



Norwegian Secondary School Teachers' Reflections on Models for Physical Activity During Schooltime: A Longitudinal Intervention Study

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To prevent the negative trend regarding youths' physical activity (PA) level, schools have been promoted as an appropriate arena for facilitating increased PA among youths. This study focuses on Norwegian secondary school teachers' perceptions of models for PA during schooltime, by interviews before, during and after a PA intervention, where various PA models are implemented in a secondary school. An important finding is that implementation of PA at school must consider the complexity of the teacher's practice, the diversity of students, and the need for flexibility among teachers in their daily practice. Our study shows that facilitating PA in secondary school by using several methods, is experienced as the most preferable approach by the teachers, and this supports the idea of a whole-school approach. Future research should focus on interventions where teachers gain experience with all the models aimed at implementing PA in school.

Keywords: physical activity, models for physical activity, teachers' reflections, secondary school, interview

INTRODUCTION

A large number of youths do not satisfy the global health recommendations of 60 min daily moderate to vigorous physical activity (MVPA) (Hallal et al., 2012; Steene-Johannessen et al., 2019; World Health Organization, 2020). Negative health consequences related to physical inactivity are well-documented, and are a major concern globally (Blair, 2009; World Health Organization, 2020). To put an end to this negative trend, schools have been promoted as an appropriate arena for facilitating physical activity (PA) (World Health Organization [WHO], 2008; Institute of Medicine, 2013; Kristiansen et al., 2021). Positive outcomes in relation to facilitating PA in schools have been found (Bartholomew and Jowers, 2011; Kibbe et al., 2011; Kriemler et al., 2011; Norris et al., 2015). Even though some interventions have shown that PA interventions can generate positive effects according to increase MVPA and sedentary time, meta-analyses have identified that school-based interventions have small effect on students' MVPA over time. It is reasonable to question whether these PA interventions are feasible and sustainable over time (Borde et al., 2017; Love et al., 2019; Jones et al., 2020). Webster et al. (2015) problematizes different conditions and varying degrees of teacher efforts in schools. As teachers play an important role in facilitating PA in schools (St Leger, 2000; World Health Organization [WHO], 2008; Norwegian Ministry of Health and Care Services, 2020), teachers' perceptions of earlier experiences and reflections on the various models for PA can provide important knowledge on how different PA approaches can succeed over time.

However, little research has examined this particular subject matter. Furthermore, a majority of the research related to PA in schools has been conducted in primary schools, and not in secondary school. Therefore, this study examines secondary school teachers' perceptions of different PA implementation models that aim to increase young people's PA levels during their school day. The longitudinal design of this study was essential in order to get complementary reflections of teachers' experiences before, under an after an actual PA intervention they took part in. Furthermore, it gave us the opportunity to see what perceptions that was persistent, and what perceptions that changed during the time of the study.

MODELS FOR FACILITATING PHYSICAL ACTIVITY IN SCHOOLS

In the research literature, the terms *opportunities*, *strategies*, and *models* have been used to describe different approaches to PA in school (e.g., Institute of Medicine, 2013; Webster et al., 2015; Tjomsland et al., 2016). These terms are referred to as *models* in this study. Different terms have also been used to describe the specific PA models, for example PA integrated with academic content, is known as either academic integration, physically active learning or physically active lessons. In this study, we will refer to these models as Physically Active Learning (PAL), which is commonly used in the literature (Norris et al., 2019; Lerum et al., 2021).

Physical Education

Physical education (PE) has an important position in the context of facilitating PA in schools (Institute of Medicine, 2013; Tjomsland et al., 2016). PE normally involves PA, and the subject focus upon students being physically active (Kirk, 2009). In Norway, the aim of PE is “*to facilitate life-long joy of movement and a physically active lifestyle...*” (Norwegian Norwegian Directorate of Education, 2019, p. 2). Movement and being physically active are perceived as essential to acquire knowledge in line with the curriculum's competence aims. Bearing this in mind, PE has an important position when it comes to facilitating and promoting a healthy lifestyle among today's youth. This is not necessarily done by increasing the students' MVPA, but by giving the students knowledge about how to be physically active, the association between PA and health, and by providing opportunities to discover and experience different movement activities. In Norway, research projects have focused on different approaches in PE. Both increased frequency of PE lessons and interest-based PE have resulted in positive outcomes according to students' enjoyment and motivation in the subject (Kolle et al., 2016, 2019; Oldervik and Lagestad, 2021).

