



Review article

Teachers' perceptions of barriers related to implementation of daily physical activity in secondary school: Academic pressure and the need for new competence

Sondre Arntzen Lomsdal*, Idar Kristian Lyngstad, Pål Arild Lagestad

Faculty of Education and Arts, Nord University, Hogskoleveien 27, 7600, Levanger, Norway

ARTICLE INFO

Article history:

Received 9 June 2021
 Received in revised form
 17 March 2022
 Accepted 18 April 2022
 Available online xxx

Keywords:

Interview
 Secondary school
 Teachers' perception
 Barriers
 Movement integration
 Physical activity

ABSTRACT

The aim of this study was to examine secondary school teachers' perceptions of barriers related to an intervention implementing daily PA during normal classroom time, known as movement integration (MI). Using a longitudinal design, twelve secondary school teachers from one secondary school in Norway were interviewed three times over a period of 8 months, before, under and after a PA intervention study. The data analysis identified four main barriers related to MI: (a) time, (b) perception of own competence, (c) uncertainty of academic outcome, and (d) inability of PA to fit within the instruction of the academic subject. Two issues were found to be representative of the study's findings: academic pressure, and a need for new competence.

© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Contents

1. Introduction	1
2. Theory framework of the study; barriers for implementing daily PA	2
3. Method	3
3.1. Participants	3
3.2. Procedures and design	3
3.3. Data collection and analysis	3
4. Findings	4
4.1. Time as a barrier	4
4.2. Perception of own competence	5
4.3. Unsure of the academic outcome	5
5. Discussion	6
5.1. Perceptions of barriers: a reflection of academic pressure and the need for new competence	7
5.2. Strength and limitations	7
6. Conclusion	8
References	8

1. Introduction

According to global recommendations, children and adolescents should engage in moderate to vigorous physical activity (MVPA) for

* Corresponding author.
 E-mail address: sondre.a.lomsdal@nord.no (S.A. Lomsdal).

60 min per day (World Health Organization [WHO], 2010). However, youths' physical activity (PA) is decreasing over time (Knuth & Hallal, 2009; WHO, 2010), and physical inactivity has been widely identified to constitute one of the largest public health challenges in the 21st century (Blair, 2009). Schools have been presented as highly appropriate settings for promoting PA (Institute of Medicine (IOM), 2013), as school-based programs reach most children, irrespective of gender, ethnicity and background, and children spend a large proportion of their time at school within weekday (WHO, 2008; Kriemler et al., 2011; Webster et al., 2015). Indeed, school-based programs have been shown to be effective in increasing children and young people's PA level (Kibbe et al., 2011; Kriemler et al., 2011; Norris et al., 2015). It has also been argued that schools should account for half of the time recommendations related to PA (IOM, 2013). As teachers occupy a central position regarding facilitating PA among students (St Leger, 2000; WHO, 2008), it is important to examine their perceptions related to implementing PA (McMullen et al., 2016; Vazou & Skrade, 2014). Earlier research on PA-promotion programs in schools has reported that factors, such as cooperation among teachers, anchoring PA in school plans and access to appropriate areas (e.g., outdoor areas), are critical for success in implementing PA in schools (Michael et al., 2019; Skage & Dyrstad, 2016; Webster et al., 2017). Studies have also indicated the need for training and/or competence among teachers that seek to implement PA in their academic subjects (Kolle et al., 2016; Parks et al., 2007).

Implementing PA in academic classrooms is known as movement integration (MI) (Webster et al., 2015), and is recommended as an approach to promote school-based PA (IOM, 2013; Webster et al., 2015). Research on MI has found positive outcomes regarding increasing children's MVPA at school (Bartholomew & Jowers, 2011; Goh et al., 2014; Norris et al., 2015). MI comprises various strategies related to incorporation of PA into regular classroom time, inside of classrooms or in other spaces (e.g., outdoor facilities) (Russ et al., 2017; Webster, 2015). The literature distinguishes two main strategies for implementing PA in school: PA as "brain breaks" (PA breaks); and PA integrated into academic content, known as physical active lessons or physical active learning (PaL) (Webster et al., 2015).

In Norway, recommendations by national health authorities are in close accordance with global recommendations (Norwegian Directorate of Health, 2014). However, the latest national survey (ungKan3) showed that only 45% of 15-year-olds achieved the recommendations of 60 min of MVPA, and this percentage has remained stable over the past 15 years (Steene-Johannesen et al., 2019). As a result of these findings, PA among youth has received substantial political attention in Norway. In November 2017, a political majority in Stortinget (National parliament) called for the government to ensure that all pupils from grades 1–10 should have minimum 60 min with daily PA in school (Innst. 51 S (2017–2018)). Although no national guidelines mandating daily PA among secondary school students have yet been introduced, schools and teachers are encouraged to implement PA in academic subjects (Norwegian Ministry of Health and Care Services, 2020). Physical Education (PE) is a mandatory subject in the Norwegian School Programme from 1st grade throughout college level, and includes curriculum goals and assessment of students (Norwegian Directorate for Education and Training, 2021). The pupils have 1–2 PE classes each week (2–3 h). The political proposal regarding PA among pupils from grade 1–10 outlined that PA is not to be seen as an extension of PE, but should affect the whole school (Stortinget, 2017).

Various implementation programs have been carried out in Norway (Dyrstad et al., 2018; Resaland et al., 2015; Åvitsland et al., 2020), but there is a paucity of PA intervention studies that have included 60 min of MVPA per day at the secondary school level. Resaland et al. (2015) implemented in total 165 min/week in their study (including 10 min/day "PA homework"), Dyrstad et al. (2018) included 2×45 min/week of PaL in their study, and Åvitsland et al. (2020) increased the amount of PE by 120 min/week in their study. In addition, research on teachers' perceptions of implementation of PA has largely been performed in primary school settings, and there is currently a lack of research at the secondary school level (Kolle et al., 2016; Michael et al., 2019; Routen et al., 2018; Webster et al., 2015). As a result, a strong need exists for more research on secondary school teachers' perceptions of implementation of 60 min of daily PA. This study was part of a project that focused on teachers' perceptions of implementation of PA in secondary school. Overall, the project aimed to examine different factors that might influence their practice, including pedagogical assumptions, facilitators and barriers. The main aim of this study was to examine secondary school teachers' perceptions of barriers in relation to implementation of PA as MI in school, both before, during, and after such an intervention.

