Physical ability and strength training in physical education and health
- a qualitative study of Swedish PEH teachers’ views and practices of strength training as a way of developing their students’ physical ability

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Abstract

This study explores how a group of Swedish physical education and health (PEH) teachers interpret the term physical ability and how they view the possibilities of using strength training in developing their students’ physical ability, which forms a part of the knowledge requirements and core contents in the upper secondary school course “Physical education and health 1”. The method used in the study consists of qualitative semi-structured interviews with five PEH teachers from different upper secondary schools in southern Sweden. The results of the study show similarities between the teachers’ interpretations of the central concepts, as they interpret physical ability mostly as a practical skill. They also view that strength training has an important role to play in the development of physical ability although their own interpretations of the curriculum result in different teaching practices related to strength training. In their actual teaching practices, it mostly varied what theoretical parts of strength training were taught and how much teachers focused on these parts. In conclusion, this study argues that the formulation of the curriculum plays a major role how PEH teachers interpret the term physical ability and how they view strength training as a part of developing students’ physical ability.

Keywords: strength training, resistance training, physical ability, physical education, PE, fitness, health, injury prevention, upper-secondary school, high school
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1 Introduction

The teaching practices in the Swedish school subject, physical education and health (PEH), aims to develop students’ physical ability (‘kroppslig förmåga’ in Swedish) by including a variety of physical activities and training methods. This is stated in the curriculum by The Swedish National Agency for Education in the following way:

Teaching in the subject of physical education and health should aim at helping students develop their physical ability, and the ability to plan, carry out and assess a variety of physical activities that promote all-round physical capacity.

(Skolverket 2011a, p. 1)

PEH curriculum includes both practical and theoretical knowledge of practices and methods, which develop all-round physical ability. It is further stated that the course physical education and health 1 (PEH 1) should cover “exercise, sports and outdoor activities which develop all-round physical ability” and “training methods and their effects, such as training fitness and coordination” (Skolverket 2011a p. 3). There are many different types of activities and training methods which can help students develop and promote their physical ability, which is a complex term that can be interpreted differently.

The curriculum does not provide a concrete definition of physical ability, and it is not defined what different training methods should be included. This can cause problems for PEH teachers to interpret these terms, and also result in differences in their teaching practices related to this concept. This study is particularly interested in how PEH teachers interpret the term physical ability and how they view the possibilities of strength training, which can be seen as one example of training methods in developing students’ physical ability.

Strength training as a training method in PEH was also chosen for this study because there is an apparent lack of research about the views and use of strength training in upper secondary school in Sweden. Due to the popularity of strength training during young peoples’ free time, accurate knowledge of strength training methods decreases the risk of injury and helps to increase the benefits associated with it. Although strength training has been criticised as a
dangerous training method for young people (e.g. Faigenbaum et al. 2009), it is interesting to examine the views of PEH teachers on strength training and how they possibly work with such training methods as part of their teaching practice.

1.1 Aim and research questions
The aim of this study is to explore how Swedish PEH teachers understand the term physical ability and how they view strength training as a part of developing their students’ physical ability as outlined in PEH 1. This study also aims to examine if PEH teachers teach strength training methods in PEH 1, and, if so, what these methods involve. The following research questions are addressed in the study:

1. How do Swedish PEH teachers interpret the term physical ability?
2. How do PEH teachers view the possibilities of using strength training methods in developing their students’ physical ability?
3. How do PEH teachers work with strength training methods and their effects in PEH 1?
2 Background

This section begins with a brief introduction of the term physical ability. Following that, a few different methods of strength training and its possible effects on physical ability are presented. At the end, the history of physical ability and strength training in the Swedish PEH curriculum is explained.

2.1 Physical ability

Physical ability is one of the central terms in the curriculum and in the syllabus of PEH 1. The term is not described in the curriculum itself, but is explained in the curriculum’s comment material (support material for the curriculum). Physical ability describes skills dealing with happiness to move, coordination, condition, strength, mobility, understanding of one’s own body, mental skills and motivation (Skolverket 2011b).

There is also a support material for grading in PEH. That material also provides a definition what physical ability means in the curriculum. According to this material physical ability includes three different dimensions and these are: a movement dimension, which is connected to movement quality; a social dimension that means an ability to move with other people; and a cognitive dimension, which means an understanding of movement in different situations and the environment. Physical ability includes different aspects and it has many similarities with the term physical literacy. It can be developed for example by doing diverse activities, training and connecting these to everyday life and well-being (Skolverket 2014).

Whitehead (2010 p. 5) writes that “physical literacy can be described as the motivation, confidence, physical competence, knowledge and understanding to maintain physical activity throughout the life course”. For long there has been a discussion in the field of PEH about the different terms that are most appropriate to use to describe the bodily skills and abilities that the students are supposed to develop in this school subject. Physical literacy is closely related to physical competence and physical ability but there are still differences between these terms; since they are seen a part of physical literacy which is a broader term (Whitehead 2010). However, physical ability is also a broad term and that is the term which is currently used in the PEH curriculum in Sweden.
There are several different interpretations of physical ability and it is not easy to define exactly what it means. Nyberg and Larsson (2016) provide a couple of descriptions of physical ability and in the first one, it is described as a skill to move in different ways. This connects to an ability to plan and assess diverse activities, which can naturally be strength training, condition training and mobility training for instance. Physical ability is also closely related to anatomy, biomechanics and physiology (Nyberg & Larsson 2016).

Another interpretation of physical ability describes it as an ability to evaluate one’s own and others’ experiences and observations of different ways to move and participate in diverse movement activities (Nyberg & Larsson 2016). This kind of interpretation can connect to students’ ability to develop their skills to participate in many sorts of physical activities. This development could happen by relating and analysing one’s own experiences of physical activities (Nyberg & Larsson 2016).

2.2 Strength training in developing physical ability

Physical ability includes different skills and some of them can be improved by doing strength training. For example, muscular strength and muscular endurance and power can be developed by doing strength training. These are common goals of strength training and can develop physical ability (Angel 2014).

Strength training, sometimes called resistance training, can be divided into different types of training methods; such as free weights, weight machines, elastic bands, medicine balls and bodyweight training. Although the specific type of method depends on the goals of the strength training, there is also a chance to do many kinds of exercises by using each of these methods. For instance, it is possible to develop muscular endurance, strength, and power by using free weights, which offer a broad range of possible exercises. The major limitation of free weights is that there is a higher accident risk, especially if the proper technique is not learned (Faigenbaum & Westcott 2009). It is also possible to use weight machines, which are in general safer than free weights but there is not usually as good a possibility to do a full range of movements as in free weights, which also require more body stabilisation (Kenney, Willmore & Costill 2011). Medicine balls are often used in core strength training and they are an effective
option to free weights, such like elastic bands, which can be used to stabilise the whole body, especially when training is planned young people (Faigenbaum & Westcott 2009).

Bodyweight training is the oldest form of strength training and “obviously, a major advantage of bodyweight training is that you need no equipment, and therefore it is free of cost” (Faigenbaum & Westcott 2009 p. 139). It might be good to start strength training with body weight training before moving to free weights or machines because that type of method is safer and easier to do (Faigenbaum & Westcott 2009).

Strength training is recommended for children and adolescents but they must have the proper technique, especially when they lift heavy weights. If children and adolescents are able to do sport, then they can do strength training as well (Faigenbaum & Westcott 2009). Tonkonogi (2009) says that children seven-eight years old could begin strength training and does not mention that younger children could not. Unlike previously believed, strength training can be started from a young age and is even recommended for growing children and adolescents. However, they are not yet adults and caution should be taken when training younger children (Faigenbaum & Westcott 2009).

Although strength training can be started early, there are risk factors that need to be taken care. “Because cartilage is not as strong as bone, the growth plates (section of cartilage at the end of long bones in children) are an area that can be highly susceptible to injury” (NASPE 2010 p. 110). Repetitive strain and tissue injuries are also more common among young people and that emphasises the importance of proper technique and appropriate weights (Peterson & Eriksson 1984).

