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Strength training for children aged 6-9 years - A survey among sports coaches

Author

Hanna Mellby
Lund University
H_mellby@hotmail.com

Supervisor

Anna-Maria Drake, PhD, RPT
Dep. of Health Sciences,
Lund University
Anna_Maria.Drake@med.lu.se

Examinator

Kalev Kuklane, Assoc. Prof.
Dep. of Design Sciences,
Lund University
Kalev.Kuklane@design.lth.se

Abstract

Title

Strength training for children aged 6-9 years – A survey among sports coaches.

Background

Research shows that strength training, defined as a training method aimed to improve muscular strength and muscular endurance, affects children's health positively. Theories about strength training being dangerous for children are today well-debated.

Aim

To describe the use of, and attitude towards, strength training for children in a group of coaches training children aged 6-9 years, and to analyse the difference in use of strength training between coaches in different sports, with different education in strength training for children, and with different coach experience.

Methods

A questionnaire survey was conducted in March 2011. The 303 largest sports clubs in Scania, based on the number of children participating in their arrangements during 2010, were invited and 121 participated. The internet-based questionnaire was sent to 418 coaches and 181 responded.

Results

Strength training was used by 32 % of the respondents. A majority used it once a week, 1-10 minutes. The percentage of coaches using it differed significantly between sport categories ($p < 0,001$), different education in strength training for children ($p < 0,001$), and different coach experience (years) ($p = 0,012$). Attitudes towards strength training for children varied.

Conclusion

One third of the coaches use strength training in sports clubs for children aged 6-9 years. Ball sport coaches are less prone to use it whereas coaches with education in strength training for children and coaches with more coach experience use it more, compared to other coaches.

Key words

Children, strength training, coach, sports

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Background

Definition

This study defines strength training as a training method aiming at improving muscular strength and muscular endurance and to improve the individual's health and capacity to perform a sport.

Strength training for children

A lot of studies have shown that strength training has a positive impact on children's health and fitness (1-16). If appropriate training protocols and guidelines are followed, children will benefit from strength training. It has shown to improve children's co-ordination and motor unit activation which improves their motor skills (4, 14). Girls performing a school based exercise intervention for 60 to 200 minutes per week including jumping, running, climbing, gymnastic activities and ball games increased their peak muscle mass significantly in twelve months (1).

In some cases a combination of strength training and other activities has better effect than strength training alone. Faigenbaum and colleagues performed a study where boys being 12-15 years old performed either plyometric training in combination with strength training or strength training alone (same strength training program for both groups). Both groups were training 90 minutes twice a week for six weeks. The results showed that a combination of strength training and plyometric training resulted in better improvements in long jump, medicine ball toss and pro agility shuttle run time (17). A literature review showed that training programs combining aerobic exercises with strength training were most effective regarding decreasing body fat among obese children and adolescents (12).

Concerns associated with strength training for children

Opposite to researchers recommending strength training for children, there are researchers resisting it. There is an ongoing debate about whether strength training is beneficial or harmful to the children's immature bodies. Faigenbaum with colleagues mean that many of the forces that children are exposed to during sports performances are larger in magnitude and duration compared to the forces that children must withstand during strength training (18, 19). Myer and colleagues state in their review that there is evidence for strength training being a

safe training method when it is performed under supervision and with appropriate instructions (3). Yet there are a few children getting injured during strength training, for example when performing heavy lifts. In a majority of those cases the lifts were performed with bad technique or with non-professional supervision (19). Those factors, together with omission of established guidelines, are the most common reasons for injuries among children performing strength training. Trunk and back are parts of the body being most frequently injured (4, 18).

One concern with strength training is whether it increases the risk for growth plate injuries among children (9). According to Faigenbaum and colleagues there is a greater risk to injure the growth plates during jumping and landing exercises than during supervised and well-instructed strength training exercises. Regarding musculoskeletal injuries researchers have not seen any increased risk to develop such injuries during strength training compared to other sports (18). Sports cause injuries to 3-11 % of all school children each year (20-22) and it appears most frequently in sports containing jumping and contact between players. Football accounts for the majority of the injuries. Most common among children are mild sprains, strains and contusions (21).

