008; Forman, et al., 2008). However, in SP neither school heads nor PE teachers could implement and maintain the

programme without the other. Thus, they have been working interdependently, resulting in school heads needing staff to back their decisions and drive the implementation process, while dedicated PE teachers and programme promoters needed school heads to support their ideas (Forman, et al., 2008; M. Ingemarson, Rubenson, Bodin, & Guldbrandsson, 2014).

SP has proved to have been maintained in a school setting for ten years, yet, maintenance is one of the less developed aspects of implementation (Ament, Gillissen, Moser, Maessen, et al., 2017; Ogden & Fixsen, 2014; Rimehaug, 2014). Both school heads and PE teachers report that the quarterly collaboration meetings have been an important influencing factor in maintaining delivery of the programme by reminding them of the requirements entailed. Griffin et al. found that being reminded that they were part of a programme was desired by teachers in helping to transform programmes into long-term change (Griffin, et al., 2015). It is important to emphasise that the collaboration between programme managers' and schools was a mix of top-down and bottom-up, where the schools' experiences, knowledge and ideas on how to advance and maintain the programme also played their part. This combination of top-down decisions and bottom-up involvement is related to successful implementation, as those involved in such collaborations will increase the opportunity to share and learn from the experiences of others and enhance the sense of being part of the programme (Ogden & Fixsen, 2014; Sulz, Gibbons, Naylor, & Higginsb, 2016).

4.2 Programme characteristics

New programmes introduced to the school setting often raise concerns at the teacher level due to the additional work-load and the time required for implementation (Adamowitsch, Gugglberger, & Dur, 2017; Naylor, et al., 2015; Pearson, Chilton, Wyatt, Abraham, et al., 2015; Schuler, et al., 2018). Teachers are also shown to be concerned that they have to reduce their

focus on academic goals in order to meet the requirements of new programmes (Keshavarz, Nutbeam, Rowling, & Khavarpour, 2010; Lytle, Ward, Nader, Pedersen, et al., 2003). Clarke et al. found that this attention on academic achievements often results in lower priority being given to PA at schools (Clarke, et al., 2013). The results of the present study show that PE teachers did not share these concerns, as the programme fitted the existing school priorities regarding PA and PE and actually resulted in teachers getting more time to teach PE. Additionally, Bugge et al. found that being part of SP had no negative effects on the academic abilities of pupils (Bugge, Moller, Tarp, Hillman, et al., 2017). Still, to achieve successful implementation, it is also important to provide additional training of programme providers (Durlak & DuPre, 2008; Naylor, et al., 2015). In SP, the professional development course provided PE teachers with new ideas, perspectives and inspiration for practical exercises and allowed them to exchange knowledge with teachers from different schools, eventually enabling high-quality implementation of the additional PE lessons.

Schools' initial involvement in the planning of SP helped ensure the potential fit of the programme to existing school values and priorities. This matching of the programme to individual school context was highlighted both by school heads and by teachers as an important factor in ensuring commitment, and this has also been highlighted by others as important in ensuring implementation and maintenance (Durlak & DuPre, 2008; Forman, et al., 2008; Naylor, et al., 2015; Pearson, et al., 2015). Due to the fairly simple programme requirements (adding three times the amount of PE, assigning a programme promoter at the school and having PE teachers attend a professional development course), schools were provided with a clear framework in which they were allowed to continue the local adaptation of the programme. This was an important aspect of the programme, as schools had different sizes, facilities and focus areas (nature, music, arts etc.) and it illustrates the point made by Kok

et al. that, when implementing programmes in a real-world setting, the realized practices will become deeply embedded in the local context (Kok, Vaandrager, Bal, & Schuit, 2012).

4.3 Strengths and limitations

A strength of this study is the focus on the provider perspective of the implementation processes and the contextual descriptions of a successful school-based programme tripling the amount of PE. In depth programme information has been provided by former evaluations of SP (Klakk, et al., 2014; Klakk, et al., 2013; Nielsen, Klakk, et al., 2018; Nielsen, Skovgaard, et al., 2018). The present study complements the former studies on SP with important provider perspectives and motives for adopting, implementing, and maintaining the programme. This potentially increases practitioners and decision-makers ability to assess the programme in relation to their individual context (Glasgow & Emmons, 2007) – ultimately strengthening the transferability of the programme and the strategies used to secure the implementation of additional PE or PA in a school context. However, we recognize that this study has limitations. Initially, we would like to point out that all PE teachers and school heads report that they found the programme relevant and in alignment with their individual school's values and priorities. Also, all the schools chose to become part of the SP from the outset, and this could explain why the respondents had an overall positive attitude towards the programme. This could challenge the possible transferability of the programme to schools not having a grounded interest in PA and PE.