However, strength training methods can also be utilised to prevent injuries because they strengthen both muscles and the skeleton. For instance, it is common to use strength training as a method to prevent knee injuries and rehabilitate from them (Peterson & Renström 2003). There is also some research which shows that strength training can decrease illness such as chronical back pain (Tonkonogi 2007).
2.3 Physical ability and strength training methods in Swedish PEH curricula

There have been three different curricula for upper secondary schools in the Swedish school system’s history. The latest one, which still applies today, was released in 2011 (Linde 2012) and the two previous ones were from 1994 and 1970 (Lindmark 2007). The original curriculum from 1970 did not include much PE, which was earlier known as Gymnastics. The Swedish National Agency for Education was earlier known as “Skolöverstyrelsen” but it changed to “Skolverket” later (The Swedish Schools Inspectorate 2015).

In the first curriculum, all-around training and good endurance formed the core contents of teaching practices. The importance of physical activity was also mentioned but there was nothing about physical ability or strength training (Skolöverstyrelsen 1975). In 1987, there was more information added but the term physical ability was not included. It was written that students should develop their motor skills and understanding of their body. Information about strength training was also added and was a goal in the teaching of PE to try to develop good strength for students and other body skills as well by doing different types of exercises (Skolöverstyrelsen 1992).

In the 1994 curriculum, different types of physical training were mentioned and their importance for good health. This means both theoretical and practical knowledge of training methods and physical activity (Skolverket 1994). Different aspects of developing physical skills and knowledge of the own body were stated in the curriculum but the term physical ability was not used in the curriculum. Strength training was also not explicitly mentioned in the curriculum itself, but the curriculum comments material for PEH said that children and adolescent have less muscular strength and higher body weight than before. This is also connected to physical inactivity, which had increased in the last fifteen years (Skolverket 1994).

In the latest curriculum from 2011, physical ability and different training methods have a central role. Strength training is not explicitly written in the curriculum, the term physical ability includes, according to the curriculum’s comment material (Skolverket 2011b), muscular strength, muscular endurance, and power, since the Swedish word “styrka” includes all of these three terms.
According to the curriculum, students should develop their understanding of how different training methods affect their body and should also get to know their own body better (Skolverket 2011a). It is also written in the knowledge requirements that the students should do different activities that improve their physical ability, and they should understand different aspects that influence their physical ability (Skolverket 2011a). Training and a knowledge of possible risks are also written in the knowledge requirements of PEH 1, stated as: “Students can in detail and in a balanced way describe risk factors in connection with training and practice of the sport, and adapt training and practice to minimising risks” (Skolverket 2011a p. 5).
3 Previous research

There is some previous research regarding PEH teachers’ interpretations and teaching about physical ability in Sweden, but internationally physical literacy is the more commonly used term (Lundvall 2014). Different strength training methods are well researched because they are widely used among athletes and people who want to exercise in their spare time. Some studies about the subject’s context in Sweden include information on how much strength training is used in PEH, but there is not much research on how it is being taught.

3.1 Physical ability in Physical education and health

The term physical literacy has become more popular, and after the 2000s more research of it has been published. Physical literacy has also become more common in PEH, and that term is related to the understanding of different movements and not just practical skills.

The literature advocated the physical literacy as an answer to the lack of philosophical ideas experienced in PE, a rationale that can underpin the school subject PE, and a foundation for the development of children and youth throughout life.

(Lundvall 2014 p. 115)

It has been seen that physical literacy has an educative role in PE, as it also means an understanding of different physical activities. However, physical literacy is also related to practical skills and sometimes to fundamental movement skills; although there has been a discussion if these two terms are close to each other or not. It is also said that physical literacy is a complex term, which needs to be studied further (Lundvall 2014).

Kroon (2016) did a qualitative interview study about PEH teachers’ interpretations of different terms of the curriculum and the term physical ability was one of them. Some PEH teachers raised participation as an important aspect of developing and showing physical ability. There were differences how PEH teachers interpreted physical ability, and Kroon’s study showed that PEH teachers were unsure what this term really means. Kroon (2016) also writes that the support material for grading was not published when that study was implemented. She mentioned that it had been possible that teachers had used that material to get more information of the central terms of the curriculum.
In Bergentoft’s (2014) research, physical ability was related to PEH teaching and running. PEH teachers found it challenging to discuss physical ability regarding good movement qualities, which is another central term in the curriculum. They also said that they should develop their teaching so that students get an understanding of physical ability and the aim of different physical activities for physical ability. This seemed to be a challenge in PEH teaching. When it comes to good movement quality in running PEH teachers discussed core stability but the researchers led PEH teachers towards that, so they could connect core stability to running. One of the central goals was the connection between physical ability and core stability in running, and it was required that participating teachers could relate these two things together (Bergentoft 2014).

In the latest curriculum for the upper-secondary school, physical ability is one of the central terms, but in the latest curriculum for the compulsory school, the capability to move is one part of the core content. These terms are closely related to each other according to Nyberg (2014). She provides a few examples what it would mean in real life to have the good physical ability. “This might mean that the 90 year-old man is able to walk, without support, to the dining room and to get up unaided from a fall” (Nyberg 2014 p. 124). She also describes that for a dancer it could “mean being able to differentiate and express ways of moving: stiffly, softly, explosively etc. while simultaneously adjusting these to the character and rhythm of the music” (Nyberg 2014 p. 124). In PEH, to have good physical ability, it would mean skills to do different movements with proper technique and understanding how they affect to own body. Nyberg (2014) found that knowing a simple movement can include many different aspects.

3.2 Strength training in Physical education

Strength training has for a long time been part of PEH teaching in Sweden. In 1968 there was a study about that how the core content of the PEH curriculum is divided and taught in PEH classes in compulsory school in Sweden (Sandahl 2004). The results showed that 33.5% of teaching was gymnastic, 29% ball sports and 16.7% track and field. The rest of PEH teaching included other moments, but training fitness was not mentioned there. However, during that time gymnastics included traditional endurance and strength training exercises A study about
teaching contents of PEH, done in 2001 discovered that physical training was 13.7% of teaching. Gymnastic was 13.8% of teaching and ball sports 30% (Sandahl 2004).

In a research about the PEH content in Sweden, over sixty percent of students responded to a survey that they have ball sports, ball games, racket sports, strength training, gymnastic and track and field once in a week or at least sometimes (Skolverket 2010). It is shown that ball activities have dominance in PEH teaching in Sweden but different training methods are also one central point of the teaching practices. Endurance and strength training often occur in that part, and their purpose is to maintain or improve health. PEH teachers see teaching different physical skills as one of the most important themes of their subject. The same research also discovered that strength also plays a role in grading PEH (Skolverket 2010).

These results are close to Larsson’s and Karlefors (2015) study, which was about PEH teaching contents. They recorded thirty PEH lessons from eight different schools in Sweden. Four of them were lower-secondary schools, and four of them were upper-secondary schools. The results showed that twelve out of thirty lessons included training moments like, “circuit training, obstacle course, fitness/endurance and fitness/strength” (Larsson & Karlefors 2015 p. 579). PEH teachers described that it was intended to teach several things through these activities such as, “trying out different kinds of physical tests, exploring which muscles are trained, planning training or planning, doing and evaluating a physical activity” (Larsson & Karlefors 2015 p. 580). The analysis of this research discovered some consequences of these statements because the researchers could not find how teachers taught these things. There was no discussion or explanation of practical activities. For example, it was not explained to students what muscles they used in exercises (Larsson & Karlefors 2015). The analysis also revealed a lack of connections between home assignments and practical exercises, which were done in PEH classes. For example, some students got the task to plan a training program at home, but the practical parts of their PEH classes were not clearly related to the task (Larsson & Karlefors 2015).

Students’ and teachers attitudes and thoughts of PEH in compulsory school in year 9 have also been studied. Quennerstedt et al. (2008) discovered that the teachers noted that physical capacity and learning about health are important learning goals in PEH. “At the same time, the
most important base for the subject content, according to the teachers, is that pupils develop a positive relation to their own bodies” (Quennerstedt et al. 2008 p. 6). Most students (76.5%) felt that PEH has influenced their physical fitness and more than 50% felt that they have learnt how to train strength (Quennerstedt et al. 2008), which is a part of training physical fitness.