2. Theory framework of the study; barriers for implementing daily PA

The theory framework of this study is based upon MI as a method for implementing PA in academic classrooms (Webster et al., 2015).

A consistent finding in most studies is that teachers perceive time to be a barrier to implementing PA (Dyrstad et al., 2018; Goh et al., 2017; McMullen et al., 2016; Michael et al., 2019; Stylianou et al., 2016; Webster et al., 2017). Both time for planning and finding time for PA itself, as well as the time that these divert from academic tasks, constitute major challenges. In addition, the perception of pressure on academic outcomes, curriculum demands, and goals in relation to PA emerge especially prominently among the oldest grades in primary and lower secondary school (Brown & Elliott, 2015; Jørgensen et al., 2020; Michael et al., 2019; Stylianou et al., 2016). Research has also examined the sentiment that PA must contribute to academic goals, and that teachers experience strong pressure to focus mainly on the parts of academic subjects that will be tested in school-wide assessments. PA is often perceived as unsuitable as a teaching method in certain subjects or academic topics (Webster et al., 2015).

Research has also found that training and teachers' self-confidence, motivation and perception of value of PA are factors of importance when implementing PA in schools (Dyrstad et al., 2018; Jørgensen et al., 2020; Michael et al., 2019; Skage & Dyrstad, 2016; Webster et al., 2015, 2017). Parks et al. (2007) identified the need for substantial training as essential to optimally incorporate PA in subjects at school. In addition, challenges with implementation, lack of motivation, teachers' collaboration, support from school administrators, lack of control (behavioral settings), training/competence, and physical environments (e.g., outdoor facilities) have been identified as barriers towards implementing PA in their academic subjects (Goh et al., 2017; McMullen et al., 2016; Michael et al., 2019; Parks et al., 2007; Routen et al., 2018; Skage & Dyrstad, 2016; Webster et al., 2017). Regarding challenges related to the implementation process, the aim of our study was not to present an effective implementation model, but to examine what barriers that are perceived prominent among

secondary school teachers. The findings in our study may be of importance as it points at certain factors that must be taken into consideration for future research and implementation of PaL at secondary school level. The study investigated the following research question: *What barriers do secondary school teachers perceive over a period of 8 months, related to implementation of MI in school?*

3. Method

To elucidate secondary school teachers' perceptions of barriers in relation to implementation of PA in school, semi-structured interviews with 12 teachers were conducted at three different times (before, under and after a PA intervention) over a period of 8 months (2019–2020). The research project was approved by the Norwegian Centre for Research Data, and fulfilled ethical standards for empirical research. The participants were fully informed about the protocol prior to participating in the study, and a written consent was obtained from all participants.

3.1. Participants

Using stratified selection, the principal from one secondary school in central Norway approved the study. The school is based in the middle of Norway, and is the only secondary school in the municipality. The school had in total 256 students during the schoolyear of 2019/20, which is just above mean size of secondary schools in Norway (225). In consultation with the school management it was decided that 9th grade was invited to participate in the study, based on the arguments that 8th grade just had attended secondary school level, and that 10th grade was in preparation for their last exams. All 12 teachers (4 men, 8 women) teaching at the 9th grade level agreed to participate in the study.

The teachers represented a varied background related to teacher education and professional experience. The mix of teaching subjects varied among the teachers, but all taught several subjects. In aggregate, they covered all subjects offered at the secondary school level, except for the two foreign language subjects German and Spanish. Their age varied between 25 and 66 years old, and experience ranged from 1.5 to 41 years of teaching. Five teachers had 5 years or less of teaching experience, three teachers had between 6 and 14 years of teaching experience, while four teachers had 15 years or more of teaching experience. In Norway, classroom teachers are not trained to lead physical activities. In this study, three of the teachers had PE-education (more than 60 ECT).

3.2. Procedures and design

The interview data were based upon the experiences of the teachers contribution in a PA intervention that included an intervention period with implementation of 60 min of daily PA for a period of four weeks in October–November 2019. The intervention was designed based on the political proposal regarding implementation of 60 min of daily PA during school days. As the political proposal was not to be seen as an extension of PE as a subject, we wanted to give the teachers the opportunity to experience how to implement PA in their teaching subject. Therefore, based on the literature related to MI (see [Russ et al., 2017](#); [Webster et al., 2015](#)), the intervention included both PA breaks (during lessons but without academic integration) and PaL (academic integration). Due to an already scheduled timetable, in order to involve each of the teachers and most subjects, it was not possible to facilitate 60 min of PA every day. However, the intervention plan ensured that the total time of PA per week was 300 min. The PA-sessions varied in length, from 15 min to 45 min. The subjects involved in the research

project were mathematics, science, Norwegian, English, social studies, arts, and knowledge of Christianity, religion, philosophies of life, and ethics (KRLE). For the first two weeks of the intervention, teachers were instructed to implement PA as physical active learning (PaL). For the last two weeks, teachers could choose between PaL and PA breaks. All of the teachers reported that they used both PA breaks and PaL in the last period, and they conducted lessons with both PA breaks and PaL during the intervention. The teachers implemented an average PA of 55 min/day during the whole intervention period.