School heads were recruited based on their current or former engagement to the programme, most of them closely involved in the decision that their school should become involved in the programme. Teachers who had acted as programme promoters across the six schools were primary sought as informants. This was due to their in-depth

understanding of the programme and broad insight of the implementation process at their individual school. However, PE teachers were only represented across three of the six schools in focus and given that the schools implemented the programme differently, adapting it to their existing context, insights from the provider level could have been strengthened by including PE teachers from all six schools. As all schools have been represented through school head interviews, the credibility of the results should be reasonable. Still, it is recognized that PE teachers from the last three schools, could have elaborated or given additional insights. Promoters, however, also acted as ambassadors for SP and could display a general positive attitude towards the characteristics of the programme. Four of the six teacher respondents in the current study were former or current programme promoters and the study would possibly have benefited from including more PE teachers not affiliated with the role as programme promoter, or even non-PE teachers from other subjects. Such perspectives from non-promoters or non-PE teachers, could have contributed to a more nuanced view of the implementation process – suggesting factors and strategies relevant for school heads when implementing programmes involving more PE in their school.

School heads and PE teachers found the programme relevant and applicable at their school. This was partly due to PE teachers' participation in the professional development course, with the main aim to secure high-quality implementation through sufficient skills of PE teachers. However, PE teachers feeling qualified to handle the additional amount of PE does not itself secure any quality in the content of PE lessons and observations focusing on the content of lessons (e.g. the application of ATC elements) could have provided valuable insights. Also, the perspectives of end-users are vital in order to obtain successful implementation (Bertram, Blase, & Fixsen, 2015; Chaudoir, Dugan, & Barr, 2013; Glasgow & Emmons, 2007; Shah, Allison, Schoueri-Mychasiw, Pach, et al., 2017) and exploring how the pupils reacted to

the implementation of the programme, would have supported the assessment of the quality in the added amount of PE.

The study does not include attention to the teachers and schools who initially decided not to participate in the programme. Although the rest of the schools in the municipality chose to become part of SP when they were given the opportunity three years after initiation, it would have been relevant to explore why they initially chose not to participate. Exploring factors influencing schools' initial decision to participate could aid the establishing of better strategies when introducing future programmes to schools and teachers. Also, some of these processes date back ten years and it might have been profitable to follow providers' implementation process from programme initiation in 2008. This retrospective position mean that we cannot eliminate the possibility that interviews could contain some recall bias. We recognise that the results could have been more nuanced if data had been gathered during the early implementation process before the programme had become a success and before it formed an integrated part of the school. However, we would also like to emphasise that SP has been successfully implemented and maintained for 10 years and has proved to be effective in relation to various outcomes. Performing this study provides a unique insight into a school-based programme introducing more PE in primary school, and SP presents itself as ideal for the exploration of providers' ability to adopt, implement and maintain the programme.

4.4 Lessons learned

The first lesson learned from this study is that the possibility to fit a programme to individual school values is an important factor to secure willingness to adopt a programme. The results indicated that school-based programmes especially can benefit from schools not having to make a trade-off between promotion of PA or PE and upholding academic standards. Results indicate

that this can be done by allocating time to incorporate additional PE into the daily schedule. In SP, this was realized by adding the programme as an addition to the existing timetable.

The second lesson learned is that programmes benefit from being flexible for adaptations to local needs. However, simple requirements are important as they deliver a frame in which programme providers can identify what it implies to be part of the programme and which elements are undiscussable and must be implemented. Such a double-faced approach can support the realisation of effective programmes in specific contextual circumstances.

The third lesson learned is that quarterly meetings between programme promoters and programme managers can support maintenance by providing continual attention to the participation in a programme and remind involved schools of the entailed requirements. Combined with a bottom-up oriented approach such collaboration meetings can also support maintenance by increasing the opportunity to share and learn from the experiences of other implementation sites in the programme and enhance the sense of being part of a programme.