Potential benefits of strength training for children

Injury prevention

The number of sports injuries among children show that there is a need for injury preventing interventions. Research has shown that strengthening exercises are effective in preventing injuries appearing during sports performances (2, 3, 23-25). The exercises cause adaptations in tendons, ligaments and bones which prepares the athlete for potentially harmful forces (3). To maximize the injury preventive effect of strength exercises it is of great importance to follow appropriate training guidelines (2).

Bone health

Beside the injury preventive effect strength training is also favourable for children's bone health (1, 2, 4-8, 11, 26-29). Bone mineral density and bone mineral content are factors favoured by weight-bearing physical activities, for example strength training (5, 6, 8) where muscle forces have a positive impact on the bone (5). Duration, type, intensity and frequency of the activity play an important role for the bone health (28). Different physical activities

affect the bone mineral mass in different ways; dynamic exercises are to be preferred to static exercises; a shorter duration of loading is more preferable than a longer duration; high strains lead to adaptation in the bone to a greater extent than low strains; and rest periods between the loadings are optimizing the bone health (8, 28).

In a study made by Douthwaite et al. preadolescent gymnastic girls were compared with non-gymnastic girls concerning bone health in distal radius. Gymnasts are exposed to high mechanical loading at the distal radius and the gymnast girls had better bone mass and bone strength than the non-gymnasts (26). Female middle distance runners have shown to have better bone strength at tibia compared to controls not participating in regular middle distance running. The amount of physical activity per week was the factor that mostly predicted the bone strength index (27). Gunter and colleagues performed a jumping intervention study where the intervention led to significant improvements in bone mineral content at all measured parts of the body, compared to the controls (7). Another intervention combining jumping exercises with strength training showed that the intervention had positive impact on the children's bone health, irrespective of gender (6).

Body composition

Strength training is also positively affecting children's body composition (2, 9-13). For the most effective influence on body composition appropriate training guidelines should be followed when composing a training program (2). Programs combining aerobic exercises with strength training are most effective in decreasing body fat among obese children and adolescents. Strength training has an ability to increase children's compliance with aerobic exercises (12).

Topp and colleagues used a special designed intervention – the Tommie Smith Youth Athletic Initiative (TSYAI) in their study aiming at improving body composition in children. This was an after school intervention including strength training, track-and-field-training and exercises for flexibility. The results showed significantly improved body composition, cardiovascular fitness and dietary habits (13). In a study made by Benson and colleagues it was investigated if eight weeks of high-intensity progressive strength training, two times per week, had any effect on adiposity in children. The intervention resulted in reduced body adiposity as well as increased strength in overweight and normal weight children (10). Clare and colleagues made

a study where the purpose was to compare a combination of diet and strength training with only diet and to study the influences on body composition and bone mineral content in children. Children in the training group were training for 75 minutes (of which 30 minutes was strength training), three days a week for six weeks and they got increased lean body mass and bone mineral content (11).

Strength training has become a well used treatment method in the struggle against overweight and obesity among children. Pescud and colleagues conducted a study including overweight children and their parents to find out the reasons to why they start a strength training program and what makes them stick to it. Parents reported that the opportunity for their child to lose weight and gain confidence were the most important factors influencing them to start a program, whereas the children meant that the opportunity to get strong was most important in their decision. Factors influencing the children to stick to the program were the lost of weight, their improved confidence and the friendly atmosphere during training whereas parents reported the children's weight loss and improved coordination and confidence (30).

However, there are trials in which strength training has no effect on body composition. Benson and colleagues made a systematic literature review to find out what impact strength training had on metabolic outcomes (glucose, insulin, lipids and adiposity) in children and adolescents. Twelve studies were included and the results showed that there is only little evidence that supervised strength training may lead to metabolic health in children and adolescents (31).

Psychological benefits

Strength training does not only affect the body physically but also psychologically (4, 14, 15, 32, 33). Some children performing strength training feel satisfied with their performances which results in feelings of success (4, 14). These feelings tend to appear more often when performing one set of 13-15 repetitions on moderate load, instead of fewer repetitions on a heavy load (14). Eight weeks of strength training with either free weights or elastic tubing showed that adolescent girls performing strength training with free weights got significantly better perceived body attractiveness compared to controls and girls performing elastic tubing exercises (15). Ekeland with colleagues made a review to examine whether strength exercise interventions can improve children's self esteem. The results showed that exercises have short

term positive effects on the children's self esteem (32). Strength training performed by adolescent anorexic patients for twelve weeks was tolerated by the patients and did not harm their bodies. However, the intervention did not add benefits to the conventional treatment of the patients (33).