Prior to the intervention, three meetings with the participating teachers were held, where the aim of the intervention was presented. They were introduced to national recommendations regarding MVPA, but were not instructed to conduct activities that would facilitate MVPA, and told to facilitate 60 min of PA. In cooperation with the teachers, a time schedule was worked out, which clearly described when, in what subjects and who was responsible for PA during all weeks. In addition, they were given time to plan and prepare the period both in groups and individually. Relevant literature such as websites and a handbook with examples of activities was made available for the teachers. They were not given any extra training prior to the intervention. An important aspect of the intervention was that the teachers had to plan and conduct this period without any extra resources, to make sure that the intervention was as close to normal school settings as possible. One of the researchers was present in all of these meetings, and was available for questions and help - if needed. During the intervention period, one of the authors was present at the school, and acted as a passive observer. The researcher presence was to help out with accelerometers (if needed) and to give assistance related to practical questions. The researcher did also collect information whether the teachers followed the schedule or not, in order to control the amount of PA that was implemented. An essential prerequisite in this study was that the teachers should plan and conduct PaL in their natural setting, without any influence of the observer.

3.3. Data collection and analysis

The first interview was conducted one week prior to the intervention. The second interview was carried out during the first week after the intervention. The third interview was conducted 7 months after the intervention. The interviews were recorded by a digital voice recorder, and lasted between 30 min and 1 h, 23 min. The interviews took place in a meeting room at the school or at the university of the authors. Prior to the study, a pilot interview was carried out with one teacher at a secondary school in Norway, and the interview guide was then revised. The interview guide was structured into several topics, with general questions that were open-ended and non-leading, and a number of follow-up questions. The interview included questions, such as: 'Can you tell me about your experiences ...?'. The interview guide for the second interview was further developed based on the experiences and findings obtained in the first interview, and included follow-up questions related to the first interview. The same process was conducted for the last interview. As this study is part of a larger project focusing on several issues related to teachers perceptions of implementation of PA, the topics varied, e.g. teachers perceptions of different models for facilitating PA, their teaching background and former experiences related to PA, and their personal interests with PA.

In order to answer the aim of the present study, the teachers were asked to describe what challenges they might face (prior to the intervention), how they perceived the importance of PA having an effect on academical outcome, what factors they felt were of

great importance to succeed in implementing daily PA in school (both facilitators and barriers), and how they perceived their own competence in relation to implement PA. The second interview focused on their experiences with the intervention, and the teachers were asked how they planned and prepared their lessons, and how they perceived this (and whether it turned out as expected). They were also asked openly to reflect upon the intervention period, using follow-up questions where they were asked to elaborate their perceptions. In the third interview they were asked to reflect upon what factors that might influence them to continue or stop with PA. They were also asked similar questions as in the second interview, related to their experiences with the intervention in order to see if their perception had changed somewhat over time.

The interviews were transcribed and analyzed using QSR NVivo 10, taking a hermeneutic approach regarding data analysis. The hermeneutical approach focused on interpretation and to obtain valid understandings of the meaning of the data (Kvale, 1983). Polkinghorne (1983) refers to the concept of perception as attempting to understand meanings related to one's experiences. The emphasis is on a person's relation to the object or phenomenon that is experienced (Laverty, 2003). The analysis included all of the participants' statements, and their perceptions of barriers were taken as subjectively true (Armour & Griffiths, 2012). Statements were identified according to the theme of perspectives and experiences related to implementation of PA in different academic subjects, and then concentrated, condensed, coded and categorized in units of analysis, and finally reconstructed into four topics and two overall outcomes of the study, which we will present in the findings and discussion sections (Brinkmann & Kvale, 2015).

Following the hermeneutical principles of meaning (Brinkmann & Kvale, 2015), the analysis was initiated by a first reading of the transcripts to get a general understanding, in which the theme of this study, teachers' perception of barriers was identified. This process was followed by a new reading, with the aim to identify barriers that teachers expressed. During this process, categories were developed, such as "Time as a factor", "Perception of own competence", and "Implementation of PA at the expense of academic achievements". Both positive and negative perceptions were identified, and coded into subcategories. With such an approach, the teachers' statements were assigned codes that were classified into categories (Hastie & Glotova, 2012). This process was then followed by a new reading of the different categories and codes, where codes were moved, outlined, and/or split into new categories, until we came to a holistic understanding without contradictions. The process led to deeper understandings of the statements in the interviews according to our comprehension of the whole and the parts of the data, termed the hermeneutical circle (Kvale, 1983; Brinkmann & Kvale, 2015). The four topics and two overall outcomes were established from the interpretations of the teachers' statements during this process, such as: (a) "Time as a barrier", (b) "Perception of own competence", (c) "Unsure of academic outcome", and (d) "PaL does not fit in". The two overall outcomes were: Academic pressure and the need for new competence. Three researchers were engaged in the analysis process, and various alternatives for interpretation and perspectives were assessed. The researchers agreed on the categories and the assigned codes. This strategy contributed to intersubjective consensus in the analysis and strengthened the credibility of the findings.

4. Findings

The analysis of the interviews led to four key topics that described barriers related to implementing PaL: (a) "Time as a barrier", (b) "Perception of own competence", (c) "Unsure of

academic outcome", and (d) "PaL does not fit in". These topics will be further presented through direct quotes from the data in the following section.

4.1. Time as a barrier

In general, time constraints were uniformly identified as barriers by the teachers in relation to planning, meetings, and handling of emergent tasks during regular school days. Regarding implementation of PA, time was perceived as one of the main barriers. In the first interview, however, the teachers did have a positive outlook regarding time, and were positive according to dedicating a few minutes of their academic subject time to PA. In fact, they asserted that small periods of PA breaks would actually increase concentration and focus among their students towards the academic subject. The teachers perceived PA as highly feasible to be implemented as short breaks, and that it was actually necessary in periods of teaching substantial theoretical academic content in which students spend most of their time sitting in chairs. As these reflections illustrate, their positivism prior to the intervention was not related to PaL, but PA breaks.

In the second interview, just after the intervention began, the teachers expressed concern about time relation to PaL. An important result is that time as a barrier was highly associated with the implementation strategy, i.e., whether they integrated PA as PaL. In fact, three perceptions of time constraints were revealed in relation to PaL.