It is possible to teach different training methods, such as strength training in many different ways and some of those methods were discovered by a study, made by Toglefors (2017). The purpose of the study was to “investigate how assessment of learning is realised in PEH” (Toglefors 2017 p. 217). This study was done in three upper-secondary schools in Sweden and it also included assessments of training methods and strength training. One example of that was a physiological assignment that students did at home and discussed later in small groups. That group discussion was found useful, and it discovered what students knew about endurance and strength training. This group discussion also gave some tips for students how they could improve their own assignment.

Another example of assignment of training methods was training diary. Students had both practical and theoretical lessons of different training methods such as strength training. After that they chose one training method and goal for their training. They did their own training diary, but they could practice either individually or in small groups. The teacher told students to choose a goal that is relevant and there was a possibility to teach a goal that is related to strength training (Toglefors 2017). One teacher had an assignment of different strength training exercises and ergonomic. Students did these strength exercises and their peers evaluated their technique. This assignment included both peer evaluation and doing strength exercises (Toglefors 2017). These examples of assignments show how it is possible to teach strength training. Toglefors (2017) research was a qualitative study which included three different upper-secondary schools in Sweden.

3.3 Research of strength training among young people

Early on, it was believed that strength training is dangerous especially for children. More recently, these views have changed due to studies which show that most accidents occur in physical activities other than in strength training. A study conducted between 2005 and 2006 in upper secondary schools in the U.S. “revealed that resistance training and weightlifting were
markedly safer than many other sports and activities” (Faigenbaum et al. 2009, p. 1). These results also support a previous study conducted in 1980 that discovered injuries among school-aged youth who had done more than one-year resistance training. In total, “resistance training resulted in 0.7% of 1576 injuries whereas football, basketball, and soccer resulted in approximately 19, 15, and 2%, respectively, of all injuries” (Faigenbaum et al. 2009 p. 1). Both studies proved that resistance training is much safer than many other sports. However, “due to the potential for injury during the performance of multi-joint free weight exercises, youth coaches should be aware of the considerable amount of time it takes to teach these lifts” (Faigenbaum et al. 2009, p. 1). The most common reason for accidents was wrong technique, and the right technique needs to be taught in PE to avoid injuries.

There are risks in strength training, and it is needed to be cautious when doing strength training. Hrysomallis (2016) writes about risks of neck injuries in neck strength training programs. These programs consisted of dynamic and isometric exercises. There were both athletes and non-athletes who participated in these programs. These findings showed that “there is evidence that isometric neck strength training or isometric strength is directly related to injury risk” (Hrysomallis 2016 p. 1122). This type of training increased injuries but there is also strength training that can decrease them.

Comprehensive resistance training programmes that included plyometric exercises (and instruction on jumping and landing techniques) have been found to enhance movement biomechanics, improve functional abilities and reduce the number of sport-related injuries in young athletes.

(Faigenbaum and Myer 2009 p. 60)

It depends on a type of training how much risks it includes and the situation is the same with different types of tests. Some of them have a higher accident risk than others.

Different fitness tests are one way to work with physical ability and strength training but there have been discussions if fitness tests should be a part of PE or not since many limitations and misinterpretations of these tests have been revealed. Earlier, it was believed that those who are physically active get high scores and those who are inactive get low scores. This is not always
true, though there seems to be a connection between physical activity and fitness test results (Cale & Harris 2009).

Tiden (2016) writes that there has been different research, which shows connection between physical activity and results in movement ability tests. Nevertheless, there has also been opposite results, which show that the amount of physical activity has not corresponded the results in movement ability tests. The study made by Tiden (2016 p. 90) also showed that

The assumption that an acquired high level of movement ability plays a central role for how physically active people are is challenged by the results of this thesis. However, a high level of assessed movement ability seem to impact on factors such as frequency and intensity and a broader interest in a number of different recreational physical activities.

Physical activity helps to reach better movement ability although it might not show in the tests, which test only a limited number of different movements and there are many other movements that are not tested in these tests (Tiden 2016). Fitness tests can be useful for students if they are well planned, and students have knowledge of why they are doing the tests and are able to understand the results. In this case, students can learn about physical activity and its relation to health. They can also find out more about their body and different physical skills (Cale & Harris 2009).

There are many different physical skills that are possible to improve by strength training and fitness tests. There are numerous types of strength tests but the most typical ones determine 1RM by lifting the maximum amount of weight as many times as possible (Faigenbaum & Westcott 2009). For instance, this can be tested using bench press or squats. In PE classes, it is common to do skill-related tests instead of standard strength training tests. There could be “skill-related assessments that involve jumping, sprinting, and throwing, require power, speed, and agility” (Faigenbaum & Westcott 2009 p. 9). Improvement in these tests can be a result of strength training. For example, “long jump and vertical jump is related to 1RM strength and therefore may be useful for assessing muscular fitness in school-age youth” (Faigenbaum & Westcott 2009 p. 9). There could also be sit-ups and push-ups tests, which are conventional methods to test muscular endurance (Kenney, Willmore & Costill 2011).
4 Theoretical perspective

In order to analyse the results of the study, curriculum theory (Linde, 2012; Lindensjö & Lundgren 2010) was identified as a useful theoretical perspective; since the practices/methods and views of physical ability and strength training of teachers seemed to largely depend on how they see their role in the curriculum and the syllabus for PEH 1. As mentioned in the background, strength can be seen as a part of physical ability, which is one of the key terms in the curriculum and the syllabus.

4.1 Curriculum theory

Curriculum theory is about issues that are chosen to teach and factors that affect how teaching contents are chosen (Linde 2012). These factors include basically everything which affects educational questions. Lundgren (1981) states that curriculum theory tries to give knowledge about how goals, content, and methods of education systems are chosen in a certain society and culture. In the following sections, different categories and factors of curriculum theory are presented.

Lindensjö and Lundgren (2010) categorise curriculum theory into three different arenas; formulation, transformation and realisation. The first category, formulation, encompasses regulations from the school system. These regulations include subjects that should be studied and the amount of time spent on each subject. It also includes goals and content for all school subjects (Linde 2012). The formulation arena has more factors today and has become common to reproduce curriculum in different municipalities, which create a number of local formulation arenas (Lindensjö & Lundgren 2010). There is a risk that changes and content of the curriculum are analysed differently in each formulation field, which can cause differences in how the curriculum and decisions regarding education are reproduced. Educational questions involve complicated juridical, pedagogic and economic problems, which can lead to difficulties in implementing these factors in a similar way in each school (Lindensjö & Lundgren 2010).

The curriculum still determines the teaching content although the teachers have some freedom to choose what they can teach (Linde 2012). In the most recent curriculum, physical ability and different training methods are a part of the core content. In addition, it is stated in the knowledge
requirements that the students should know how to train in a safe way and they should also know the risks of training (Skolverket 2011). It means that these aspects have to be taught in PEH although it is not determined how.

Transformation of the curriculum includes different interpretations of the curriculum but also how teaching is organised, what contents are chosen and what skills are conveyed to students (Linde 2012). There are several reasons that affect how the curriculum is transformed. The curriculum can be interpreted differently but it is not the only factor which affects educational questions and possibilities to transform the curriculum. Lindensjö and Lundgren (2010) say that factors, such as politics, media and greater possibilities of getting information can affect how the curriculum is transformed. There are different sources, which can be utilised in PEH teaching. The curriculum’s comment material and support material for grading are examples of sources that can affect how the curriculum is transformed and realised by PEH teachers, as they are made by The Swedish National Agency for Education (Skolverket 2011b and Skolverket 2014).

Linde (2012) writes that in some subjects there is a lot of freedom for teachers own interpretations, which cause differences in teaching practices between teachers. In PEH there is no textbooks or national tests, and the curriculum leaves a lot of freedom for different interpretations. In that case, the teachers’ background and own experiences largely shape how the formulations in the curriculum are transformed and realised in the teaching practice because it is not strictly defined what should be taught and how (Linde 2012).

There are also opportunities to choose which school to go to in Sweden, which increases the importance to show and evaluate results. These factors affect how the curriculum is transformed, with one reason being that schools have pressure to prove their quality (Lindensjö & Lundgren 2010). Transforming the curriculum includes all factors which can affect interpretations of the curriculum and choices of teaching contents (Linde 2012).