Guidelines for children's strength training

There are a lot of factors important for the coaches to take into consideration when their adepts are performing strength training (3). Children must be well supervised during strength training sessions (3, 4, 9, 18, 21, 34) and appropriate equipment should be used to avoid injuries (3, 21, 34). A careful start of the training program is of importance since strength training causes repetitive stress to the musculoskeletal systems being under development in children. The progression of intensity, volume and frequency must be appropriate to benefit the development of power and strength; otherwise injuries may appear (3, 4, 18, 21). Children are also in need of adequate recovery between the strength training sessions to optimize the effects (34). A strength training program should take into account what biological age the children are in and pay less attention to the children's chronological age (21, 22). The number of heavy lifts should be limited since the amount of resistance affects the numbers of repetitions a child can be perform, influencing muscle strength and muscular endurance (14).

Two or three strength training sessions per week may maximize muscular endurance and strength (5). Children performing short-term strength training programs with a progressive character have shown to increase muscle strength and physical performance (14). To avoid too heavy programs a "10 % rule" is suggested, which means that any training program for children should not progress the intensity more than 10 % per week (22). Young children and youths with no experience from strength training should start with exercises using the body weight as resistance. When entering puberty most youths are mature to start with sports specific exercises which should focus on power and strength related to the sport (9).

Results from a study with children performing either a low number of repetitions with heavy load (6-8 reps) or a high number of repetitions with moderate load (13-15 reps) showed that the last-mentioned method was to prefer. These children got significantly stronger than children performing fewer repetitions with heavy load (14). Guidelines have been constructed to help coaches make appropriate training programs for children (table 1).

Table 1. Training guidelines for strength training for children.

	Canadian Society for Exercise Physiology (35)	UK – BASES (36)	The American Academy of Pediatrics (37)
Frequency	2-3 times/week	At least 2 times/week	2-3 times/week
Intensity	Low to moderate loading (60 % of 1RM)	50-100 % max effort	
Time			At least 20-30 min/session Use training program with at least 8 weeks of training
Type	Warm-up 5-10 min (dynamic movements) 8-12 exercises for different muscle groups 1-2 sets 8-15 repetitions Focus on correct technique Increase loading and number of sets with increased experience Exercises; Olympic-style lifting; plyometrics (jump exercises); balance training	2 or 3 sets 6-15 repetitions	Warm-up and cool-down 10-15 min 2-3 sets 8-15 repetitions Start without any loading to learn correct technique When technique correct, use; free weights; own body weight as resistance; machines; elastic bands
Other	Start when children are 7-8 years old (no strict limit, just an objective) Instructed by coaches experienced in strength training	All young people should be encouraged to train strength Strength training should be a part of balanced physical exercises and sports education	Start when children are 7-8 years old Focus on large muscle groups Max. 10 children per coach

To make children’s sports participation safe and successful components such as flexibility, cardiovascular condition and accurate nutrition are important in addition to strength (16). Neuromuscular training including a combination of strength training, dynamic movements such as jumping and landing and proprioceptive training benefits children’s health (3). Obviously, there are many factors important for the coach to keep in mind when training children. Most important is to focus on lifetime fitness and to aim at making the children develop a healthy lifestyle (9).

Swedish sports

In Sweden sports participation play an important role in many people's lives. A total of 77 % of all Swedes practice sports one to five times per week (38) and almost 50 % of them are members in any of 22 000 sports clubs. The sports clubs are divided into 67 different special sports federations and The Swedish Sports Confederation keeps Swedish sports together (39). Organized sports started in Sweden in the end of the 19th century and The Swedish Sports Confederation's original was established in 1903 (39).

Today, performing sports is the second most popular leisure time activity behind being with friends among Swedish children (40). A total of 94 % of all children being 7-14 years old are performing any physical exercise (more than 20 minutes) at least once a week. Many children are training or competing in organized leisure time sport activities: 72 % of the boys and 58 % of the girls (38). The Swedish government together with the municipalities grant sports clubs having youth activities (39). Football is by far the sport that engages most children being 7-20 years old. During 2009 the ten most popular sports (the highest number of active children) were football, riding, floorball, ice hockey, tennis, basketball, swimming, handball, gymnastics and track and field (38).