The first perception of time as a barrier is that PaL demands more time than just the activity itself, both before and after the activity. For instance, PaL required time for explanation, time to divide students into groups, time to physically move to other areas, time to change clothes, etc. Sarah's reflections after the intervention period clearly express that PaL took a relatively longer time, with regard to organization before, during, and after PaL:

Sarah: "What has been a challenge then, is if we are going out, and then the physical activity should be half an hour, but you spend the time of the whole lesson before you finish. Because first you have to explain it, and then we go out, and the students spend a long time getting out, and then they have to do that for half an hour. And then we go in, and then we have to clean up, and then the whole lesson has passed. So, you feel that it will be, maybe, not very effective then."

The teachers also questioned the effectiveness of PaL, as it took time to physically move to other areas and get the PA equipment to the appropriate location. As a consequence, an activity that intentionally should last, for example, for 15 min, ended up using almost the entire lesson. These experiences were in contrast to teachers' perceptions of PA prior to the intervention, and the main reason for this was that PaL took more time than do typical PA breaks.

The second main perception of time as a barrier is that it diverted needed time from the academic content. Although this perception was ubiquitous among the teachers, it became a markedly larger challenge for those who taught subjects with a less amount of allocated time. Phil, who taught English and social science, stated that the amount of time spent on PaL over time is not pragmatic considering the amount of time in which each academic subject is taught. For him, the amount of PaL that was implemented in the intervention was not viable in the long-term, as it simply occupied too much time:

Phil: "And I have faith in it [PaL] too, but as I said, with a subject that only has 2 h a week, I do not think this can work. It is not something you can run every week, for example".

That too much time is dedicated to PaL itself and that integrating PaL requires too much time, was common. Indeed, in order to allocate time for PaL, teachers had to omit some of the content of the

academic subject. As a direct consequence, implementing PaL impeded progress in the academic subject. In the last interview, Shaun explained that he spent more time on one topic in social science during the intervention than he normally does, and as a result, he had to omit some other topics later on:

“We had a chapter called the “Dish in the Sea”, which I had to drop, because we had spent so much time on this.”

The consequence of omitting some topics in subjects constituted a great concern. Due to curricular demands, and to prepare students for school-wide exams in the 10th grade, teachers became even more stressed about preparing their students for these assessments. They already felt that they had insufficient time before adding PaL. Shaun expressed this: *“I think it's because of the pressure we have on us because there are so many competence goals to be achieved ...”*

The third main perception of time as a barrier was that planning PaL required too much time. This perception was expressed by several teachers. The teachers expressed that time for planning is often under prioritized and other, often urgent, demands are prioritized. Urgent demands could often be behavior related cases among students and tasks that came up during the day that had so be solved immediately, in addition to meetings, reports and contact with parents. They also agreed that it took more time to plan lessons that included PaL in comparison to “normal lessons”, although this perception was somewhat dissimilar among teachers. While some teachers found time to collaborate and had positive experiences with this collaboration, other teachers reported that the planning was stressful, and that they spent an entire evening to prepare the PaL lesson for the following day.

4.2. Perception of own competence

Prior to the intervention, several of the teachers expressed concern about how to implement PaL. In his first interview, Phil explained the difficulty of both facilitating PA and focusing on academic content, and reported that only one or the other could be implemented successfully, but not both:

Phil: “If you are going to have a whole lesson like this, then you have to plan based on either that it will be a PA-lesson or that it will be an English lesson. I find it terribly difficult to imagine that one should ... Teach the intended English content and perform physical activity over time.”

The teachers' concern seemed to be related to the combination of academic subject and PA, and not directly to PA itself. It was when PA is integrated as part of a subject (PaL) that one's own competence led to a feeling of uncertainty or anxiety, as Jackie explained: *“... But, like connecting PA and, for example, Norwegian as I have then. I think that's scary ...”* She was unsure of how she would be able to successfully combine academic subjects and PA, and how she would be able to achieve sufficient intensity in the activity:

Jackie: “But, I'm not sure about what's going on. (...), I do not know the big thing, do not quite know what to do then. As in Norwegian, for example, what should I do? Because it will probably be Norwegian-related at the same time as there will be some hard physical activity. I feel that I, aaaahhh, how should I do this, what should I do?”

Although several of the teachers expressed this uncertainty in the first interview, others did not. Some of the teachers were positive and referred to successful previous experiences when asserting that implementing PA is achievable. When analyzing their expressions of competence over time, however, some perceptions seemed to change. For example, in the second interview, Jennifer described tension between PA and academic learning, in which she found it difficult to plan activities that fulfilled both aspects: *“It got a little stressful sometimes then, because ... I could not relate it well*

enough to what I was doing [academically] ... But, it was just because I could not plan well enough, so it's up to me then. Because I could not think well enough about incorporating the academic contrast.” Indeed, this was in contrast to her perspectives in the first interview, in which she saw possibilities, rather than challenges, related to this: *“For my part, I should do well, yes, I should always be able to come up with something, for me it's not a problem ... Because I have taught physical education ... And there are many fun activities where you can play, right, also in other subjects.”* Her different perceptions over time might indicate disparity between her perceptions of PA prior to the intervention and the strategy used in this study, i.e., PaL. Implementing PaL may differ from her previous experiences, in which PA was integrated as PA breaks.

4.3. Unsure of the academic outcome

Another main finding in this study was that teachers expressed uncertainty regarding the effect of PA on academic outcomes, especially in relation to high intensity PA. Prior to the intervention, many teachers expressed a positive belief that PA breaks might increase students' ability to concentrate and focus on the subject matter. This perception indicates that they saw PA integrated as breaks, and not as PaL. As a result, a majority of these findings were found in the analysis of the second and third interview. Only a few of the teachers stated this uncertainty prior to the intervention.

Several of the teachers used competitions as a form of activity when they facilitated PaL, and stated that they felt that this was necessary to bring about intensive PA in which students become sweaty and tired. At the same time, however, the teachers were unsure of how much academic benefit the students received. Jackie expressed this as follows:

Jackie: “I think they became so ..., at least when we did the competitions ..., I think they are in such a competition mode that I do not think they can think so much about whether it is subjective or adjective, hehe, I am very unsure about that.”