The fourth lesson learned is that a professional development course will possibly support PE teachers' dedication to implementing a programme containing more PE and increase their skill level. Participation in a course can also secure that PE teachers perceive themselves competent to increase the amount of PE lessons. Such courses can benefit from having practical exercises that directly can be applied in the PE lessons. Also, having PE teachers from different school participate together can contribute to exchange of knowledge and ideas regarding the implementation of additional PE.

5. Conclusion

This study presents a valuable insight into PE teachers and school heads motives for adoption, implementation three times the amount of PE and maintaining this for a period of ten years.

This has been realized through dedicated PE teachers and school heads, who found the additional PE to be a valuable asset that could benefit the pupils and fit their school's existing values and priorities. Teachers in particular find that pupils increase their movement skills and that there is increased self-confidence in pupils who are insecure in relation to movement and sports. Furthermore, PE teachers participated in a professional development course that resulted in new perspectives and teaching methods, which both aided their dedication to the programme and their implementation of it and increased their skill level. Lastly, simple programme requirements provided a structural framework, which ensured that schools knew what was expected of them and the degree to which they could adapt the programme to their individual school practice and priorities.

Competing interests

The authors declare that they have no competing interests

Funding

This work was supported by the TRYG Foundation [grant number 104982]. The authors accept full responsibility for the manuscript. The funders were not involved in the conduct of the study or the preparation of the manuscript.

Acknowledgements

The authors would like to thank the participating school heads and PE teachers for their willingness to reflect on the various aspects of SP and the implementation process.

References

- Adamowitsch, M., Gugglberger, L., & Dur, W. 2017. Implementation practices in school health promotion: findings from an Austrian multiple-case study. *Health promotion international*, 32, 218-230.
- Ament, S.M.C., Gillissen, F., Moser, A., Maessen, J.M.C., Dirksen, C.D., von Meyenfeldt, M.F., & van der Weijden, T. 2017. Factors associated with sustainability of 2 quality improvement programs after achieving early implementation success. A qualitative case study. *Journal of evaluation in clinical practice*, 23, 1135-1143.
- Bach, L.G. & Eiberg, S. 2010. *Aldersrelateret træning - Håndbog for 0.-6. klasse [Age Related Training – A Handbook for Pre-School to 6th Grade]*. Team Denmark, Brøndby, Denmark.
- Bailey, R. 2006. Physical education and sport in schools: a review of benefits and outcomes. *The Journal of school health*, 76, 397-401.
- Ballet, K. & Kelchtermans, G. 2009. Struggling with workload: Primary teachers' experience of intensification. *Teaching and Teacher Education*, 25, 1150-1157.
- Bangsbo, J., Krstrup, P., Duda, J., Hillman, C., Andersen, L.B., Weiss, M., Williams, C.A., Lintunen, T., Green, K., Hansen, P.R., Naylor, P.J., Ericsson, I., Nielsen, G., Froberg, K., Bugge, A., Lundbye-Jensen, J., Schipperijn, J., Dagkas, S., Agergaard, S., von Seelen, J., Ostergaard, C., Skovgaard, T., Busch, H., & Elbe, A.M. 2016. The Copenhagen Consensus Conference 2016: children, youth, and physical activity in schools and during leisure time. *British journal of sports medicine*, 50, 1177-1178.
- Bentsen, P., Bonde, A.H., Schneller, M.B., Danielsen, D., Bruselius-Jensen, M., & Aagaard-Hansen, J. 2018. Danish 'add-in' school-based health promotion: integrating health in curriculum time. *Health promotion international*, day095-day095.
- Bertram, R.M., Blase, K.A., & Fixsen, D.L. 2015. Improving Programs and Outcomes. *Research on Social Work Practice*, 25, 477-487.
- Bugge, A., Moller, S., Tarp, J., Hillman, C.H., Lima, R.A., Gejl, A.K., Klakk, H., & Wedderkopp, N. 2017. Influence of a 2- to 6-year physical education intervention on scholastic performance: The CHAMPS study-DK. *Scandinavian journal of medicine & science in sports*.
- Chaudoir, S.R., Dugan, A.G., & Barr, C.H. 2013. Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. *Implementation science : IS*, 8, 22.
- Clarke, J., Fletcher, B., Lancashire, E., Pallan, M., & Adab, P. 2013. The views of stakeholders on the role of the primary school in preventing childhood obesity: a qualitative systematic review. *Obesity reviews : an official journal of the International Association for the Study of Obesity*, 14, 975-988.
- Dobbins, M., Husson, H., DeCorby, K., & LaRocca, R.L. 2013. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *The Cochrane database of systematic reviews*, 2.
- Durlak, J.A. & DuPre, E.P. 2008. Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American journal of community psychology*, 41, 327-350.
- Fixsen, D.L., Blase, K.A., Naoom, S.F., & Wallace, F. 2009. Core Implementation Components. *Research on Social Work Practice*, 19, 531-540.
- Fixsen, D.L., Naoom, S.F., Blase, K.A., Friedman, R.M., & Wallace, F. 2005. *Implementation research : a synthesis of the literature* 1st ed. University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network, Tampa, FL.