The Swedish sports model is based upon voluntarily engaged leaders. About 600 000 Swedes are working as a coach or leader in any sports club and the majority works for free. The driving force among most of them is the pleasure that sports gives back to them (39). Many of the leaders participate in education to develop themselves as a coach or to develop the sports club (39). Most of them are educated by SISU Sports educators, which is the educational association in Swedish organized sports (39). During 2010 almost 800 000 leaders participated in any of 95 000 educational arrangements organized by SISU Sports educators. The number of participants has increased during the last years (38). Sports with the most number of educational arrangements as well as participants during 2010 were football, riding, ice hockey, golf and handball (38).

Attitudes towards strength training for children

Recently performed studies have shown that strength training can have positive effects on children's health (1-16). These effects were not known until the end of the 1990's and researchers did not recommend children to perform strength training. One of the reasons to

not recommend it was children's low levels of androgens circulating in the blood, which makes it impossible for muscles to hypertrophy in response to strength training (3, 16, 22). People were also afraid of an increased risk of growth plate injuries among children caused by strength training (3). In Sweden The Swedish Sports Confederation published material during the 1980's containing very cautious recommendations about strength training for children (41, 42).

Strength training for children has been lively debated during the last years. Deep rooted theories about strength training being a dangerous training method for children are questioned by researchers showing contrary results. The discussions have spread in the whole society and influenced different authorities to take action. The Swedish Sports Confederation compiled the latest evidence concerning strength training for children in a report 2009 (43). Also in Denmark and Finland the topic is well debated. It was discussed in the Danish Journal of Sports medicine (44) in January 2011 and professionals working for the Research Institute for Olympic Sports (KIHU) in Finland have produced a CD with instructions about strength training for youths (45).

This study was designed to evaluate to what extent strength training is used and what kind of strength training that is used among coaches training children aged 6-9 years in different sports clubs. A second aim was to describe the attitudes towards strength training for children among coaches training 6-9 years old children. A third aim was to analyse whether there was a difference in the use of strength training for children between coaches in different sports, with different education in strength training for children, and with different experience as a coach.

Research questions

The aims mentioned above lead to following six research questions:

1. To what extent is strength training used during children's training in sports clubs?
2. What kinds of exercises are performed during children's strength training in sports clubs?
3. What attitudes do coaches have to strength training for children?

4. Is there a difference in the use of strength training between coaches within different sport categories?

5. Is there a difference in the use of strength training between coaches with different education in strength training for children?

6. Is there a difference in the use of strength training between coaches with different experience from coaching children?

Specific hypothesis to be tested are:

Hypothesis 1:

H0 = There is no difference in the use of strength training between coaches active in different sport categories.

H1 = There is a difference in the use of strength training between coaches active in different sport categories.

Hypothesis 2:

H0 = There is no difference in the use of strength training between coaches with different education in strength training for children.

H1 = There is a difference in the use of strength training between coaches with different education in strength training for children.

Hypothesis 3:

H0 = There is no difference in the use of strength training between coaches with different experience from coaching children.

H1 = There is a difference in the use of strength training between coaches with different experience from coaching children.

Methods

Research design

To answer the research questions a cross sectional questionnaire survey was conducted.

Study sample

Persons appropriate to be engaged in this study were coaches within the area of Scania training children aged 6-9 years. The coaches could be active as a coach in any sport belonging to Scania sports federation. Only sports clubs where children and youths aged 7-20 years were participating in any arrangements within the club at least 3 700 times during year 2010 were of interest.

A number of inclusion and exclusion criteria were set to direct the study towards the purpose of it:

Inclusion criteria:

- Sports clubs belonging to Scania sports federation.
- Sports clubs having at least 3 700 occasions when children aged 7-20 years participated in their arrangements during year 2010.
- Sports clubs having training groups for children aged 6-9 years.

Exclusion criteria:

- Sports clubs not belonging to any special federation (for example sport clubs for disabled children, sports clubs with a focus on making people exercise, for example Korpen, and school sports clubs.

According to Scania sports federation's statistics from year 2010 there were 305 sports clubs having 3 700 participants aged 7-20 years at their arrangements during that year. After adding the inclusion and exclusion criteria, 303 sports clubs remained. The two clubs that were excluded were one sports club for disabled children and one belonging to Korpen.