This uncertainty concerning the learning effect, expressed in the statement above, applies to more than just competitive activity, but also to facilitating PaL. When reflecting on academic outcomes, Karen did not seem to have any solution to the problem, but did explain that this has been a substantial issue among teachers: *Karen: “We have talked a bit about it, do we feel that, with physical activity (PaL), do we feel that they have learned something more academically?”* Emily summed up the responses that teachers had to this question: *“I have no idea what they are left with, afterwards. I think it is difficult.”* The consequence seems to be that the teachers found it difficult to advocate for implementing PaL if it did not benefit the academic content:

Shaun: “I probably think that many people think, including myself that, at least as it has been now, you have the academic goals you have to achieve, and then you are a little unsure if you will reach them by going outside [with the class for PaL] ... if there is nothing academic in it, then you feel that you have lost a lot simply then, you do.”

As Shaun expressed, the significant decrease of academic outcome, or the perception that PaL occurs at the cost of academic achievement, seemed to be present. Although he was confident about facilitating PaL, he was worried that the diminishment of academic outcome might be a barrier that would also increase over time. Moreover, the perception that PaL must also contribute some value to the academic outcome existed; otherwise, including it into the academic subject would be deleterious overall. Although the teachers in this study offered no concrete evidence to support their perceptions, they expressed the feeling of not having control over the learning process of their students. In the last interview, some of the teachers referred to assessment tests in their academic subjects

after the intervention period. Specifically, they did not find any significant changes in their students' performance on the tests, which would support their doubts about whether it has an academic effect. The concern related to how PaL contributes to academic content is closely connected to the next topic, "PaL does not fit in", which will be described further in the following.

PaL does not fit in.

Several of the teachers were adamant that PA must fit in with the academic content when integrating PaL. To achieve this aim, one challenge was to determine how to set up the lesson so that the activities become a natural part of the academic subject. Another challenge was determining how PaL fits into different topics within subjects, or a single subject as a whole.

When reflecting on the intervention period, and how they conducted PaL, several of the teachers stated that they prioritized physical activities rather than spending time reviewing or summarizing academic content during the lesson. In normal classroom settings, they often finish their lesson by summarizing the academic content; whereas, when they integrated PaL, this was not prioritized. Laura expressed this as follows:

Laura: "Because it turned out that way, that we spent about the whole lesson, maybe started by handing out the weekly schedule and said something about it, and then we went out, and then the lessons were finished when we finished out, so we did not get together and talk about what we had done, what we learned now."

The act of summarizing academic content may be seen as a didactic strategy, in which all disparate knowledge that is taught within a single class is reconstructed into a more comprehensible whole. Summarizing academic content, of course, does not lead to increased PA, as this activity often involves inactivity and teacher-led situations. However, integrating PA might influence this strategy. Indeed, teachers in this study seem to degrade this strategy for the benefit of PA, although they did not think that this was preferable. This sentiment was expressed by Phil: "I would prefer to stop a little more often to talk about what they have achieved, but since the point is the physical activity, you can say, it will be so you just have to let it go then."

Although they managed to facilitate PaL in several subjects, the teachers stated that it did not necessarily fit into all subjects or different topics within subjects. Two of the teachers facilitated PaL as part of the subject "arts", and found it difficult to both fit into the actual topic as well as the whole subject. Amanda stated: "I felt that it was very difficult to facilitate PaL in arts, for example, at least when we were working on the topic of ceramics, which should not dry." Teachers felt that facilitating PaL was challenging, especially considering that they had to break up the practical activities that they were doing, and thus it imparted a disruptive effect on the learning process. Moreover, they had to use themes with which they did not normally work, without being able to summarize the individual aspects taught with the theme on which they actually worked. Emily expressed this as follows:

Emily: "I think that this is a subject (arts) where they eh, already in a way are a bit out of the classic classroom turnover. They walk around and move, work with their hands, eh So I, I think, I think it's hard to find arguments to get it right there."

The same arguments were found among other teachers, as well as in other subjects. Lisa, a teacher of science, found it difficult to integrate PaL into the actual topic during the intervention. She stated: "The topic we have been working on the last two weeks has been like the 'curious method and research', which has stopped me a bit then ... I have not managed to, I have not come up with anything which I have managed to relate to the topic rather." Indeed, in the second and third interview, the teachers argued that PaL might fit as repetition activities, such as grammar repetition tasks, summarizing academic topics, etc. However, they seemed to be unsure

about how to combine PaL with learning something new or introducing new topics. For instance, Laura stated that learning new strategies in mathematics is dependent on concentration and focus, which would not be feasible with highly intensive activities.

5. Discussion

The analysis of this study revealed four main perceptions of barriers related to implementation of PA in secondary school. We will now discuss these findings in relation to previous research and present two issues that can be representative for the findings: academic pressure and the need for new competence.

Previous studies have identified time constraints as one of the primary barriers for teachers to succeed with implementation of PA in schools (Dyrstad et al., 2018; McMullen et al., 2016; Michael et al., 2019; Webster et al., 2015). Our finding - that implementation of PA diverts time away from academic tasks, has also been reported in earlier research (Brown & Elliott, 2015; Stylianou et al., 2016), although our findings point towards certain nuances. For instance, that time as a barrier seemed to be related to the PaL strategy and the amount of PA that has been integrated, and not necessarily to PA itself. Although the teachers were positive about taking small breaks during their lessons, integrating PaL was perceived as more stressful by the teachers, as it consumed time, and threatened successful instruction of the designated academic content.

Our findings related to teachers' perceptions of their own competence are in accordance with previous studies identifying the lack of competence or training as a barrier for succeeding in implementing PA in school (Michael et al., 2019; Routen et al., 2018; Skage & Dyrstad, 2016). However, our results also revealed certain nuances, as the teachers' perceptions in this study differed between PA and PaL. The teachers may well be able to create and conduct PA as breaks from academic study, and even with high intensity. This concern seems not to be related to the PA itself, but rather to the combination in which the teachers need to include both the PA and the academic content. Our interpretation of the teachers' statements regarding the complexity when it comes to PaL, can reasonably relate to the need of a new or different form of competence, where teachers combine PA and academic content, compared to the use of PA breaks or traditional teaching methods. To our understanding, this competence does not require either strong professional education or experience related to the subject or PA *per se*. In fact, the requisite competence seems to be a combination of these into a new practice within classroom teaching. The findings that we have presented in this study corresponds with previous studies that have identified the need for substantial training in order to optimally incorporate PA in subject at school (Parks et al., 2007), especially related to PaL. To our understanding, substantial support at schools, district level, and/or during teacher training related to PA integration should be beneficial for this matter.