Even traditional aspects of each subject can affect how the teaching is transformed and realised (Linde 2012). These aspects can be related to different aspects, such as media, earlier curricula and their comment materials. In the previous curriculum’s comment material, it is stated that
PEH teaching has been affected by media that has expanded competitive sports and also students’ parents. It is also mentioned that gymnastic halls and sports fields highlight the traditional ways of teaching PEH (Skolverket 1994). In the first curriculum of PEH in Sweden, all-around training and good endurance formed the core contents of teaching practices. The subject was also more practical and it was called “Gymnastics” (Skolöverstyrelsen 1975). Since then the subject has become more theoretical, but only the latest curriculum includes the term physical ability (Skolverket 2011) although the previous curriculum also highlights theoretical skills such as a knowledge of own body (Skolverket 1994). However, PEH has more practical than theoretical roots, and that can be a factor, which affect how PEH teachers transform and realise the curriculum. According to Lundgren (1981) the curriculum needs to be related to its historical context and the time when it uses, which includes for example the norms of the school and society.

Realisation of the curriculum describes issues that are ultimately taken into teaching practices and subjects, also including topics which are discussed in the classroom. Communication and activities play a central role in this realisation category (Linde 2012), which is based on “field implementations” according to Lindesjö and Lundgren (2010 p. 176). At this level, the curriculum is implemented by “street level bureaucrats”, which are the teachers. Realisation is a result of formulation, transforming, and all other factors which affect what teachers do in the classroom. Realisation is what happens in the classroom and this includes communication and different activities (Linde 2012). There are also factors in both the transformation and realisation arena that do not only depend on the teacher. Examples of these are the students that are taught, the timetable, available material, the school environment and schools own working methods (Linde 2012). In PEH this school environment means also a sports hall, gym and other facilities where teaching happens. In addition, colleagues, the values of the teachers and schools also can affect how teaching is realised (Linde 2012).

There is also the hidden curriculum which affects what teachers take into their teaching practices. Englund et al. (2012) write that the hidden curriculum includes everything that students learn at school, which is not written in the official curriculum. The hidden curriculum also includes traditional ways of teaching different subjects and emphasising some moments and skills over others. There are certain parts that are realised in teaching in the same way
although those parts are not taken from the curriculum. Those parts can be similar regardless of a subject, but each subject can have its own aspects that are included in the hidden curriculum (Englund et al. 2012).
5 Method

In this section, the method and implementation of this study are described along with information about the participants. Ethical considerations and the trustworthiness of the study are also discussed.

5.1 Qualitative interviews

There are several ways to use quantitative and qualitative approaches, with the most suitable method dependant on the aim and research questions. This study employed a qualitative interview method, as this allowed for the collection of rich and meaningful data (Bryman, 2012) in relation to the aim and research questions outlined earlier.

The interviews were semi-structured, as they involved using an interview guide (see Appendix A). This interview guide was based on three categories; interpretations and views of the term physical ability, strength training's role in the developing of physical ability, and methods and tests (which teachers use when working with strength training). The first of these categories was essential for determining physical ability, which is one of the most essential terms for this study. It is a complex term that can be interpreted differently depending on the teacher, so questions that defined the term was important for this study. The second category in the interview guide is directly related to the first research question and the third category to the second research question.

Interviews can also be conducted using a structured quantitative method. This method was not as suitable as the qualitative interview method because “in qualitative interviewing, there is much greater interest in the interviewee’s point of view; in quantitative research, the interview reflects the researcher’s concerns” (Bryman 2016 p. 466). There are also other positive aspects of qualitative research, one of which Bryman (2016) raises as a useful advantage, stated as the ability to ask follow-up questions. Asking follow-up questions made it easier to get richer and more comprehensive answers. It was also sometimes helpful to explain the meanings of questions if the teachers were not sure what they should answer. This happened a couple of times during the interviews when they were asked to think about how physical ability is defined in the curriculum and its associated knowledge requirements. It was also sometimes important
to ask more specific questions about strength training if the teachers discussed too much about other training methods. Without these supplementary questions, some relevant information would not have been received. Although there is also a chance to ask supplementary questions in unstructured interviews, these types of interviews might include only a single question (Bryman 2016). That had made it hard to get answers to this study’s research questions, as it was required to set more than one or two questions for the respondents to get a reliable overall picture of their views and working methods of strength training.

5.2 Participants

One female and four male upper school teachers ages 36 to 59 participated in this study. They all taught in different schools. All participants had a minimum six years working experience as a PE teacher, were qualified to teach PEH, and were also qualified to teach at least one other subject in upper secondary school level in Sweden. They all taught the PEH 1 course when interviews were implemented. All participants were interviewed in Swedish and their answers were translated to English.

Participants showed their interest in this study by replying to an e-mail invitation, which was sent to many PE teachers. The schools’ close geographical location was the major reason why they were contacted. Otherwise, it would have taken more time to implement this study. The participants of this study were the only teachers who agreed to participate. Other teachers did not answer to the e-mail or replied that they did not have time for an interview.

5.3 Implementation

The teacher contacted by e-mail were informed that the names of participants or their schools would not be published. It was also stated that the purpose of this research was to interview teachers who teach the PEH 1 course. Five PE teachers who taught PEH 1 replied with their interest to participate in this study and suggested possible times for an interview.

Meeting environments were comfortable, and the teachers seemed to be relaxed and calm during the interviews. There were not any disturbing background noises during the interviews. A calm environment plays a central role in successful interviews, as background noises could disturb both the interview situation and post-interview transcription. It is also easier to get
teachers to speak more openly if they feel comfortable in the interview situation (Bryman 2012). The interviews were between 20 to 40 minutes long.

During the interviews, follow-up questions were asked if the participants did not answer the questions or spoke off topic. This happened a couple of times when the teachers started explaining training methods other than strength training. Although they sometimes spoke off topic and gave broad answers, it was not necessary to change the order of the interview questions. Bryman (2012) writes that this would be an option in qualitative interviews.

Following the interviews, it was confirmed with the teachers that it was okay to use these interviews and it was again explained that no names would be published. All of the teachers granted permission for their interviews to be used in this study and one teacher said that it would also be okay even if his name was published in this study. As anonymity was guaranteed for the schools and not only for the teachers, any name of the respondents and their schools are not published.

5.4 Transcription and analysis

All interviews were recorded by two phones in case of possible technical problems. Fortunately, there were not any problems and decent recording quality made it easier to transcribe the interviews. They were transcribed to the computer and the results of each interview written down under the interview guide’s questions. The results section is divided into three different themes, which are based on the research questions. The summary of results are presented and some quotes from the interviews are used. There was a purpose find differences and similarities of the answers of the participants when presenting the results section. In addition, it was a purpose to give an overall picture of the answers of the participants. In the analysis section, the results are analysed by using the curriculum theory. This theory and the results of the study form the basis of the whole analysis section. It helped to compose the analysis because the interview questions and the results are closely related to this curriculum theory; as the content of the curriculum and interpreting of its terms plays a role when relating to answers of the participants to the interview questions.
The first interview question is analysed by using the formulation and transformation arenas because the question is about how teachers interpret the term physical ability, which is formulated in the curriculum. The second research question about the views of teachers on strength training’s role in physical ability is also analysed from the formulation and transformation arenas; since these two categories make it possible to analyse how teachers view physical ability, and how they transform this term and strength training together. The third research question is instead about teachers working with strength training and its effects in PEH 1. This question is analysed by using the realisation arena because the results show how teachers answered what happens in the classroom. Nevertheless, the other two arenas are connected to the realisation arena and are also taken into account when analysing the last question. Unfortunately, it cannot be said for sure what really happens in the classroom because no students were interviewed and no classroom observations were made. Information about what actually happens in the classroom comes only from the interviews with the participating PEH teachers.

5.5 Trustworthiness

In qualitative research, trustworthiness is a common way to evaluate qualitative research instead of validity and reliability, which are more closely related to quantitative research. Trustworthiness includes four terms of focus including credibility, transferability, dependability and confirmability (Bryman 2016).