- Forman, S.G., Olin, S.S., Hoagwood, K.E., Crowe, M., & Saka, N. 2008. Evidence-Based Interventions in Schools: Developers' Views of Implementation Barriers and Facilitators. *School Mental Health, 1*, 26.
- Glasgow, R.E. & Emmons, K.M. 2007. How can we increase translation of research into practice? Types of evidence needed. *Annual review of public health, 28*, 413-433.
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. 2004. Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Q, 82*, 581-629.
- Griffin, T.L., Clarke, J.L., Lancashire, E.R., Pallan, M.J., Passmore, S., & Adab, P. 2015. Teacher experiences of delivering an obesity prevention programme (The WAVES study intervention) in a primary school setting. *Health Education Journal, 74*, 655-667.
- Ingemarson, M., Bodin, M., Rubenson, B., & Guldbrandsson, K. 2016. The implementation of a behavioural support programme: Teachers' perceptions of the programme and themselves as providers. *Health Education, 116*, 526-540.
- Ingemarson, M., Rubenson, B., Bodin, M., & Guldbrandsson, K. 2014. Implementation of a school-wide prevention programme-teachers' and headmasters' perceptions of organizational capacity. *Evaluation and program planning, 43*, 48-54.
- Kelly, S.E., 2010. Qualitative Interviewing Techniques and Styles, in: Bourgeault, I., Dingwall, R. & Vries, R.d. (Eds.), *The SAGE Handbook of Qualitative Methods in Health Research*, Publishing, London, pp. 307-326.
- Keshavarz, N., Nutbeam, D., Rowling, L., & Khavarpour, F. 2010. Schools as social complex adaptive systems: a new way to understand the challenges of introducing the health promoting schools concept. *Social science & medicine (1982), 70*, 1467-1474.
- Klakk, H., Andersen, L.B., Heidemann, M., Moller, N.C., & Wedderkopp, N. 2014. Six physical education lessons a week can reduce cardiovascular risk in school children aged 6-13 years: a longitudinal study. *Scand J Public Health, 42*, 128-136.
- Klakk, H., Chinapaw, M., Heidemann, M., Andersen, L.B., & Wedderkopp, N. 2013. Effect of four additional physical education lessons on body composition in children aged 8-13 years - a prospective study during two school years. *BMC Pediatr, 13*, 170.
- Kok, M.O., Vaandrager, L., Bal, R., & Schuit, J. 2012. Practitioner opinions on health promotion interventions that work: opening the 'black box' of a linear evidence-based approach. *Social science & medicine (1982), 74*, 715-723.
- Langford, R., Bonell, C.P., Jones, H.E., Poulidou, T., Murphy, S.M., Waters, E., Komro, K.A., Gibbs, L.F., Magnus, D., & Campbell, R. 2014. The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement. *The Cochrane database of systematic reviews*, Cd008958.
- Langille, J.L. & Rodgers, W.M. 2010. Exploring the influence of a social ecological model on school-based physical activity. *Health education & behavior : the official publication of the Society for Public Health Education, 37*, 879-894.
- Lytle, L.A., Ward, J., Nader, P.R., Pedersen, S., & Williston, B.J. 2003. Maintenance of a health promotion program in elementary schools: results from the CATCH-ON study key informant interviews. *Health education & behavior : the official publication of the Society for Public Health Education, 30*, 503-518.
- Mclsaac, J.D., Read, K., Veugelers, P.J., & Kirk, S.F.L. 2017. Culture matters: a case of school health promotion in Canada. *Health promotion international, 32*, 207-217.
- McKay, H.A., Macdonald, H.M., Nettlefold, L., Masse, L.C., Day, M., & Naylor, P.J. 2015. Action Schools! BC implementation: from efficacy to effectiveness to scale-up. *British journal of sports medicine, 49*, 210-218.
- Moller, N., Tarp, J., Kamelarczyk, E., Brond, J., Klakk, H., & Wedderkopp, N. 2014. Do extra compulsory physical education lessons mean more physically active children - findings from