In a review, Michael et al. (2019) found that teachers' perceptions of the value of PA is a central facilitator of implementing PA. The uncertainty described by the teachers in this study might indicate that their experiences caused them to be dubious about the benefit of PaL. As one of the teachers asked: "Do we feel that they have learned something more academically?" The findings presented here are consistent with earlier research that has examined pressure on academic outcomes and curriculum demands when implementing PA in older primary school grades (Brown & Elliott, 2015; Stylianou et al., 2016), and the contention that PA must contribute to academic goals (Michael et al., 2019). Viewing these findings in relation to the teachers' perceptions of time as a barrier would indicate the existence of doubt regarding the value of PA in

terms of academic outcomes.

When it comes to the finding that PaL does not fit into the subject, similar findings have been reported in extant literature (Michael et al., 2019; Webster et al., 2015). A key question here is whether the academic goals and the subject content should decide the use of method, or the opposite. It may seem that the teachers attempted to adapt the content of the lessons (subject matter) to the method (organization), and thus it became challenging to create a holistic learning process. As a consequence, a pertinent question becomes whether it is possible to implement PA to this extent in secondary school because it does not feel natural to facilitate PA in certain topics or subjects.

5.1. Perceptions of barriers: a reflection of academic pressure and the need for new competence

Summarizing the perceived barriers identified in this study, two issues are especially evident: (1) teachers' feelings of academic pressure; and (2) the need for new competence. Academic pressure seemed to be a common issue, which highlights the tension between implementing PA and curriculum demands. Teachers' perceptions can be understood as pressure to cover all of the intended subject matter, to ensure that the students are prepared for future exams and assessments, and not to lose time that has been designated for academic content. The teachers were largely positive about taking a few minutes for PA; however, when they organized it as PaL, markedly more time was required for its organization, i.e., before, during, and after its implementation. Therefore, it took substantially more time than anticipated and, for example, and 15 min of PaL often became 30 min. Since the teachers also were dubious about whether PaL contributed academically, it was reasonable that they would ask whether or not the implementation of PaL is reasonable. In subjects that have only a few lessons per week, the validity of this question becomes even more evident. For instance, if a subject has only two scheduled lessons per week, and one of these two lessons is occupied with PaL, the pressure to get through two lessons of academic curriculum in one session may be intense. As a result, the teachers can experience substantial stress, in which they feel pressure to simultaneously increase the students' PA level and create optimal learning situations for academic subjects. The integration of PA in this study would clearly put extra pressure on the subjects with fewer amount of hours. As our study indicates, this might have influenced the teachers' perception of academic pressure. The importance of being aware of the diversity of the subjects, and adjust the amount of PaL introduced in the different subjects is, to our concern, not examined earlier, and should be given more attention in future research and discussions of implementing PaL. Without presenting any solution to this matter, implementation of PaL with differentiations between subjects might be favorable. Interdisciplinary integration of PaL, or differentiation between subjects when it comes to amount of time spent with PaL, are examples that can contribute positively to this matter.

Although few relevant investigations have been carried out in secondary school settings, research has examined curriculum goals and assessment demands as a barrier among teachers in older grades in primary schools (Brown & Elliott, 2015; Michael et al., 2019; Stylianou et al., 2016). Studies have demonstrated that teachers find it highly challenging to prioritize time for PA, as they had to prioritize parts of the academic subject that were going to be assessed in school-wide tests (Brown & Elliott, 2015; Michael et al., 2019). The findings in the present study indicate that the perception of academic pressure constitutes a greater barrier compared to findings in primary school research. Among the barriers examined in this study, academic pressure stands out as a major barrier

involving much of the teachers' practice. In fact, implementation of PA in secondary schools might be associated with this complexity to a greater extent than has been previously reported.

Teachers' perceptions of own competence in this study indicated that this is an important factor in secondary school, which is in line with previous research (Dyrstad et al., 2018; Michael et al., 2019; Webster et al., 2015). Prior to the intervention, the teachers were not given any extra training related to neither PA or PaL. Parks et al. (2007) identified the need for substantial training as essential to optimally incorporate PA in subjects at school. As the teachers were not used to facilitate PaL, this might have influenced their perception of not being competent. Although the teachers were given some extra time to plan the intervention, and one of the researchers were available during the planning period, the findings illustrate that the teachers were uncertain about how to successfully integrate PA into the academic content. As the teachers were not given any additional training prior to the intervention, the design of the study (which not included this aspect) might have influenced their perception of own competence negatively. On the other hand, the way the teachers prepared for the intervention could be seen as a natural way of planning, as it did not involve any extra resources, which is somewhat natural in their teaching practice. In practice, teachers are free to choose teaching methods, and must plan and conduct their lessons for themselves or in cooperation with other teachers. The way the teachers were told to plan this intervention was therefore not unfamiliar, and should be seen more as a natural and realistic situation in the Norwegian context. The way the planning and intervention was designed, the findings related to their perception of competence illustrate that this aspect must be taken into consideration if the aim is to succeed in implementing PA in secondary schools. However, the analysis revealed that the teachers perceived this need for new competence especially when it came to academic integration of PA (PaL). For instance, when PA is organized as PaL teachers in this study expressed this uncertainty regarding their own competence. One of the teachers, Jackie, stated that "I do not see it" to express that she was unable to determine how to successfully combine subjects and PA. This situation was described as frightening and stressful, and could be interpreted as an indicator of uncertainty related to one's own competence. In fact, it seems that facilitating PA as PaL requires a different form of competence than PA breaks or traditional teaching methods. A strong professional education, a teaching education related to the subject itself, or movement competence, are all insufficient. The requisite competence seems to constitute a combination, in which the new practice differs markedly from the teaching practices that they normally use. Moreover, it seems that teachers prioritized activities that facilitated as much intensive activity as possible, such as competitions. This was in line with the intention of the intervention. It also corresponds to what seem to be the discourse of both research and political attention (Norwegian Directorate of Health, 2014; Norris et al., 2015; Norwegian Directorate of; WHO, 2010). During this intensive activity, it became difficult to focus on learning at the same time. Furthermore, as the teachers emphasized PA and high intensity activities, they did not take the time to summarize and reflect on the theoretical academic content during the lesson. The focus was on whether the students reached the health recommendations, and how to optimally combine PA and academic content seemed unclear.