Physical Activity Lessons and Recess

Research have shown that PA lessons involve scheduling PA during schooldays without academic content (Tjomsland et al., 2016). In Norway, schools have conducted PA lessons commonly known in Norway as FYSAK. FYSAK is scheduled as a lesson involving PA during the school day, but it is not connected to

a specific subject (Tjomsland et al., 2016). The aim of FYSAK lessons is to increase PA among students during schooltime, and it seems to be several understandings of how to organize FYSAK. Traditional activities in FYSAK lessons include walking trips and ball games, often with the opportunity for students to choose between different physical activities. PA during recess or “free-periods” involves facilitating PA by opening the gymnasium or arranging outdoor activities. In contrast to FYSAK lessons, PA during recess is often voluntary. A common aim for projects that have introduced PA lessons or free-period PA, is to improve the social environment, increase well-being among the students, improve health (by increasing students' PA level), and contribute to positive academic achievement (Tjomsland et al., 2016).

Movement Integration

Movement Integration (MI) is defined as the provision of PA opportunities, at any level of intensity, during normal classroom time (Webster et al., 2015). Russ et al. (2017) have identified and described a range of MI models. Moon and Webster (2019) have included these various models in their four-level progression framework. These models are known as the MI Wheelhouse, moving from beginning strategies (level one) to the top level (level four). Levels one and two include PA models without academic content or PA breaks. PA breaks are often small breaks that include activities lasting up to 10–15 min. Level three includes academic integration, and it is called PAL. This model focuses on integrating PA with academic content (e.g., relays, solving a number of tasks by moving around, jumping answers, competitions). Level four is presented as interdisciplinary integration of PA, which involves integrating PA in two or more subjects (e.g., PE and math), with strategies that support learning in several subjects. The top level (level four) in the progression framework of MI–interdisciplinary integration of PA, is described as the most advanced level of integrating PA.

Whole-of-School Approach

Globally, a whole-of-school approach has been recommended as one of the most promising investments in PA for young people (Centers for Disease Control and Prevention, 2010; Institute of Medicine, 2013; Daly-Smith et al., 2020). A whole-of-school approach includes a variety of methods, both during schooltime and outside regular schooltime, with the intent to promote PA among youths. Institute of Medicine (2013) included five models in their approach: physical education (PE), recess, in-class PA breaks, after-school programs, and interscholastic sports teams. Daly-Smith et al. (2020) included four models in their whole-of-school approach: Events/visits, recess, PE and curricular lessons (non-PE).

When comparing the presented PA implementation models, the diversity in curriculums and traditions in different countries needs to be taken into account. In Norway, research has identified four different PA models that have been introduced in schools: extended free-periods in the middle of the day (recess), interest-based PE, PA lessons without academic content (FYSAK) and active learning (PAL) (Tjomsland et al., 2016). Based on their research, Lillejord et al. (2016) argued that it is difficult to decide whether some models are better

than others, and pointed out that the use of PA in school should rather be adjusted in relation to students' interests and motivation. In the Norwegian context, FYSAK lessons have been used for a long period of time with positive results (Tjomsland et al., 2016). However, this model is rarely described in research from other countries, such as the United States (Institute of Medicine, 2013). On the other hand, interscholastic sports, such as school sports teams, appear to be a common strategy in the United States, while they are non-existent in Norwegian school settings (Institute of Medicine, 2013; Tjomsland et al., 2016).

Based on the current knowledge, we have included models that are compatible with the Norwegian context. These models are divided into five main models for implementing PA in Norwegian secondary school: (1) PE, (2) PA lessons and recess, (3) PA breaks, (4) Physical Active Learning (PAL), and (5) interdisciplinary integration of PA. Although we present these five models as main models, we are aware that each model has variations due to the content, the use of PA, and the teacher engagement.

Based on the literature presented above and the limitations in this research, the aim of this study is to examine Norwegian secondary school teachers' perceptions of various PA implementation models in secondary school. The research question is: Based on their former experiences and reflections over a period of 8 months, how do secondary school teachers in Norway perceive different PA implementation models in secondary school?