The e-mail addresses to each of these 303 sports clubs were searched for in a list belonging to Scania sports federation. In this list the e-mail addresses to 252 sports clubs were found. The e-mail addresses to another 49 clubs were found on their homepages at the Internet. The two

remaining sports clubs did not have any homepage. One of them was contacted by telephone resulting in one more e-mail address. The last club was not contactable by phone and therefore not able to include in this study.

Survey of strength training for children

The purpose of this survey was to collect information about the use of strength training for children and the type of strength training that is performed. The aim was also to get information about the coaches' education concerning strength training for children and their experience of coaching children. To get this information an online questionnaire was made. The computer program that was used was QuestBack. This program made it possible to let the respondents answer the questionnaire anonymously by means of Internet.

Totally 21 questions were put together and made up the questionnaire. The first eight questions were about the characteristics of the coaches and their training group. This was followed by two questions about whether the coaches had heard of or read the report from the Swedish sports confederation called "Survey of knowledge: strength training for children and youths" (43). Next question consisted of seven statements about strength training for children and the coaches had the possibility to fill in "I do not agree at all", "I partly agree" or "I totally agree". There were two questions asking if the coaches had used strength training at least twice during the last month or if they planned to use it in the children's training within the next twelve months. Coaches using strength training were asked to respond questions concerning to what extent they used it and what kind of exercises they used. All coaches responded a question about whether they had participated in any education including instructions about strength training for children, or if they had been offered any such education. Finally, all coaches got the possibility to write their own comments on the topic "strength training for children".

A pilot test of the questionnaire was sent to six persons. The aim with the pilot test was to detect any confusing questions or questions possible to misinterpret. The answers from the test persons led to some changes in the questionnaire. The definitive version of the questionnaire together with the cover letter can be found in appendix 1-4. No official translations from Swedish into English have been done of the questionnaire and cover letter.

Data collection

A total of 302 sports clubs were contacted by e-mail in March 2011. In this e-mail the e-mail addresses to the coaches training children aged 6-9 years were asked for (appendix 5, 6). A total of 59 clubs answered and sent the e-mail addresses to the appropriate coaches. Three clubs were excluded since they did not practise any strength training for children aged 6-9 years and did not want to participate in this study. Three clubs were excluded because they did not have any children aged 6-9 years and one club because the training group consisted of children aged 6-12 years.

The 236 sports clubs that did not answer the first e-mail were contacted with a second e-mail one week later and were reminded to send an e-mail with the e-mail addresses to the appropriate coaches (appendix 7, 8). A total of 62 clubs answered and sent the e-mail addresses. Three clubs were excluded since they did not practice any strength training for children aged 6-9 years and did not want to participate in this study. Four were excluded because they did not have any children aged 6-9 years.

A total of 121 (40 %) sports clubs were included in this study, 14 (5 %) clubs were excluded and 167 (55 %) clubs did not respond. The included sports clubs sent a total of 418 coaches' e-mail addresses.

An e-mail with a cover letter and a link to the questionnaire was sent to 418 coaches. The cover letter explained the aim of the study, gave information about the respondents being anonymous and that it was voluntary to response the questionnaire (appendix 1, 3). The coaches got the questionnaire in March 2011. Five days later those who had not responded were reminded and the questionnaire was closed in the beginning of April 2011.

A total of 181 (43 %) coaches replied. All coaches responded to every question.

Data management

To make it possible to employ the statistical Chi-square analysis the coaches were divided into four different categories, based on Scania Sports Federation's "Special sports focus" classifications (Nilsson, N-O, personal communication, January 24, 2011). The categories were:

- Team Precision and racket (squash, bowling, badminton, table tennis, golf, shooting sport, tennis and dart)
- Team ball sports (football, handball, ice hockey, floorball, volleyball and basketball)
- Team power and motor (boxing, wrestling, budo and martial art, gymnastics, karate, weight-lifting, body-building, figure skating, riding, taekwondo, motorcycle, motor sport, judo and dancing)
- Team element (swimming, canoe, cycling, track and field, orienteering and sailing).

Statistical methods

The statistical analyses were done in the computer program IBM SPSS Statistics 19. The level for statistical significance was set at $p < 0,05$. To compile the results descriptive statistics was used and to test dependence or independence between two categorical variables Chi-square tests were used.

Results

Characteristics of the respondents

Of the responding coaches a majority were male; 128 (71 %) men and 53 (29 %) women. All respondents were born between 1941 and 1996. The majority were born 1961-1970, whereas fewest coaches were born 1971-1980 (figure 1).