5.2. Strength and limitations

In a qualitative study using in-depth interviews, the study included a high number of participants (twelve teachers). The study also used a longitudinal design with three interviews before, during

and after an actual intervention that the participants took part in – resulting in 36 interviews. This are strengths of the study, giving new insight into teachers' perceptions of barriers related to implementation of daily PA in secondary school. The fact that most of the participants seemed to confirm the same main findings, strengthens the credibility and reliability of the study. However, the study has some limitations. Using a qualitative study, investigating only one single school, it is necessary to be cautious in the generalizability of our conclusion. In order to examine whether our findings are representative and transferable to other districts or countries, future research should include quantitative studies, using statistical analyses. Furthermore, most of the participants were women, and both personal and professional experience with PA varied a lot among the participants. Furthermore, few of the teachers did have PE education, which is the only subject that is related to PA in Norwegian schools. On the other hand, we will argue that the participants reflects the natural distribution of teachers in Norwegian schools. Nonetheless, the findings have a credible general validity on the basis that the participants seem to be in broad agreement in their experiences related to barriers implementing PA in school, and that other teachers have something to learn according to the teachers experiences.

6. Conclusion

This study examined teachers' perceptions of barriers related to the implementation of PA and PaL. The barriers that teachers perceive were found to be time, own competence, academic outcome, and inability of PaL to fit within academic content. By analyzing the findings, two main issues can be described as overarching: academic pressure and the need for new competence. From a practical perspective, implementation of PA must consider the appropriateness of how PA, and especially how PaL can fit into the subject matter. The findings also indicate that the teachers must consider how to plan and conduct PA during lessons, so that it does not use time dedicated to academic content. As the findings seem to illustrate, facilitating PaL requires more of the teachers when it comes to planning, competence and time, teachers must take these aspects into consideration when implementing PaL. Future interventions and implementation processes should also take these perspectives into consideration in order to achieve optimal outcomes. More research in secondary school level is needed to confirm our findings, and especially take into consideration the perception of academic pressure among teachers at this level. The findings also illustrate that teachers' perceptions of new competence regarding the implementation of PaL should be given attention when planning and conducting future intervention in secondary schools.

References

Armour, K., & Griffiths, M. (2012). Case study research. In K. Armour, & D. Macdonald (Eds.), *Research methods in physical education and youth sport* (pp. 204–216). London: Routledge.

Åvitsland, A., Ohna, S. E., Dyrstad, S. M., Tjomsland, H. E., Lerum, Ø., & Leibinger, E. (2020). The process evaluation of a school-based physical activity intervention: Influencing factors and potential consequences of implementation. *Health Education, 120*(2), 121–139.

Bartholomew, J. B., & Jowers, E. M. (2011). Physically active academic lessons in elementary children. *Preventive Medicine, 52*, 51–54.

Blair, S. N. (2009). Physical inactivity: The biggest public health problem of the 21st century. *British Journal of Sports Medicine, 43*(1), 1–2.

Brinkmann, S., & Kvale, S. (2015). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). Thousand Oaks, Calif: Sage.

Brown, K. M., & Elliott, S. J. (2015). It's not as easy as just saying 20 minutes a day": Exploring teacher and principal experiences implementing a provincial physical activity policy. *Universal Journal of Public Health, 3*(2), 71–83.

Dyrstad, S. M., Kvalø, S. E., Alstveit, M., & Skage, I. (2018). Physically active academic lessons: Acceptance, barriers and facilitators for implementation. *BMC Public Health, 18*(1), 1–11.

Goh, T. L., Hannon, J. C., Webster, C. A., & Podlog, L. (2017). Classroom teachers' experiences implementing a movement integration program: Barriers, facilitators, and continuance. *Teaching and Teacher Education, 66*, 88–95.

Goh, T. L., Hannon, J., Webster, C. A., Podlog, L. W., Brusseau, T., & Newton, M. (2014). Effects of a classroom-based physical activity program on children's physical activity levels. *Journal of Teaching in Physical Education, 33*(4), 558–572.

Hastie, P., & Glotova, O. (2012). Analyzing qualitative data. In K. Armour, & D. Macdonald (Eds.), *Research methods in physical education and youth sport, 309–320*. London: Routledge.

Institute of Medicine. (2013). *Educating the student body: Taking physical activity and physical education to school*. Washington, DC: National Academies Press.

Jørgensen, H. T., Agergaard, S., Stylianou, M., & Troelsen, J. (2020). Diversity in teachers' approaches to movement integration: A qualitative study of lower secondary school teachers' perceptions of a state school reform involving daily physical activity. *European Physical Education Review, 26*(2), 429–447.

Kibbe, D. L., Hackett, J., Hurley, M., McFarland, A., Schubert, K. G., Schultz, A., & Harris, S. (2011). Ten Years of TAKE 10!: Integrating physical activity with academic concepts in elementary school classrooms. *Preventive Medicine, 52*, 43–50.

Knuth, A. G., & Hallal, P. C. (2009). Temporal trends in physical activity: A systematic review. *Journal of Physical Activity and Health, 6*(5), 548–559.

Kolle, E., Säfvenbom, R., Ekelund, U., Solberg, R., Grydeland, M., Anderssen, S. A., & Steene-Johannessen, J. (2016). Utprøving og evaluering av modeller for fysisk aktivitet for elever i ungdomsskolen [Testing and evaluation of models for physical activity for students in upper secondary school]. *Henta, 7*, 18.