MATERIALS AND METHODS

This study is part of a larger project focusing on teachers' perceptions of the implementation of 60-min daily MVPA in secondary school. The project included an intervention over 4 weeks with the aim of implementing 60 min of daily MVPA, interviews with teachers, measurement of students' PA levels (accelerometer data), and a questionnaire. This study is based upon the interview data. The research project was approved by the Norwegian Centre for Research Data, fulfilling ethical standards for empirical research.

Participants

Using a stratified selection, a single secondary school was contacted during the spring semester in 2019. The school was willing to participate in the project, and the entire ninth grade (15 year-olds) was chosen to participate in the study. This decision was based on the fact that year 8 had just joined the secondary school level, and that year 10 was about to start examination preparations. All teachers teaching at the ninth grade were invited to participate, and were fully informed about the project. All of the teachers ($N = 12$) agreed to participate, and a written consent was obtained from all.

The teachers represented a varied background according to age, teaching experience, teaching subjects and earlier experience with PA—both personally and professionally. The teachers covered all of the teaching subjects at the secondary level, except from foreign-language instruction in Spanish and German. Three

of the teachers had graduated in the subject PE (60 ECT or more in PE education).

Procedures and Design

During a period of 4 weeks, the teachers were asked to implement 60 min of daily PA. The intervention period was divided into two periods. The teachers implemented PA as PAL the first 2 weeks, and could choose between PAL and PA breaks for the last 2 weeks. The subjects involved in the intervention were mathematics, Norwegian, science, English, social studies, art, and Christian and other religious and ethical education (*CREE*). Prior to the intervention period, the teachers were given time to plan and structure the intervention. One of the researches conducted these meetings, wherein the teachers were given relevant information and an activity booklet. In the first meeting, the intervention period was scheduled. At this meeting, an open discussion about how to plan and conduct the period took place. Furthermore, the teachers were also given time to cooperate and plan the period.

To answer the research question, three interviews with the 12 teachers were conducted over a period of 8 months during the schoolyear of 2019/2020. The interviews were based on a semi-structured interview guide, using an open and flexible approach where the researcher actively listened to the interviewee (Brinkmann and Kvale, 2015). A pilot interview with a secondary school teacher from another school was conducted, and the interview guide was revised based on the feedback. The second interview included follow-up questions in relation to the teachers' statements in the first interview. The same procedure was followed during the third interview.

The first interview was conducted 1–2 weeks prior to the intervention period. It focused on the teachers' perceptions of PA, both generally and in relation to the intervention. Especially their previous experiences of PA in school and their reflections relating to their teaching practice when using PA in school were examined. Examples of questions were: "What kind of impediments and facilitators do you perceive in relation to the implementation of PA?" "Tell me about your former experiences related to when you have included PA in your lessons." The second interview, conducted the first week after the intervention, focused on the teachers' experiences and perceptions of the PA intervention. Examples of questions in the second interview were: "Can you describe how you experienced the intervention period?" and "Based on your experiences during the intervention and your former experiences, what do you think is important for having a successful facilitation of PA at school?" The third interview, conducted 7 months after the intervention, focused on the teachers' perceptions of the period after the intervention. This interview focused upon the teachers' reflections related to the intervention from a more distanced perspective, according to their perceptions and hopes for the future. Questions were also asked in relation to the teachers' perceptions of specific PA implementation strategies, and their reflections on students' PA outcomes (accelerometer data), for example: "What can you say about the different models that can be used according to facilitate PA during schooltime?"