- the childhood health, activity, and motor performance school study Denmark (The CHAMPS-study DK). *The international journal of behavioral nutrition and physical activity*, 11, 121.
- Naylor, P.J., Nettlefold, L., Race, D., Hoy, C., Ashe, M.C., Wharf Higgins, J., & McKay, H.A. 2015. Implementation of school based physical activity interventions: a systematic review. *Preventive medicine*, 72, 95-115.
- Nielsen, J.V., Klakk, H., Bugge, A., Andreasen, M.L., & Skovgaard, T. 2018. Implementation of triple the time spent on physical education in pre-school to 6th grade: A qualitative study from the programme managers' perspective. *Evaluation and program planning*, 70, 51-60.
- Nielsen, J.V., Skovgaard, T., Bredahl, T.V.G., Bugge, A., Wedderkopp, N., & Klakk, H. 2018. Using the RE-AIM framework to evaluate a school-based municipal programme tripling time spent on PE. *Evaluation and program planning*, 70, 1-11.
- Ogden, T. & Fixsen, D.L. 2014. Implementation Science: A Brief Overview and a Look Ahead. *Zeitschrift fur Psychologie*, 222, 4-11.
- Payne, A.A. 2009. Do predictors of the implementation quality of school-based prevention programs differ by program type? *Prevention science : the official journal of the Society for Prevention Research*, 10, 151-167.
- Pearson, M., Chilton, R., Wyatt, K., Abraham, C., Ford, T., Woods, H.B., & Anderson, R. 2015. Implementing health promotion programmes in schools: a realist systematic review of research and experience in the United Kingdom. *Implementation science : IS*, 10, 149.
- Pryce, R., Willeberg, S., Falkentoft, C., & Meyhoff, T. 2005. *Aldersrelateret træning – Målrettet og forsvarlig træning af børn og unge [Age-related training - Targeted and proper training of children and young people]*. 1st ed. ed. Team Danmark, Brøndby, Denmark.
- Rimehaug, T. 2014. The Ecology of Sustainable Implementation: Reflection on a 10-Year Case History Illustration. *Z Psychol*, 222, 58-66.
- Rogers, E.M. 2003. *Diffusion of innovations* 5th ed. Free Press, New York, NY.
- Schreier, M., 2014. Qualitative Content Analysis, in: Flick, U. (Ed.), *The SAGE Handbook of Qualitative Data Analysis*, Publishing, London, pp. 170-183.
- Schuler, B.R., Saksvig, B.I., Nduka, J., Beckerman, S., Jaspers, L., Black, M.M., & Hager, E.R. 2018. Barriers and Enablers to the Implementation of School Wellness Policies: An Economic Perspective. *Health promotion practice*, 1524839917752109.
- Shah, S., Allison, K.R., Schoueri-Mychasiw, N., Pach, B., Manson, H., & Vu-Nguyen, K. 2017. A Review of Implementation Outcome Measures of School-Based Physical Activity Interventions. *The Journal of school health*, 87, 474-486.
- Sulz, L., Gibbons, S., Naylor, P.-J., & Higgins, J.W. 2016. Complexity of choice: Teachers' and students' experiences implementing a choice-based Comprehensive School Health model. *Health Education Journal*, 75, 1-12.
- van Nassau, F., Singh, A.S., Broekhuizen, D., van Mechelen, W., Brug, J., & Chinapaw, M.J. 2016. Barriers and facilitators to the nationwide dissemination of the Dutch school-based obesity prevention programme DOiT. *European journal of public health*, 26, 611-616.
- Wandersman, A., Duffy, J., Flaspohler, P., Noonan, R., Lubell, K., Stillman, L., Blachman, M., Dunville, R., & Saul, J. 2008. Bridging the gap between prevention research and practice: the interactive systems framework for dissemination and implementation. *American journal of community psychology*, 41, 171-181.
- Waters, E., de Silva-Sanigorski, A., Hall, B.J., Brown, T., Campbell, K.J., Gao, Y., Armstrong, R., Prosser, L., & Summerbell, C.D. 2011. Interventions for preventing obesity in children. *The Cochrane database of systematic reviews*, 12.
- Wedderkopp, N., Jespersen, E., Franz, C., Klakk, H., Heidemann, M., Christiansen, C., Moller, N.C., & Leboeuf-Yde, C. 2012. Study protocol. The Childhood Health, Activity, and Motor Performance School Study Denmark (The CHAMPS-study DK). *BMC Pediatr*, 12, 128.