The credibility of the study can only be seen afterwards because it covers how credible the results of the study are from its participants’ perspective. The results are possible to see when the study is finished and that is the reason why credibility cannot be measured beforehand. Credibility also defines how well the study is implemented by following the principles of good research and that the study is concluded in a reliable way (Bryman 2016). Transferability describes how well research can be generalised and used in other contexts. Since qualitative studies typically have a low number of participants, it can be difficult to generalise or use them in other contexts. That is the reason why it is often just relevant to analyse if the same study can be generalised later in the same context (Bryman 2016).
Dependability is a parallel term to reliability in quantitative research. It requires deep analysing during the entire research process. For instance, this includes “problem formulation, selection of research participants, fieldwork notes, interview transcripts, data analysis decisions” (Bryman 2016 p. 386) and all other factors that are important for research. Confirmability means that research needs to be objective and that the researcher’s personal opinions or theoretical inclinations should not affect the research process and its publishing (Bryman 2016).

Some strength and weaknesses of the chosen method can be found when discussing these four terms in relation to the study. Although the results of the study to some extent can be seen as relevant to all the PE teachers in Sweden who work in upper secondary schools, the fact that only five teachers were interviewed, means that the generalisations that can be made are limited. Transferability is often a weak part in qualitative research, and this study is no exception due to the low number of participants. Dependability has been the focus during the research process. This is being considered by spending a lot of time when working with each part of the study. However, it is possible that informing the aim of the study affected the interest of teachers toward this study. There is, therefore, a chance that the teachers who decided to participate in the study were all in favour of using strength training methods in PEH. There is also a risk that teachers had prepared their answers before the interviews although the researcher did not notice this when implementing the interviews. Quotations of the teachers’ answers increase dependability because it clearly shows how they answered. Dependability would be improved if more than one researcher conducted the same study. Confirmability has also been considered and it was the goal to remain as objective as possible while doing the study. It is still possible that some personal interests and opinions affect the conclusion of the study.

5.6 Ethical aspects
There are always ethical aspects which must be considered when doing research. The Swedish Research Council (Vetenskapsrådet, 2002) discusses four different ethical aspects that have to be considered in every research project. The first aspect is a requirement to inform participants what the research is about and that participation in the research is voluntary. In this study, participants were informed before the interviews about the purpose of the study and the research questions through the request for an interview e-mail.
The second of these four requirements involves the approval of the participants in the interview situation. For example, this includes the right of the participant to end their participation without any risks of harm (Vetenskapsrådet 2002). Participants were informed immediately prior to the start of recording that they could stop the session whenever they wanted. Participants were asked after the interviews if they accepted that the interview will be used as a material for this study. All participants gave approval to use the interviews as a material for this study and they seemed to feel comfortable with that idea. They were informed in the e-mail that the interviews would take approximately 30 minutes. One interview was longer than 30 minutes but there was no time pressure.

It is also required that no one other than the researcher have access to the information of the participants and the research data (Vetenskapsrådet 2002). This was ensured during the whole process and the anonymity of the participants is still ensured. The last of these four requirements states that the information obtained from the investigation is only to be used for the study (Vetenskapsrådet 2002). This requirement was adhered to in this study and there is no reason to use any information of the participants for any other purposes other than this study.
6 Results and analysis

In this section, the results of the study are presented and analysed using curriculum theory. The results are divided into three themes, related to the aim and research questions that guided the study.

6.1 Interpretations and views of the term physical ability

All participating teachers had principally similar definitions of the term physical ability. They described it as the overall ability to do different types of physical activities. They mostly discussed physical skills such as coordination and endurance. An understanding of physical ability in terms of its relation to health was also mentioned, but in a minor role compared to physical skills.

Teacher 1 on physical ability:

It covers everything (T1).

He provided a couple of examples such as eye-hand and eye-foot coordination. He also mentioned that we work all the time with our physical ability, for instance, when we do something with a football. He concluded that it is essential for students to develop their physical ability.

Teacher 2 and 4 had quite similar thoughts on physical ability and said that it is the ability to perform physical activities, which includes almost everything. There were also a few examples of important skills necessary for good physical ability such as coordination, condition and core stability. Teacher 4 described physical ability as:

It is everything that deals with the body (T4).

Physical ability is an essential part in all types of physical activities. T4 stated that this term contains a broad range of practical skills which are needed for these activities.
Teacher 5 described that a student can show his physical ability by developing his skills in different physical activities, for instance by showing that he has learnt how to swim. T5 mentioned that physical ability includes:

Developing your own body and showing progress in physical ability. It is possible to swim faster, longer or with better technique. That is one way to show your own physical ability (T5).

Teacher 3 described physical ability as a:

Skill to take instruction, go forward with it and develop it (T3).

He raised similar aspects as all the others but highlighted that physical ability means an understanding of your own body and the implementation of different activities. One of his key points was that it is also a skill to teach physical ability to others. This could happen in a situation where a student is skilled in performing a certain movement but others are struggling with the same movement. T3 views physical ability as both a theoretical and practical skill. His opinion differs from the others because they did not emphasise that physical ability also includes a knowledge of your own body and physical activities as much as he did.

There were similarities between the answers from the teachers, and they mainly have the same understanding of the term physical ability. T3 described physical ability as more than just physical skills but others did not mention as many abilities which require more than physical skills. Overall, they all viewed physical ability as an essential part of all physical activities.

When it comes to the curriculum and physical ability, all the teachers viewed the term physical ability as very broad, and mentioned that it should be described better. Teacher 2 said that the term physical ability is unclear and that some parts of the curriculum are unclear as well. According to the teachers, it is still necessary to have physical ability written into the curriculum. T3 said that:

It is very good that physical ability is a part of assessing (T3).
Besides that, this term is too open to interpretation and all the teachers thought there is no clear explanation of physical ability in the curriculum.

6.2 Strength training’s role in the developing of physical ability
All the teachers thought that strength training exercises have an important role in developing physical ability but T3 said these exercises are just one part of it. He explained the importance of coordination and balance as examples of other central skills for physical ability. He also mentioned the importance of strength training exercises for physical ability but he thought that strength training is just one way to improve this.

Alternatively, T5 emphasised strength training exercises and especially functional training. He said that functional training is the base for everything. He also stated that strength training has an essential role to play in how students survive their everyday life. T2 mentioned this as well and said that strength training helps to:

Manage everyday life and avoid back problems (T2)

The teachers mentioned many advantages of strength training but no disadvantages. T4’s answer demonstrates what the teachers thought about strength training:

There are no disadvantages if they know what students do and what they should do (T4).

The teachers did not provide many disadvantages to strength training, noting that negative aspects only arise if students are unaware of what they should do. For instance, T1 and T3 mentioned unhealthy fitness trends and training only for the improvement of physique. T2 and T5 said there are no disadvantages at all but he said that the right technique is important. Meanwhile, T5 said that many students have not found their coordination and balance yet, and that this is the reason why teaching the correct techniques is essential. Otherwise, he did not mention anything about the risks of strength training and considered its potential in developing physical ability.
There were different examples of how strength training could develop the physical ability of the students. The most common term which came up was ‘core strength’.

It is the prerequisite for a good movement quality and technique that students have good core strength (T2).

Strength training provides a foundation which is required for developing good physical ability and T4 also mentioned it since they thought that all sports require a certain amount of strength training. All the teachers considered this mainly in the same way but T3 also added that strength training could develop students’ weaknesses such as weak muscles. There was a varied range of skills the teachers mentioned when they explained how strength training can develop physical ability. For example, T1 mentioned body posture and T5 power and speed. Overall, all the teachers provided many examples of how strength training can improve students’ physical ability and they thought that strength training exercises play an important role in physical ability.

There were no remarkable differences between what the teachers thought about strength training and its relation to physical ability. All of them emphasised strength training except T3, who said it was just one part of physical ability. He still provided many examples of how strength training could develop physical ability. All the teachers had essentially similar thoughts about the advantages and disadvantages of strength training and how it does not present any disadvantages unless students do something wrong or they do not know how to practice safely. Many different aspects of physical ability came up when the teachers described how strength training could develop it. Coordination, balance, core stability, power and especially strength were mentioned in their answers.