Analysis

The analysis followed the principles of hermeneutic interpretation of meaning (Brinkmann and Kvale, 2015) in relation to the hermeneutic circle. The process of moving back and forth between parts of the text and the whole text, led to an increasingly deeper understanding of the teachers' statements. The analysis was conducted as a thematic analysis (Creswell and Poth, 2018), where the transcripts were read through, and statements were sorted and coded into pre-figured categories. According to Hastie and Glotova (2012), the use of pre-figured categories is often based on theory or themes in the interview guide, and is one of two common approaches to analysis. This strategy was followed by further analysis of the codes in the initial categories, where the categories were read through and sorted into sub-categories. These subcategories included both positive and negative perceptions, and experiences of and reflections of these models. To ensure that the views of the participants are reflected in the pre-figured categories, it is recommended to be open to additional codes that emerge during the analysis (Creswell and Poth, 2018). An additional reading of the interviews was therefore carried out, which led to new categories that were related to the aim of the study. Codes were also marked and sorted for each participant and for each of the interviews, to ensure that each participant's perceptions over time could be analyzed. Finally, the pre-figured categories and the new categories were constructed. Following the principles of hermeneutic interpretation of meaning, the statements were analyzed with critical lenses and in relation to the research question. Throughout the analysis, the researchers were constantly aware of their own assumptions and prejudices. To protect against any misinterpretations, and to be open to what the data reflected, this was carefully addressed throughout the analytical process by all three authors. This strategy increased the credibility, and prevented possible biases from one of the authors, who was a former colleague of the participants.

FINDINGS

The presentation of the findings is based on the pre-figured categories that were previously described as the five models for in-school implementation of PA. However, a sixth model also appeared in the analysis—teachers' perceptions of the benefit of not just focusing on one model. The advantage of implementing several of the models is therefore also presented in this study.

Teacher Perceptions of PE—PE Does Not Reach All Students

In the first and second interviews, the teachers related themselves to PE when reflecting on their own competence regarding PA and perceptions about PA in school. Jackie, with 15 years of teaching experience, claimed that if PA has to be connected to any subject, it should be PE, and not other subjects. She argued that PE teachers had more competence than her related to facilitating PA in school. After the intervention, in the second interview, the teachers reflected on how to best succeed in satisfying the health recommendations for PA during schooltime. Some of the

teachers suggested that if the aim was to increase the amount of MVPA among students during schooldays, without focusing on any other outcomes, both PE and PA lessons would be preferable. Although they argued that increasing the amount of PE in schools might be positive for the students' PA levels, they were not comfortable with splitting up the "traditional" 90-min lessons into shorter PE lessons several days a week. Instead, they would rather increase the amount of PE.

In the last interview, the teachers had become more critical of PE being the only subject serving students with PA during schooldays. According to the teachers, PE has a natural position when it comes to facilitating PA in schools, but it should be combined with other strategies. The analysis revealed a common understanding that PE is not a good fit for all students, and if the aim is to increase students' PA, PE alone will not reach all students. An interesting finding is that this critical perception that PE is not a good fit for all students appears to be strongest among PE teachers. Shaun, a PE teacher, stated: "You have students here who do not like PE, and associate the subject with something negative, and there is a lot of focus on assessments and grades, so...". This statement was supported by Richard, another PE teacher, who argued that PE would only benefit the active students who are positive to PE, and enjoy the subject:

"I have no faith in increasing PE as it is now. I think it would only benefit those who are active. I think it would only increase the differences. For those who like the subject, they will thrive better, while those who do not like the subject, will thrive less."

According to the teachers' statements in our study, the subject is more than just an instrumental subject, which aims to satisfy the PA recommendations. PE focuses on learning, behavior and effort, and they underlined that the assessment of students is based on academic goals described in the curriculum.

Physical Activity Lessons—Could Benefit Both Students' Motivation and School Environment

When reflecting on their former experiences of PA in school settings, several of the teachers referred to a project that was conducted in the actual school several years ago, called GAP (English translation: Happy Activity Project). This project involved scheduling a double lesson in the middle of the day, where the students could choose between different activities, both physical and other activities, such as art-related interests. The lessons had no academic content, and time was taken from different subjects. The teachers reflected on this period as something very positive, and something they clearly wished to bring back. Based on their positive experiences with this project, many of the teachers argued for PA lessons without any academic content, where the aim would be related to facilitating positive and motivational activities that could positively benefit both students' PA and the social environment at the school. These reflections came up in the second and third interviews, when the teachers reflected on the impact of different models on students' PA. However, some of the teachers also reflected critically on PA lessons, especially related to how to organize these lessons. One

of the teachers expressed that the model had to be prioritized by the local politicians, the school board and the head of school.

During the interviews, the teachers did not reflect on recess as an alternative model for facilitating PA. However, they mentioned that the students had access to the gymnasium during the mid-day break, which was very popular for a certain group of students. The fact that not all students participated in these voluntary activities, was used as an argument for making PA mandatory. If students were given the opportunity to opt out, some of them will do so and be inactive, they claimed.