Kriemler, S., Meyer, U., Martin, E., van Sluijs, E. M., Andersen, L. B., & Martin, B. W. (2011). Effect of school-based interventions on physical activity and fitness in children and adolescents: A review of reviews and systematic update. *British Journal of Sports Medicine, 45*(11), 923–930.

Kvale, S. (1983). The qualitative research interview: A phenomenological and a hermeneutical mode of understanding. *Journal of Phenomenological Psychology, 14*(2), 171–196.

Laverty, S. M. (2003). Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. *International Journal of Qualitative Methods, 2*, 21–35.

McMullen, J. M., Martin, R., Jones, J., & Murtagh, E. M. (2016). Moving to Learn Ireland – classrooms teacher's experiences of movement integration. *Teacher and Teacher Education, 60*, 321–330.

Michael, R. D., Webster, C. A., Egan, C. A., Nilges, L., Brian, A., Johnson, R., & Carson, R. L. (2019). Facilitators and barriers to movement integration in elementary classrooms: A systematic review. *Research Quarterly for Exercise & Sport, 90*(2), 151–162.

Norris, E., Shelton, N., Dunsmuir, S., Duke-Williams, O., & Stamatakis, E. (2015). Physically active lessons as physical activity and educational interventions: A systematic review of methods and results. *Preventive Medicine, 72*, 116–125.

Norwegian Directorate for Education and Training. (2021). *Fag- og timefordeling og tilbudsstruktur for Kunnskapsløftet Udir-1-2021 [Framework regulating the distribution of teaching hours per subject. Norwegian curricula. https://www.udir.no/regelverkstolkninger/opplaring/innhold-i-opplaringen/udir-1-2021]*, 2021.

Norwegian Directorate of Health. (2014). *Anbefalinger om kosthold, ernæring og fysisk aktivitet [Recommendations on diet, nutrition and physical activity. IS-2170]*.

Norwegian Ministry of Health and Care Services. (2020). *Sammen om aktive liv. Handlingsplan for fysisk aktivitet 2020-2029 [Together about active lives. Action plan for physical activity 2020-2029]*.

Parks, M., Solmon, M., & Lee, A. (2007). Understanding classroom teachers' perceptions of integrating physical activity: A collective efficacy perspective. *Journal of Research in Childhood Education, 21*(3), 316–328.

Polkinghorne, D. (1983). *Methodology for the human sciences: Systems of inquiry*. Albany: State University of New York Press.

Resaland, G. K., Moe, V. F., Aadland, E., Steene-Johannessen, J., Glosvik, Ø., Andersen, J. R., & Anderssen, S. A. (2015). Active Smarter Kids (ASK): Rationale and design of a cluster-randomized controlled trial investigating the effects of daily physical activity on children's academic performance and risk factors for non-communicable diseases. *BMC Public Health, 15*(1), 1–10.

Routen, A. C., Johnston, J. P., Glazebrook, C., & Sherar, L. B. (2018). Teacher perceptions on the delivery and implementation of movement integration strategies: The CLASS PAL (Physically Active Learning) Programme. *International Journal of Educational Research, 88*, 48–59.

Russ, L. B., Webster, C. A., Beets, M. W., Egan, C., Weaver, R. G., Harvey, R., & Phillips, D. S. (2017). Development of the system for observing student movement in academic routines and transitions (SOSMART). *Health Education & Behavior, 44*(2), 304–315.

Skage, I., & Dyrstad, S. (2016). Fysisk aktivitet som pedagogisk læringsmetode i skolen [Physical activity as a pedagogical learning method in school]. *Fysioterapeuten, 5*(16), 20–27.

St Leger, L. (2000). Reducing the barriers to the expansion of health-promoting schools by focusing on teachers. *Health Education, 100*(2), 81–87.

Steene-Johannessen, J., Anderssen, S. A., Bratteteig, M., Dalhaug, E. M., Andersen, I. D., Andersen, O. K., Kolle, E., Ekelund, U., & Dalene, K. E. (2019). *Nasjonalt overvåkningsystem for fysisk aktivitet og fysisk form. Kartlegging av fysisk aktivitet, sedat tid og fysisk form blant barn og unge 2018 (ungKan3) [National monitoring system for physical activity and physical fitness. Mapping of physical activity, sedat time and physical shape among children and young people 2018 (ungKan3)]*.

- Stortinget. (2017). *Innst. 51 s (2017–2018). Innstilling fra helse- og omsorgskomiteen om Representantforslag om å innføre en ordning som sikrer elevene på 1.-10.trinn minst én time fysisk aktivitet hver dag. [Recommendation from the health and care committee on Representative proposal to introduce a scheme that secures students in grade 1-10 at least one hour of daily physical activity.*
- Stylianou, M., Kulinna, P. H., & Naiman, T. (2016). '... because there's nobody who can just sit that long' Teacher perceptions of classroom-based physical activity and related management issues. *European Physical Education Review*, 22(3), 390–408.
- Vazou, S., & Skrade, M. (2014). Teachers' reflections from integrating physical activity in the academic classroom [Abstract]. *Research Quarterly for Exercise & Sport*, 40(1), 181–188.
- Webster, C. A., Russ, L., Vazou, S., Goh, T. L., & Erwin, H. (2015). Integrating movement in academic classrooms: Understanding, applying and advancing the knowledge base. *Obesity Reviews*, 16(8), 691–701.
- Webster, C. A., Zarrett, N., Cook, B. S., Egan, C., Nesbitt, D., & Weaver, R. G. (2017). Movement integration in elementary classrooms: Teacher perceptions and implications for program planning. *Evaluation and Program Planning*, 61, 134–143.
- Who. (2010). *Global recommendations on physical activity for health*. Geneva, Switzerland: World Health Organization.
- World Health Organization (WHO). (2008). *School policy framework: Implementation of the WHO global strategy on diet, physical activity and health*. Geneva, Switzerland: World Health Organization.