6.3 Methods and tests teachers use when working with strength training

All participating teachers teach strength training but there were differences in teaching both the theoretical and practical aspects of strength training although all the teachers teach at least some basic strength exercises, such as squats and push-ups. In terms of the theoretical aspects, they all teach an understanding of strength training and its effects. They emphasised that students
should know what they do and how strength training could affect them. There were a few practical examples of how teachers work with the effects of strength training, and these include focusing on weaknesses that some students have, like weak body posture and core stability. More examples of teaching the theoretical parts of strength training were provided, and these also include more teaching the effects of strength training and their importance for health and well-being. Everyone agreed that they teach what muscles are trained in each exercise, and that is an example of how they teach the understanding of the effects of strength training. When it comes to assessing strength training, the teachers use some theoretical assignments and exercises which are a combination of theory and practice.

T1 and T5 focused on more of the theoretical aspect of strength training than the others because they went deeper into the terminology of muscles and how muscles are built up. T1 also described how strength training is a part of PE classes although it is not taught all the time.

Strength part is the core of teaching although we do not have strength training all the time. But for some students, there is strength training in every class. For example, when we jump to a trampette, for keeping our body posture we have to keep our core stable and tight abdominals (T1).

T1 and T5 emphasised the importance of strength training and provided many examples of different parts of the body that are focused on in their teaching. They teach both the Swedish and Latin names of muscles and how muscle fibres develop. The terminology of strength training which they teach contains terms such as concentric, eccentric and static training. They also teach what happens in muscles. In addition, terms like capillary and mitochondria are explained to students. Students learn:

Physical effects of training and what happen in muscles. They will, for instance explain mitochondria, capillary and ATP, and that how they should build up their muscles (T5).
The others do not teach as many theoretical parts of strength training as these two teachers but they include the same aspects in their teaching, which includes the different terminology of strength training.

T4 explained that she cooperates with a teacher of Swedish on a strength training theme. She explained that students read a text of strength training, which has many different terms in it. They have to analyse the text and use other books and sources for it. This is a writing task, which takes place in PE and Swedish classes. She is the only teacher who works with a teacher from another subject on a strength training theme.

T5 uses only the Muscle active quality (MAQ) program when he teaches strength training in PE classes where students do exercises. He said that in this program, everything is trained and he did not consider it necessary to teach any other strength training exercises, as there are basic exercises such as squats and push-ups in the MAQ-program. He also noted that he focuses on the students’ body posture before starting to perform the MAQ program.

We start with body posture and check technique for instance in squats. After that, we do functional training, Muscle Active Quality training (T5).

All the other teachers use other types of strength training other than the MAQ program but functional training was mentioned in their answers and it is possible that the MAQ program has been a part of their functional training.

T4 is the only teacher who does not use the gym because there is no proper gym at her school. She gets a lot of exercises in PE classes, which can be done at home.

I work a lot with bodyweight training. I have also worked with pair exercises and simple equipment that could be done at home. There is no meaning to do strength training at the gym because we do not have that possibility to give instructions and we do not have that money. We do exercises with easy equipment; trx, elastic bands, circuit training and tabata (T4).
All the teachers give assignments for strength training, which are assessed. Some of these include training but they are mostly theoretical. T1 and T3 have an exam in strength training, which is assessed. T1 explained that it is also possible to do an oral exam instead of a written one. T4 and T5 require students to make a film of strength training where they complete different strength training exercises. T4 makes her students plan and do their training program and then present it. In the presentation, they have to explain and show their exercises in the video. T5’s students do just the first movement of the MAQ program and film it. Before that, students have 2-3 weeks to practice the movement and after that, they film it again. In the end,

They will explain what they have done during 2-3 weeks’ period, what have happened in their body, have they got better technique, have they thought balance, have they thought body posture, how they have thought and what they have developed during that period (T5).

T2 also has an assignment where students create their own strength training program and present it in front of the class along with a written summary. T3 said his students are also required to do a training program but it is not necessarily a strength training one.

Students ask themselves a question: What do I need to train more? Some students decide endurance and some strength training for example (T3).

T1 does not give that type of assignment to his students but he and T5 focus more on strength training than the others, especially the theoretical aspects.

None of the teachers have any tests for strength training which test the physical ability of students, except for T2 who sets the one-minute plank test.

The only one I actually have is that they will have a little bit core stability, so they should try to stay one minute in the plank position (T2).

The teachers teach the theory on injury prevention. This includes information on how to train in the right way and the knowledge of possible risks. T5 also described how students develop
their technique and core strength while they practice the MAQ program. T2 mentioned the ‘knäkontroll’ (knee control) application, which he uses in his teaching, to prevent accidents among other reasons. All the teachers also use rehabilitation training to recover from accidents. T4 explained that students who cannot participate in her classes do their own exercises.

I try to help them to find exercises or they have a training program from a physiotherapist (T4).

In PEH 1, all the teachers use strength training to recover from accidents with students who are unable to participate in the classes. Not everyone uses strength training to prevent accidents but they do teach how to train in a safe way and how to decrease the risks of training. The teachers teach strength training in PEH 1 so that all students learn how to practice safely and learn the basic exercises such as squats and push-ups.

All the teachers give theoretical assignments and these include training diaries, filming strength training, theoretical exams and planning your own training program. It is not common to have tests of strength training and T2 is the only one who gives the one minute plank test. This is just a small part of teaching but no teacher used such tests.

6.4 Analysis
The formulation of the term physical ability is not clear in the curriculum because it does not describe what physical ability really means. However, the term physical ability is written in the curriculum and the syllabus for PEH 1, which means that it must be a part of PEH teaching. The teachers mostly view physical ability as a practical skill and they said little about theoretical skills, which are related to it, except T3 who highlighted theoretical knowledge as well. Physical ability was not in the previous curricula (Skolverket 2011b), and PEH has earlier been more practical and the subject was known as “Gymnastics” (Skolöverstyrelsen 1975). These factors can explain why teachers provided many practical examples and at times discussed a little bit off topic. One reason for this may also be that there is no clear definition of physical ability. Nyberg and Larsson (2016) explain, there are several ways to interpret physical ability and this showed from the answers of the teachers. The teachers have transformed physical ability in
different ways because all of them provided different explanations of it which they did not only base on the formulation found in the curriculum.

Transformation means different interpretations and compromises of these interpretations (Linde 2012). There is a lot of room for different interpretations and indeed, the teachers’ answers varied from one another’s. Furthermore, all the teachers said that the physical ability term is not clearly formulated in the curriculum and that results in clear challenges for interpreting physical ability. However, the teachers transform basically in the same way that strength training plays an important role in developing physical ability. This view can be linked to the formulation of the curriculum, which states that students should understand how different training methods affect their body (Skolverket 2011a). That can partly explain why the teachers view the importance of strength training as an important role in developing physical ability. However, there are also differences between their answers and different transforming arenas, which are for example the support material for grading and the comment material of the curriculum. These documents also include different definitions, which can affect the teachers’ views. Furthermore, there are other factors such like teachers’ background that results differences between the answers of the teachers.

There are different transforming arenas (Linde 2012) as there are sources such like the curriculum’s comment material and support material for grading, which provide different definitions of physical ability. These documents are not official, but the teachers might have used these materials because they are made by The Swedish National Agency for Education, and the purpose of these materials is to help teachers to teach and assess PEH. All of these aspects can affect how teachers interpret the term physical ability and view the importance of strength training in developing physical ability. Nevertheless, the transformation arena is broad and includes many different factors like media, previous research and colleagues (Linde 2012). These factors can affect how the teachers interpret physical ability and the importance of strength training in developing it.

The teachers found that strength training exercises have an important role in developing physical ability although they thought that the physical ability term is unclear. The comment material of the curriculum (Skolverket 2011b) states that strength is a part of physical ability
and that idea is easy to transform into PE teaching. It is also written in the support material for grading that different training methods have an important role in physical ability (Skolverket 2014). On the other hand, these materials are only for support and are not official documents which have to be used PEH teaching. There is also a chance that the teachers are not familiar with these documents. In that case, they have derived their answers from somewhere else. It can also be a part of the hidden curriculum in PE that strength training is in important role in developing physical ability; as the teachers seem to have a picture of that strength training has an essential role in its development. Nevertheless, the teachers’ own background plays also a role how they transform strength training in developing physical ability.