Physical Activity Breaks—Variety to Get the Students “Back on Track”

The analysis indicated that facilitating PA by using PA breaks during normal classroom time, was perceived as an preferable model among the teachers in this study. Their positive statements about PA breaks were consistent throughout the study, although their arguments appeared to change somehow during the interviews. In the first interview, they referred to positive experiences from their former teaching practice, where they varied the lessons with different activities, such as dance videos (e.g., YouTube) and out-door activities (e.g., ball games, or a short walk). Their arguments for the use of PA breaks were related to better concentration, on-task behavior, and that it would improve the class environment. They also claimed that they needed to activate students by doing something else, because variation like these breaks were necessary for the students to maintain concentration and on-task behavior. This was especially apparent during the days with a lot of theoretical content. The teachers explained that these breaks not necessarily had to focus on PA. It could just as well be a 5-min break, watching a movie or similar things, in which variation was used as a didactic strategy to get the students “back on track.” The argument for these breaks appeared to be related to the intention of creating a good environment for learning, rather than increasing students' PA levels. In the first interview, Laura talked about a strategy she used in one class some years ago. The class was struggling with bad behavior, and lack of academic motivation. As a result, she introduced a “running break,” where the students ran up a steep hill right behind the school, from one to several times a day. She experienced that the activity led to vigorous PA, and that it had a positive effect on the classroom environment and students' on-task behavior. Although she reflected positively about her experiences with PAL during the intervention, her previous experiences with PA breaks appeared to be emphasized, especially when reflecting on how to increase students' MVPA.

Another finding in relation to the teachers reflections upon PA breaks, was that the teachers highlighted the importance of flexibility when facilitating PA during normal classroom time. Taking a short break often had a positive effect on the students' motivation and concentration, they argued. This was an impression they acquired during lessons, and therefore it was difficult to plan how and when to take these breaks.

In the second and third interviews, several of the teachers included reflections on students' PA levels in their arguments for PA breaks, as Laura:

“I think that if the goal is more physical activity, then we should have cut out the subject, and just been physical, 20 min. Then I would have had more activity[. . .]. That you can spend 20 min running up the hill a couple of times. I believe that, we should have done more [of that].”

The teachers argued that to facilitate MVPA, PA breaks might be the most effective strategy. Their experience after the intervention was that it was difficult to achieve “enough” intensity during PAL lessons, compared to PA breaks. Moreover, they argued that it might be both easier and more effective to only focus on the PA itself, and not integrate PA with academic content, to successfully increase students' PA level.

When it came to the organization of PA breaks, the teachers argued that this could be done by the teachers or the students. A break might increase the ability to concentrate on the subject matter, but if the aim was to increase the PA levels, it had to be structured in some way. If not, some of the students would not participate in these activities they claimed.

Physically Active Learning—Offers Variation, but Not Necessarily Feasible on a Daily Basis

The first interview revealed that the teachers had little or no experience with PAL as a model for promoting students' PA level. Few of the teachers had conducted activities which combined PA and academic content, but not on regular basis. After the intervention period, the teachers were positive about this model, and felt that a great majority of the students enjoyed these PAL lessons. They reported that students who were normally less physically active during schooldays, were more active during PAL. Phil, who taught English and social studies, experienced a positive attitude among a majority of the students when integrating PAL in his subjects, that “*made it worth it.*” Even though the use of PAL was a positive experience for him, he was not confident in spending too much time on it: “*I think if you do not do it to often so that it does not become boring, then it could be a nice thing. Using it as a variation in teaching is clearly important.*” He found PAL to be a method that provided variation in his teaching practice, but that it was not necessarily feasible to implement on a daily basis.

Comparing PAL to other models, Sarah argued for the use of PAL. She claimed that some students might just sit down and do nothing during PA breaks. On the other hand, as a part of the subject, they somehow were “forced” to participate, as it was a part of the academic content. Another argument was that PAL might engage group of students that preferred a more practical way of teaching, as Richard pointed out:

“... it may well be that some students who learn less from regular teaching, learn more from such teaching [PAL] and the opposite. So it's a lot about variety. As teachers, we should become better at varying our approaches.”