Appendix A - 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, Falkentoft, & Meyhoff, 2005).

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 educators of the professional development courses were mainly educators from University College Lillebaelt. The initial course setting worked as a pilot-project meant to adjust the course. 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. PE teachers (mainly the ones chosen as programme promoters) and pedagogic personnel across all schools in the programme participated. This pilot-project ran from late-2008 to mid-2009 and contained 40 hours (divided across four modules). 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. 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). School heads were the ones deciding when the teachers could attend the course and the course was held was placed after the teachers normal working hours.

Appendix B

This appendix contains the used coding frame (left column) as well as examples of citations from the qualitative material across both PE teacher and School head interviews. Citations are presented across the provider and programme characteristics, as these were the dimensions the qualitative data were informing on (see table 1 in the manuscript). All citations have been identified through the coding process (see section “Qualitative data analysis”).

Provider characteristics	Teacher	Heads
<p><u>Perceived need for programme</u> Extent to which the proposed programme was relevant to local needs</p>	<p><i>... the benefits were also that it was for everyone... because we were facing some challenges, some children became heavier and there were some children who had poor motor skills and we had some difficulties... we saw that this might be an extra effort to counteract that... [School 1 - teacher]</i></p>	<p><i>And at least it was my perception that it helped to provide a good knowledge of the different schools and good cooperation between physical education teachers and the municipal school area, so it was a really good programme for developing that... but also a programme that brought cohesion in the new municipality... [School 4 – head]</i></p> <p><i>Well, I believe that a child’s first communication is through their body... so, it is very important that they know how interact with each other physically... if you are not able to kick a ball or are in the way all the time, then you are put on the bench and getting marginalized already from a young age... I think it means the world that they learn how to use their bodies, and enjoy using them in play with others... the social development of children, it is increased, I am sure of it... [School 3 – head]</i></p>

<p><u>Perceived benefits of programme</u> Extent to which the programme has achieved benefits desired at the local level</p>	<p><i>In physical education lessons there is some social education build into it... because when you are playing a game or doing exercises the pupils need to learn to be quiet when new instructions are given and so on... but especially in relation to the social aspect... when playing the game, they have to respect the rules of the game but also respect each other, otherwise the game will collapse... and now we have gotten the opportunity to focus even more on this because we have more physical education lessons... [School 3 – Teacher]</i></p> <p><i>I think those who benefit from this [the school being part of the programme] are the children who feel very insecure regarding movement, touching a ball or using the facilities in the gym... and by having to do it several times a week, they become so much more skilled, they are actually making progress from being at a very low skill-level and are clearly getting better and more confident... I do not think that the children that are already good at sports are become significantly better... but the insecure, they greatly benefit from the school being part of SP [School 6 – Teacher]</i></p>	<p><i>Some children... the children we see that benefits the most of it... they are the ones who really struggled to commit themselves physically, they are the ones really getting something out of this. Those who perform well sportingly, they would have done that anyway. They do not get any extra out of it. That's how I experience it. The joy of using their body ... [School 3 – head]</i></p> <p><i>The physical education teachers expanded their professionalism... and we definitely did not get poorer physical education of this [participating in SP], I am absolutely sure of that... there has been a huge progression, some of the teachers who have been involved for many years, they have gained so very much from this [School 1 - head]</i></p>