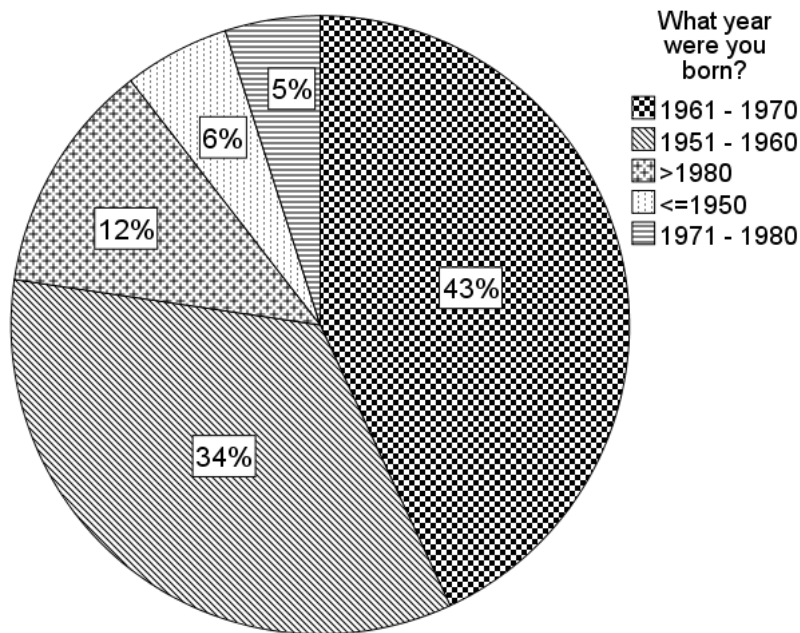


Figure 1. The responding coaches' (n=181) years of birth.

The responding coaches were active in 17 different sports. Those sports were divided into four categories, based on Scania Sports Federation's "Special sports focus" classifications (Nilsson, N-O, personal communication, January 24, 2011). Table 2 displays the distribution of coaches.

Table 2. Distribution of the responding coaches (n=181) in four different teams, based on Scania Sports Federation's "Special sports focus" classifications (Nilsson, N-O, personal communication, January 24, 2011).

Team ball sports (n)	Team power and motor (n)	Team element (n)	Team racket and precision (n)
Football (84)	Gymnastics (8)	Swimming (14)	Golf (1)
Handball (20)	Judo (5)	Track and field (7)	Squash (1)
Basketball (13)	Riding (4)		Tennis (1)
Floorball (12)	Dancing (1)		
Ice hockey (7)	Figure skating (1)		
	Karate (1)		
	Wrestling (1)		
n=136	n=21	n=21	n=3

The responding coaches had been coaching children for different number of years from one year to more than five years. The number of coaches in every group was relatively similar, which is shown in figure 2.

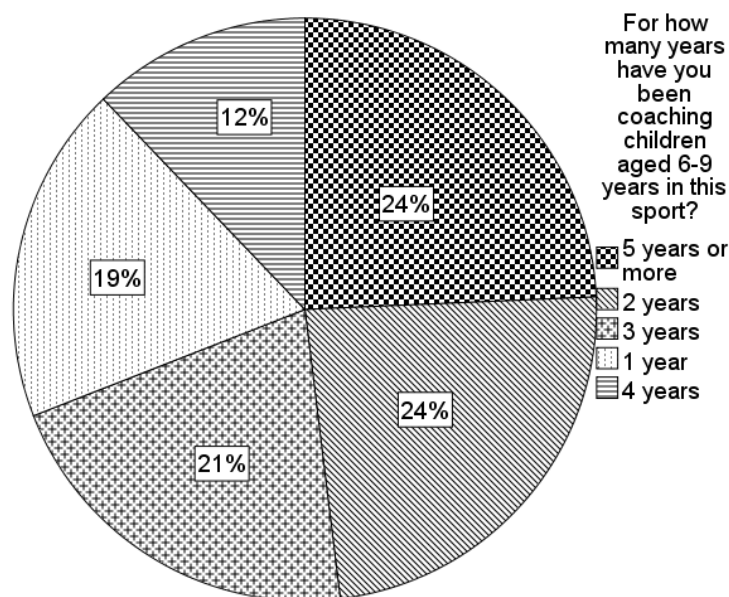


Figure 2. Number of years the responding coaches' (n=181) had been working as a coach.