Summing up the teachers arguments for the use of PAL, it seems that important factors are that the students have positive attitudes to this teaching method, and also that it is a good

alternative to traditional teaching methods. Furthermore, PAL give teachers the opportunities to vary their teaching methods.

Although the teachers had some positive experiences related to PAL, they were uncertain as to whether these lessons led to increased academic outcome. They were also concerned about the amount of time they spent on planning and conducting PAL. They experienced that PAL demanded more time than PA breaks, and questioned whether this model would have a negative impact on student learning over time. The teachers also reported that it was difficult to both facilitate high intensity PA (MVPA), and address the subject matter at the same time. When reflecting on the outcome of students' PA during these lessons, they felt it was difficult to achieve enough high intensity during PAL.

When analyzing the teachers' perceptions of PAL as a model, different ideas emerged. The teachers arguments were related to variation of teaching methods, and not focused upon increasing students' PA level. Indeed, several of the teachers pointed out the importance of flexibility when implementing PAL—as it did not fit in all subjects or topics. When asked about what they would prefer if the aim was to increase students' MVPA, a majority claimed they would prefer PA breaks, PE or PA lessons, rather than PAL. Laura stated: *“If the aim is to increase students' MVPA, I think we need to forget the academic part, and just focus on physical activity. Then they would have had more physical activity.”* However, some of the teachers claimed that using PAL as a method for variation in subjects might positively impact the students' well-being.

Interdisciplinary Integration of Physical Activity—An Idealistic Model of Teaching

Because interdisciplinary integration of PA was not part of the intervention, this model was not given much attention in the first and second interviews. However, the use of open-ended questions in the interviews led to reflections among the teachers on their earlier experiences of PA. In the first interview the teachers described experiences of what they called “whole-subject days,” where they spent the entire day on few different subjects, such as math and science, with an integration of PA. These activities could often include walking trips or tasks involving outdoor activities with an academic content.

When asked more explicitly about their perceptions of interdisciplinary integration of PA in the third interview, the teachers expressed that they were very positive to this model, as Richard:

“Yes, it's beautiful, interdisciplinary integration. Teaching where the students had felt it was meaningful, and the teachers the same, and it had become a break in working life, not a break with learning, but that it had changed everyday school life without it having affected the content. In an optimal world, I think interdisciplinarity with physical activity as part of the teaching would be best, both for the students and the teachers.”

This reflection from Richard, and other teachers reflections, indicate that interdisciplinary integration of PA is seen as an ideal and futuristic model of teaching, which they would prefer. The findings also revealed that the teachers were aware of the challenges relating to interdisciplinary integration of PA—describing several factors that problematize such a

model. According to Sarah, such a strategy requires more cooperation between the teachers. Time needs to be prioritized and scheduled, she claimed, and the teachers should be given more time to do the planning together. The teachers suggested, based on these reflections, that interdisciplinary integration of PA should be implemented in specific periods, rather than on a daily basis.

Some of the teachers also perceived interdisciplinary integration of PA as a new way of thinking—a model that required a new way of teaching. They pointed out the need for a more holistic view on the subject matter, and the importance of seeing the curriculum in different subjects in relation to each other. The teachers did not perceive this as something negative, but rather an opportunity to focus on in-depth learning, in line with the new curriculum (valid from the 2020/21 schoolyear). However, they claimed that the teachers involved in such a model, had to be positive and willing to change their way of teaching. The teachers also may have to step away from their traditional perception of how teaching should be conducted. Furthermore, this new way of thinking had to be a whole-school project, initiated and supported by the school administration, with political support on both the local- and central-authority levels.

Combining Different Models—We Are Doing Ourselves a Disservice If We Only Go for One Model

Even though the focus of this study is on teacher perceptions of certain PA implementation models, there appears to be an agreement among the teachers that to reach all students, and with respect to pedagogical implications, just focusing on one model might be unfortunate. A common perception among the teachers seemed to be that no matter which model that was being used, PA had to benefit the students, and to be conducted in relation to the diversity of students. According to Michael, integrating PA by using several of the models would be beneficial:

“I'm thinking a little pedagogically then, (. . .). Because there may be students who are very fond of PE and who like the subject, and get lots of good activity there. While some may not, and with an activity break without any academic content, where they can just unfold and have fun. Others who are very interested in the subject, have no interest in any of those breaks. However, when they're integrated into the subject, then the student gets motivated. . . . So I think we have to try different models, all of them are good models. I think we're not being smart if we only go for one of them.”