All the teachers said that they teach strength training both theoretically and practically. The teachers still have some different instances in which they seem to teach about strength training. The teachers transform strength training in the same kind of way because they think that students can develop their physical ability a lot by doing it. This can explain why strength training plays a role in their teaching, but it is not the only reason. Another reason is that in the syllabus, it is written that the core content includes “training methods and their effects, such as training fitness and coordination” (Skolverket 2011a p. 1). This can also affect how the teachers transform and realise strength training in PEH teaching because they might see it as a part of the training methods. The comment material of the curriculum and the support material for grading also provide examples of using strength training in PEH and it is possible that teachers have taken ideas of teaching strength training from there. Their background and own experiences can also affect their chosen teaching methods of strength training. Different training methods have also been a part of previous PEH curricula, which were more practical than newest one (Skolverket 1994 and Skolöverstyrelsen 1975) The teachers might have a more traditional view of teaching strength training in physical education, and that can also explain why they focus a lot on the physical body. This comes up when they describe that how they view physical ability and how they teach strength training. There also seems to be a connection between how the teachers transform and realise the curriculum; as they view the term physical ability mainly as a practical skill, and teach strength training mostly from a natural scientific perspective, which includes for instance teaching injury prevention, rehabilitation and Latin names of muscles. The way these natural scientific understandings seem to dominate how the
concept of physical ability is transformed and realised into PEH practice based on the current Swedish PEH curriculum can be seen as problematic.

There are still differences between how strength training is taught and what parts of it are adopted in PE teaching. The unclear formulation in the syllabus can lead to differences between how it is transformed and realised in PEH 1. Transforming the curriculum includes all factors which can affect how the curriculum is interpreted and how to choose teaching content. The transforming stage has many different factors, and only the formulation of the curriculum cannot explain everything. In the end, this transforming stage affects how the teachers realise the curriculum, which includes the chosen content and different methods of teaching (Linde 2012).

All the teachers still noted that they emphasise the understanding of strength training and that it can be related to physical ability, which also means understanding and not only practical skills. Teaching the effects of different training methods can also be easier to accomplish by using theoretical teaching, which contains written or oral assignments. Students should also be able to “adapt training and practice to minimising risks” (Skolverket 2011a p. 7) and this requires knowledge of strength training. This knowledge requirement seems to realise in the teaching of strength training because students get an overall picture of it, which contains both practical and theoretical practises on how to train safely. This overall picture is also developed by performing strength training exercises with the right technique. All the teachers have transformed and realised their teaching in almost the same way, according to their answers, when it comes to teaching different risks of strength training and safe training methods because the formulation is clear in the syllabus. However, the teachers might have taken the teaching risks of strength training and the right technique from the hidden curriculum which includes different traditions of teaching (Englund et al. 2012) and it also can include the importance of safe training. In addition, the background and experiences of the teachers can also affect this, along with other factors like the students they teach and their colleagues’ working methods (Englund et al. 2012).

There is no information on physical tests in the syllabus, and that seems to realise in strength training teaching in almost the same way between the teachers because T2 is the only one who
said that he has a test, which is the one-minute plank test in his teaching. That is only a small part of his teaching and all the others noted that they do not have any tests of strength training. This aspect is realised similarly in their teaching, according to the results. It is also possible that testing strength is seen as old-fashioned since the last two curricula include more theoretical aspects of teaching PEH (Skolverket 1994 and 2011) and different physical tests can be hard to justify as part of these new knowledge requirements.

All the teachers also mentioned that they utilise strength training when they teach injured students, to encourage rehabilitation. This is also realised in the same way because all teachers think it is important to help students recover from accidents and be able to participate in PE lessons. When it comes to injury prevention, not all teachers use strength training for it and the reason may be that it is not formulated in the curriculum, and the risk factors, which are in the syllabus, are possible to teach in other ways. However, three teachers said that they use strength training also for injury prevention and they might interpret the syllabus so that the risk factors of training can include injury prevention training as well. There are still different aspects in the realisation arena, such as equipment and teaching environment (Linde 2012), which in PEH means for instance sports hall and gym. These are factors which cause differences how the contents of strength training are realised. There is also a lot of freedom to choose what to teach in PEH. That can also explain why teachers have chosen partly different teaching methods of strength training. Nevertheless, this study did not include any classroom observations, so it was not possible to see how teaching is realised and what really happened in the classroom.
7 Discussion

This section presents a discussion of the results in relation to previous research, and the aim and research questions of the study. This is followed by a discussion of the methods employed in the study, suggestions for future research and conclusions.

7.1 Teachers’ interpretations of the term physical ability

The teachers defined physical ability as both a practical and theoretical skill but the practical aspects were highlighted more. These practical aspects included basically everything that has to do with the body. This can be related to good movement quality, which is close to the term physical ability and another central part of the curriculum (Bergentoft 2014). T3 provided more theoretical examples of physical ability than the other teachers, and he said that physical ability includes, for example, an understanding of your own body and he mentioned that teaching others is also a part of it. Nyberg and Larsson (2016) explain that physical ability includes both theoretical and practical aspects. That is also stated in the support for grading (Skolverket 2014), which mentions that it is close to physical literacy. Lundvall 2014 notes that the term physical literacy has an educative purpose and it takes philosophical aspects to PE teaching.

In the curriculum, the meaning of physical ability is not clearly formulated and that also explains why the teachers have different interpretations of it. In that case, the teachers’ background and own experiences greatly influenced how they transform and realise their curriculum (Linde 2012). This can explain the differences and difficulties of interpreting physical ability. All the teachers also said that the term physical ability is not clearly defined in the curriculum. According to the previous research by Kroon (2016) and Nyberg (2014), it is challenging to define the meaning of physical ability. This supports the results of this study because the teachers had some problems defining it and they spoke a little bit of the topic. There were also differences in their answers. Nyberg (2014) writes that good physical ability means different things for different people and that can also explain why the teachers provided many examples of it. It can be hard to define what decent physical ability means for all students because no two students are alike.
7.2 PE teachers’ views of strength training as a possible method to develop physical ability

All the participating PE teachers view strength training as an important part of developing physical ability but one teacher (T3) also pointed out that it is only one part in addition to, for example, balance and coordination. These opinions can be related to the curriculum’s comment material, which provides many different skills that are a part of physical ability (Skolverket 2011b) but also to the syllabus of PEH 1, which states that teaching “should cover exercise, sports and outdoor activities which develop all-round physical ability” (Skolverket 2011a p. 3). This formulation of the syllabus can also play a role why T3 view that strength training is only one part of developing physical ability, as the syllabus states that there should be different activities in PE teaching that develop it.

Strength training can also develop several different skills and there are many kinds of strength exercises as well (Angel 2014). The teachers provided some practical examples of skills which help in sports and everyday life, such as core stability and strength, which could include both muscular endurance and strength, which are useful in everyday life and sports. They also mentioned other skills like technique and speed, which are more sports specific skills (Angel 2014). The teachers gave only practical examples of how strength training can develop physical ability and they also defined it more as a practical than theoretical skill. The teachers’ interpretations of physical ability can affect how they transform strength training’s relation to physical ability.

The teachers seem to believe that strength training is safe because they do not see any negative effects of it as long as the students know what to do. These answers support the previous research of strength training and its risks. Faigenbaum and Westcott (2009) write that strength training is a safer activity than basketball or soccer when it comes to the number of injuries in upper secondary schools. It is still mentioned that young people should be more cautious of their techniques than adults (Faigenbaum and Westcott 2009), and the teachers frequently referred to the importance of the right techniques. They have considered that the risks of accidents are higher if students cannot do movements in the right way.
7.3 Strength training in Physical education and health

The teachers said that they teach strength training in both practical and theoretical ways but there seems to be differences between which aspects were used in teaching. Apparently, all students are still taught the right techniques of some basic movements such as squats or push-ups, and they are also taught how to exercise safely. These common exercises include muscular endurance and muscular strength that are common goals of strength training (Angel 2014). The teachers mentioned core strength when they described strength training’s importance for physical ability. The answers of their teaching methods of strength training and thoughts on it were linked to each other because the teachers seem to consider the effects of strength training when they teach it.