Among the responding coaches 35 (19 %) were coaching girls, 66 (37 %) were coaching boys and 80 (44 %) were coaching mixed groups with both girls and boys.

The respondents were coaching children in varying ages: 50 (28 %) coaches had 6-7 years old children in their group; 72 (40 %) had 8-9 years old children; whereas 59 (32 %) had 6-9 years old children.

In most training groups there were ten or more children; 164 (91 %) compared to 17 (9 %) training groups consisting of less than ten children.

The number of training sessions per week varied between the responding coaches. A majority of the respondents had one training session per week. Two training sessions per week did also occur frequently among the respondents, whereas few respondents had three training sessions per week. This is displayed in figure 3. No respondents had more than three training sessions per week.

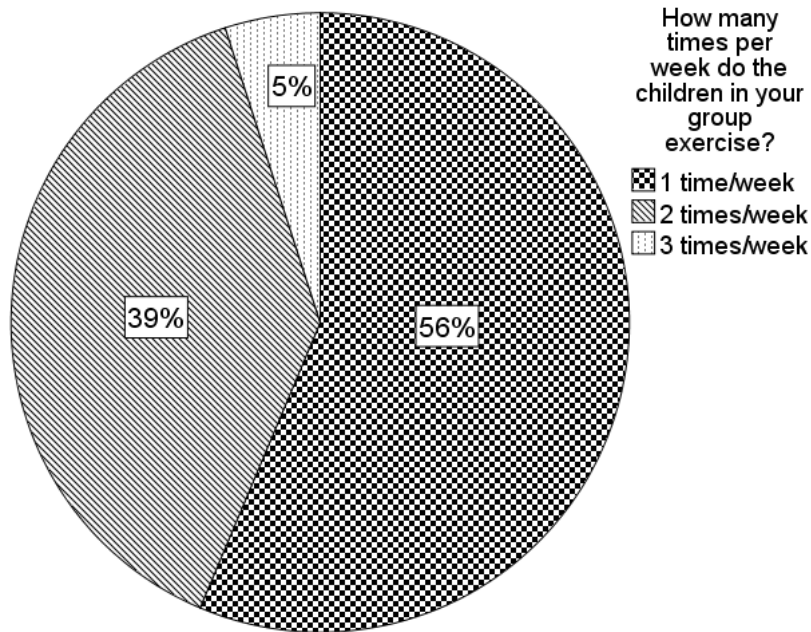


Figure 3. The responding coaches' (n=181) number of training sessions per week with their training group.

On the question about whether the coaches had heard about the report “Survey of knowledge: strength training for children and youths” (43) a total of 25 (14 %) coaches responded that they had heard about it whereas 156 (86 %) responded that they had not. The abovementioned report (43) was read by eight (4 %) of the responding coaches.

Research question 1

To what extent is strength training used during children’s training in sports clubs?

Among 181 responding coaches a majority (123 (68 %)) had not included strength training in their training sessions at least twice during the last month. Remaining 58 (32 %) coaches had included at least two strength training sessions during the same period of time.

Most common was to include one strength training session per week. More than two strength training sessions per week was the least common number of sessions, which is shown in figure 4.