DISCUSSION

Our findings reveal that the teachers reports both positive and negative aspects of the various models, when it comes to the implementation of PA in secondary schools. In relation to the challenges of translating successful interventions into daily school settings (Borde et al., 2017; Love et al., 2019; Jones et al., 2020), our findings illustrate how the complexity of teachers practice influences successful implementation of daily PA in schools. This is especially important, because teachers

have a central role in facilitating PA in schools (St Leger, 2000; World Health Organization [WHO], 2008; Norwegian Ministry of Health and Care Services, 2020). The longitudinal design of this study made it possible to see how the teachers responded in relation to the intervention period. It also allowed us to follow up statements in previous interviews, in order to examine teachers deeper reflections about the different models. Especially the teachers perceptions of PA breaks seems to be persistent throughout the study. On the other hand, the longitudinal design also made it possible to examine how their arguments of different models changed after their experiences with the intervention, e.g., PE and PAL.

The teachers clearly point to PA breaks as a preferable model when the aim is to increase students' PA levels, and this model is also reported to be a flexible model that requires little preparation. The teachers also highlight the importance of taking such breaks, especially on days with heavy theoretical content. According to the MI framework (Moon and Webster, 2019), the PA breaks are presented as level 1 and 2 breaks. This model demand less preparation, and can be easily adjusted to the classroom setting. The findings in this study appear to be compatible with these perspectives.

The teachers' perceptions of PAL also appeared to be compatible with the MI framework (Moon and Webster, 2019), as the teachers in our study point to different aspects in relation to this model that they find as impediments. Factors such as having the time to both plan and implement PAL and integrating PA with academic content, complicate the attempts to achieve high enough intensity of the PA itself. These findings may explain why interventions struggle to be sustainable over time (Borde et al., 2017; Jones et al., 2020). However, the teachers also had positive experiences of PAL during the intervention.

Another interesting finding is that the teachers appeared to be very positive to the interdisciplinary integration of PA. Several of the teachers were quite enthusiastic about such a model, describing this model as an idealistic approach for the future, and that it would have a great impact on their traditional teaching methods. However, the teachers also highlighted that this model needs to be prioritized and supported by the politicians and/or school administration.

The analysis indicated that both PE and PA lessons appear to have a positive standing among the teachers. According to the teachers, both models would not take time from the other subjects, and were found to be easy to implement compared to PAL and interdisciplinary integration of PA. However, the teachers underlined that PA lessons should be led and organized by the teachers. With such a strategy the students would not have the opportunity to be inactive during the break. PE, a subject with the intrinsic value of being physically active (Kirk, 2009), was reflected upon critically by the teachers during the interviews. The PE teachers in our study pointed out that there is a group of students who do not want to participate in the subject, and more or less hate it. Because of this, it would be difficult to reach all of the students by just focusing on PE as an arena for facilitating daily PA, they argued.

The longitudinal design of this study contributed to examine how the teachers perceptions changed over time, and how the intervention affected their perceptions of different PA models.

This aspect was important in order to address some of the findings in our study. The analysis revealed that the intervention period made the teachers more aware of the importance of the students' PA levels. In the first interview, their arguments were related to students benefitting in terms of on-task behavior, motivation and concentration, and seeing PA breaks and PAL as facilitating variation in their teaching. The teachers previous experiences of PA show that PA breaks are perceived as a didactic strategy that is commonly used among the teachers when they feel that their students need a break from the academic content.

The intervention—which focused on students' PA level, raised awareness on how they could increase PA among the students. In the second and third interviews, the teachers were more aware of, and reflected on how to facilitate a higher level of PA, in addition to the arguments mentioned above. Our findings indicate that when focusing on specific aspects (in this study, students' PA levels), attaining a higher PA level was given more attention among the teachers. For some of the teachers, their understanding of PA during schooldays seemed to be deeply connected to their previous experiences, such as PA breaks and the former project they participated in. These teachers referred to their former experiences of PA breaks as something that had a positive impact on students' well-being and motivation, without compromising the subject matter.