<p><u>Perceived ability to do what is expected</u> Extent to which providers felt they were able to do what is expected</p>	<p><i>It also demanded that management is backing my work as promoter, because they are still my colleagues... I only have the function of coordinating these things, but still it is very important to have someone at the schools who have this promoter perspective, it is important to the programme to have someone who are prioritizing it... but you also need the backing of management to be able to do so [School 1 - teacher]</i></p> <p><i>I also think it has been productive that to have these non-negotiable elements from the beginning... that there are something specific to hold on to... in the long run you might find that things become more mixed, but I think it is important to have a solid structure to start with ... [School 3]</i></p>	<p><i>I would promote the need for external decision-making... decisions from someone not part of the individual school culture... Because it really has been an important aspect in this programme... if we were told to develop this kind of concept and we had to figure it out ourselves... then we would never have come this far... this programme is just unique because there is a frame, there is some external control that ensures that we, as a school is able to say that is how it is, now how do we act on it [School 1 – head]</i></p> <p><i>The thing that aids me as a school head is the strong political dedication to the programme... when politicians in [Anonymised municipality] prioritized this and said that they wanted to promote it in all schools in the whole municipality, that they would give a big bag of money to support the schools... they were talking a lot about the programme, they made conferences and such things... it helps making the programme happen as it also sweeps resistance [School 6 – head]</i></p> <p><i>You need some physical education teachers who finds value in the programme... who are dedicated and can see the possibilities of it ... If I were to listen to physical education teachers each day saying ‘it is awful that we have these six hours of physical education - The kids are tired and we cannot make it work’... Well, that would be something else, but the</i></p>
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<p><u>Skill proficiency</u> <i>Possession of the skills necessary for implementation</i></p>	<p><i>I was collaborating and learning with my colleagues... colleagues from my school but also from other schools that was part of the programme... And you got the Age-related Training Concept! So, the concept was introduced theoretical and we tried it out in practice too... It changed my way of thinking and gave some new perspectives on how to prioritize when planning my lessons... it was really good... it was a fantastic course... [School 1 – teacher]</i></p>	<p><i>The course and the Age-related Training Concept, it boosted... people came back from these courses and were very lifted and positive... typically the courses were from 4pm to 8pm, and they [teachers] had been at work all day... But nevertheless, I witnessed that they had been learning, they had gained something that they immediately could put to use... They, had become part of the product they were supposed to deliver... And that gave a lot to how we did things at our school... [School 4 – head]</i></p>
<p>Characteristics of the programme</p>		
<p><u>Compatibility</u> <i>Extent to which the programme fits school priorities and values.</i></p>	<p><i>I think there was a big commitment to it, which was also due to the fact that we had chosen this ourselves [to become part of the programme]... no one had said "here you are, now you HAVE to this" it was more like "do you think this is an interesting programme and would you like to be part of it"... and that is a really nice approach ... [School 6 – Teacher]</i></p>	<p><i>It [SP] has become grounded in our set of values... I would argue that if we suddenly no longer were part of the programme, some years would pass before... well I think it would be like "we are not a part of the programme anymore - no, but we are continuing this"... because it has become part of the way we think, it makes sense, it has become an</i></p>

		<p><i>embedded part of our school and how to be a physical education teacher at our school... [School 1 – head]</i></p> <p><i>In my position, I had to represent the whole school... and how can this [the programme] fit into all aspects of our school?... are we channelling too many resources into physical education... are they [physical education teachers] the ones getting all the financial prioritization? Are they the ones who get a lot of qualification courses? So, we should focus on representing the whole school... [School 4 – head]</i></p> <p><i>We have very talented arts teachers, and we have very talented music teachers... Well, being part of this programme [SP], such subjects will be neglect a bit.... However, now that we have those skills at the school, they should be used... so, we have been able to combine movement and music... we've taken one of our six physical education lessons and simply call it dance... so we dance and through that we combine music and movement... [School 6 – head]</i></p>
<p><u>Adaptability</u> The extent to which the</p>	<p><i>I was part of the group focusing on how we should implement it [the programme] at our school... there were much attention on schools being allowed to adapt it to their individual culture... so of</i></p>	<p><i>It is the balance between top-down and bottom-up... because it must not be top-down all the way, the frame is the top-down decision, whereas the content and the implementation of it is bottom-up... we were invited to</i></p>

<p><i>proposed programme can be modified to fit provider preferences, school practices and cultural norms</i></p>	<p><i>course it was something new, but we focused on what it would look like at our school... because the schools are very different... [School 3 – Teacher]</i></p> <p><i>Of course, there is an overall frame, the six hours and 20 minutes of high intensity etc.... However, it is very different... there is a very high degree of variation between the schools on how they have organized it, how they apply it... We actually had, in the beginning, we had workshops, and we came to inspire each other and listen to how the different schools had put it into practice... and already then there was such a big difference in how we had done it ... [School 1 - teacher]</i></p>	<p><i>develop the content... They [programme managers] were like; there is a frame [programme requirements] and we do not want to discuss it, however, we would like to discuss how it could be implemented, how you want to do it at your school... how do you want to define the concept... [School 1 – head]</i></p>
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