There also seems to be a connection to the syllabus and working methods with strength training. There is a knowledge requirement in PEH 1 which says that students should know how to practice in a safe way as well as the risks of training (Skolverket 2011a). All the teachers noted that they teach this to their students and the knowledge requirement in the syllabus may be the reason for that. They also look to be aware of the most recent recommendations of strength training because they knew the positive effects of strength training but they also knew that the proper technique is essential for students to learn because they are still adolescents (Faigenbaum & Westcott 2009). In addition, they might know that adolescents have higher risks for accidents than adults (NASPE 2010). The teachers also said that they utilise strength training to recover from injuries, and three of them mentioned that one purpose of the strength training which students do in PE classes is to help to prevent injuries. This also shows that the teachers are aware of the different possibilities of using strength training methods in their PE teaching practice.

Peterson and Renström (2003) write about the possibilities of using strength training to recover from and prevent injuries. All the teachers use strength training to recover from accidents but only three teachers (T2, T4 and T5) said that they also use strength training to prevent injuries in PE classes. It is not their only goal of strength training but these three teachers said it is one reason for doing strength exercises. The reason why the other two teachers did not use strength training to prevent injuries is that they have found it easier to teach injury prevention theoretically rather than practically.
The teaching of strength training varies most in the theoretical aspects and assignments that are assessed. A training diary is one assignment that the teachers use, and it was so also in Toglefors (2017) study. Two of the teachers (T1 and T5) seem to delve into more theoretical parts than the other teachers but everyone stated that they teach the effects of strength training and what advantages it can have. These identified differences might be a result of the statements of the syllabus which do not include much specific information about training methods. PE teachers have a lot of freedom to choose which aspects they want to teach and how, because some aspects regarding physical ability and strength training can be interpreted in many different ways.

7.4 Methodological discussion

The chosen method helped to reach the aim of this study, which was to get an overall picture of the views of PE teachers regarding physical ability and strength training as an aspect of developing it. Another aim was to gain more knowledge about the teaching of strength training methods in PEH 1.

A quantitative method would have made it easier to reach more teachers but it would have been harder to get rich answers in relation to the research questions. Another advantage of a quantitative method would have been the better chance to repeat the study, which is a key point for reliability (Bryman 2012). In qualitative interviews, each interview situation is unique, and there are no similar possibilities to repeat exactly the same situation another time, although almost the same results could possibly be reached by using the same interview guide. It was more valid to use the qualitative interview method because comprehensive answers were required for the research questions. In particular, it was important for internal validity to use this qualitative method because the results had to draw on theoretical ideas to make it possible to come up to a conclusion. Internal validity tends to be a strength of qualitative research but external validity, which involves, for instance, the possibility of generalising results, is a more common problem in qualitative research because of the low amount of case studies or samples (Bryman 2012).

This study is written in English but interviews were made in Swedish. That could also have affected the results of the study because all the interviews were translated from Swedish to
English. For example, the term physical ability is a complex term, and it is challenging to define it regardless of the language, and the translation of the answers of the teachers was challenging at times. Translation is also subjective depending on the translator.

In addition, there are also disadvantages regarding the relation between the aim of the study, chosen method and the curriculum theory. One purpose was to find out how PE teachers work with strength training in PEH 1 but due to the chosen method, the results was based only on the answers of the teachers. It is not possible to know what really happens in the classroom because no observations were done and no students were interviewed. That makes the analysis of the results in terms of the realisation arena somewhat limited.

7.5 Future research

It would be beneficial to further study how teachers work with strength training in developing physical ability. It would be possible to use classroom observations and interview students to get a better idea of what really happens in the classroom. Then it would be possible to get a deeper picture how the teaching of strength training is related to developing physical ability. A further study would focus more on that topic and develop the weaknesses of this study. This would make it more clear how teaching happens in practice, and the curriculum theory (e.g. Linde 2012) would be a more useful tool when analysing the results of the study.

7.6 Conclusion

This study provides an overall picture of how five Swedish PE teachers interpret the term physical ability and view strength training as a part of developing their students’ physical ability and how they go about teaching it in PEH 1. According to this study, the teachers view physical ability mostly as a practical skill but they feel it is challenging to define it and it is not clearly formulated in the curriculum. All teachers work with strength training and all students get at least a basic knowledge of strength training, and can do it in a safe way on their own because the PE teachers said that they include these aspects as part of their teaching practice.

There were some differences in terms of what aspects are used in their teaching practice, but that can be partly explained by the current syllabus which does not provide accurate information on what training methods and contents are to be used. An exception is safe training, which is
one of the knowledge requirements. All the teachers seem to focus on this in PEH 1 and they have many different working methods of strength training which help students to reach this requirement. It looks like that the formulation of the curriculum plays an immense role on how the teachers answered what they teach in PEH 1. However, it is hard to conclude how much the formulation of the curriculum determines what is then realised in their teaching practice. There are also other factors which affect how the curriculum is transformed and realised such as the background of teachers and their previous experiences.
8. References


https://bp.skolverket.se/delegate/download/test/informationmaterial?testGuid=DB00615FF7054F8A90A4182DECF911BC


https://www.skolinspektionen.se/sv/Om-oss/Var-verksamhet/Historik/


Appendix A: Interview guide

Background

Age?

Education?

Amount of years as a PE teacher?

What sports have you been involved in?

Interview questions

**Theme 1.** Interpretations and views of the term physical ability. (Tolkningar av och syn på begreppet kroppslig förmåga).

1. According to the curriculum for Physical education and health, students will develop their physical ability. What is your understanding of this term? (Enligt läroplanen, GY 11 ska eleverna utveckla sina kroppsliga förmågor. Hur ser du på detta begrepp?)

2. How do you see the curriculums and syllabus’s connection to physical ability? For instance, what do you think of its meaning and importance? (Hur ser du på läroplanens och kursplanens koppling till kroppslig förmåga? Till exempel viksen och betydelsen av kroppslig förmåga?)

**Theme 2.** Strength training’s role in the developing of physical ability. (Styrketräningens roll i utvecklandet av kroppslig förmåga)

3. What kind of role do strength training exercises have in relation to physical ability? (Vad har styrketräningsövningar för roll i förhållande till kroppslig förmåga?)

4. What advantages and disadvantages do you see in strength training for upper secondary school students? (Vilka för- och nackdelar ser du med att gymnasieeleverna styrketränar?)

5. How can strength training develop students’ physical ability? (På vilket sätt kan styrketräning förbättra elevers kroppsliga förmåga?)

**Theme 3.** Methods and tests, which teachers use when working with strength training. (Metoder och tester som lärarna använder för att arbeta med styrketräning).
6. Core content for Physical education and health 1 includes: Training methods and their effects, such as training fitness and coordination. How do you work with strength training as a part of training methods? (Centralt innehåll i Idrott och hälsa 1 innebär: Träningsmetoder och deras effekter, till exempel konditions- och koordinationsträning. Hur jobbar du med styrketräning som en del av olika träningsmetoder?)

(If you do not teach strength training). Could you describe why you do not have it in your teaching? ((Om du inte undervisar styrketräning). Hur kommer det sig att du inte har med styrketräning i dina idrottslektioner?)

7. Which parts of strength training do you incorporate into your teaching of Physical education and health 1? Theoretical/practical? (Vilka delar av styrketräning tar du med i din undervisning i Idrott och hälsa 1? Teoretiskt/praktiskt?)

8. What types of tests about strength training do you have in Physical education and health 1? (Vilka typer av test har du för styrketräning i Idrott och hälsa 1?)

9. Do you have any assignments or moments of strength training, which are evaluated in Physical education and health 1? If yes, describe. (Finns det uppgifter- eller moment i form av styrketräning som bedöms i Idrott och hälsa 1? Om ja, beskriv vilka.)

10. Have you used strength training to prevent accidents or to recover from accidents in Physical education and health 1? If yes, how? (Har du använt styrketräning för att förebygga skador eller återhämtning från skador i Idrott och hälsa 1? Om ja, på vilket sätt?)