Their experiences of PAL during the intervention—with a focus on students' PA levels, changed their view somewhat. In the last two interviews they reflected on how to facilitate for a higher level of PA in the best way possible, in addition to striving for other positive outcomes that they mentioned in the first interview. However, they did not agree as to whether one model was better than another. Instead they used their arguments related to the diversity of students, motivation and on-task behavior to argue for using different models instead of just focusing on one of them. The teachers appeared to adopt the focus on students' PA levels as the study progressed, even though the findings show that other aspects were still weighted highly.

Our findings show that the teachers reported that the different models for facilitating PA have both positive and negative aspects, and that each of the models might not fit all students. The arguments used by the teachers in this study indicate that they emphasize individual benefits for students, and that facilitating PA should help them to address the diversity of the student body. These perceptions are compatible with findings from Lillejord et al. (2016), who pointed out the importance of adjusting the use of PA to students' interests and motivation. The teachers in our study argue that focusing on one model, might not be a success factor. Considering the teachers' perceptions of the importance of addressing all of their students, it was not possible for them to say that one model is better than any of the others. This finding supports the argument for a whole-of-school approach, which has previously been recommended (Institute of Medicine, 2013; Daly-Smith et al., 2020). As a consequence, facilitating PA by implementing several models would naturally demand a whole-of-school approach. Here it is important that both the administration and the teachers taking part in the process of organizing and implementing PA in school. In addition, implementation of PA must be adapted to

the students' different abilities and interests, where individual learning and development must be emphasized.

Such a starting point highlight the complexity of teachers' practice in secondary school. It is also being supported by Webster et al. (2015), who emphasized that implementation of PA must be sensitive to the dynamic conditions in school settings. Based on the findings in this study, employing a whole-of-school approach that includes several of the models might give teachers a greater opportunity to reach all students. However, the findings in this study shows that a whole-of-school approach, involving different models might complicate the whole idea behind implementing PA. This is because such a strategy requires more from both the teachers and the school when it comes to organization, cooperation and fulfilling the aims behind such a model.

STRENGTHS AND LIMITATIONS OF THE STUDY

The longitudinal design of this study has made it possible to clarify statements and perceptions from the teachers, and the teachers have also been asked to clarify and reflect upon former statements. Using three interviews over a period of some months has made it possible for the teachers to reflect critically on their own experiences and perceptions over time. This strategy has increased the opportunity to go in-depth in the field of study. Furthermore, this strategy has led to richer and more reflective interview data on the implementation of PA in school from a longitudinal perspective.

However, some limitations should be mentioned. The results only reflect the perceptions of one secondary school in Norway, so there are clearly limitations when it comes to a generalization effect. Furthermore, a longer intervention period would have made it possible to evaluate the effect of these interventions over a longer time.

CONCLUSION

This study focuses on Norwegian teachers' perceptions of different PA models in secondary school. To the best of our knowledge, this is the first study that has examined teachers' perspectives on different models for implementing PA over an extended period of time, and where teachers' reflections on the use of different PA models have been examined. The results show

that the students have positive attitudes to PAL, and that PAL give teachers the opportunities to vary their teaching methods. The use of PA breaks appeared to be favored as they were easy to use, flexible and did not require much preparation. An important finding is that the implementation of PA must take into account the complexity of the teachers' practice, the diversity of the student groups and the need for flexibility among teachers in their daily practice as teachers. Bearing this in mind, the teachers argue for the use of several models when implementing PA in secondary school. Our study shows that facilitating PA in secondary school by using several methods was preferred by the teachers, based on their perceptions of the various models. We argue that our findings point toward the importance of a whole-of-school approach, were it is important that both the administration and the teachers at schools taking part in the process of organizing and implementing PA. This study has only focused on Norwegian secondary school teachers with limited experience of all of the models described in this study. Future research should focus on interventions where teachers gain more experience of all the models for implementing PA in school, and examine teachers reflections over a longer period. Furthermore, students reflections about PA interventions at school should be studied.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Norwegian Social Science Data Services. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SL and PL contributed to the design and intervention of the study. All authors contributed to the interview guide, analysis, findings, and the discussion of the study, contributed to all parts of the manuscript, and approved the submitted version.

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