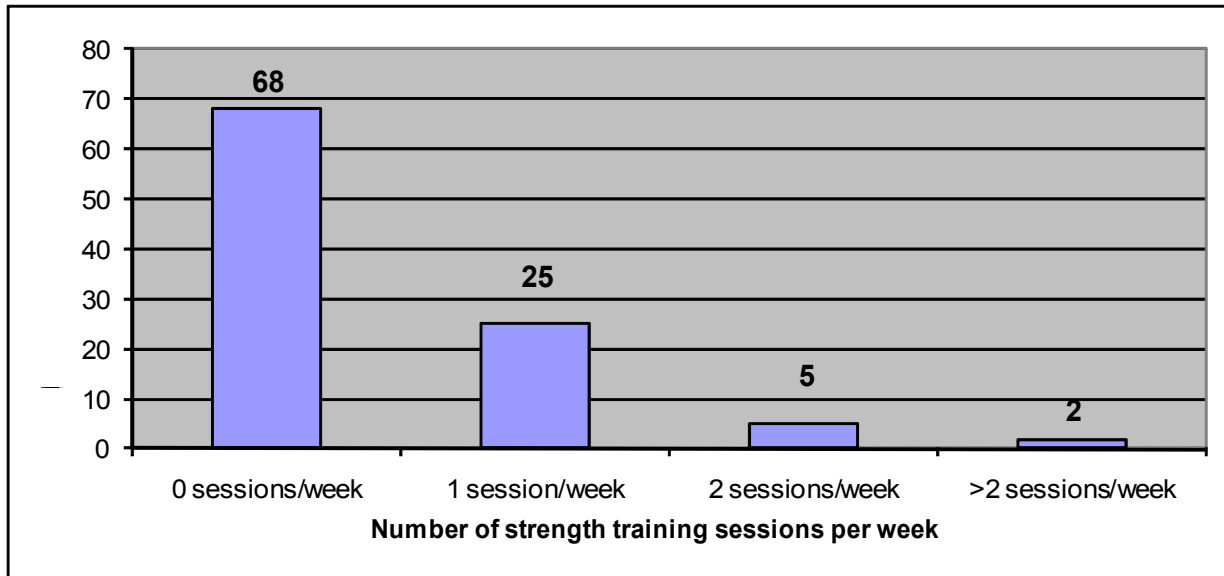


Figure 4. The responding coaches (n=181) number of strength training sessions per week.

Time used for strength training in each strength training session varied between the respondents. Most of the coaches used 1-10 minutes, next common was to use 11-20 minutes whereas a few coaches used 21-40 minutes. This can be seen in figure 5.

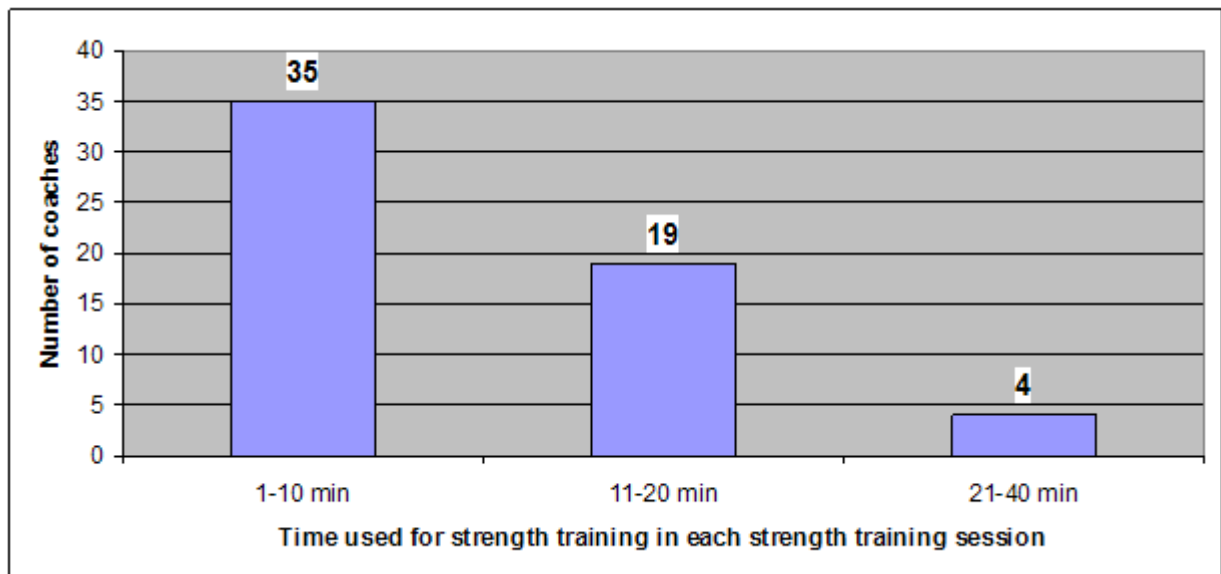


Figure 5. Time that the responding coaches using strength training (n=58) used for strength training in each strength training session.

Research question 2

What kinds of exercises are performed during children's strength training in sports clubs?

Among the coaches using strength training 54 (93 %) used 1-7 exercises per strength training session and 4 (7 %) used 8-12 exercises per strength training session.

Different kinds of exercises were used by the responding coaches during strength training. Most frequently used were exercises using the own body weight as resistance, followed by jump exercises. No coaches used machines during strength training with children and few of the coaches used free weights. The number of coaches using different kinds of exercises is displayed in figure 6. One or more alternatives could be chosen by the respondents.

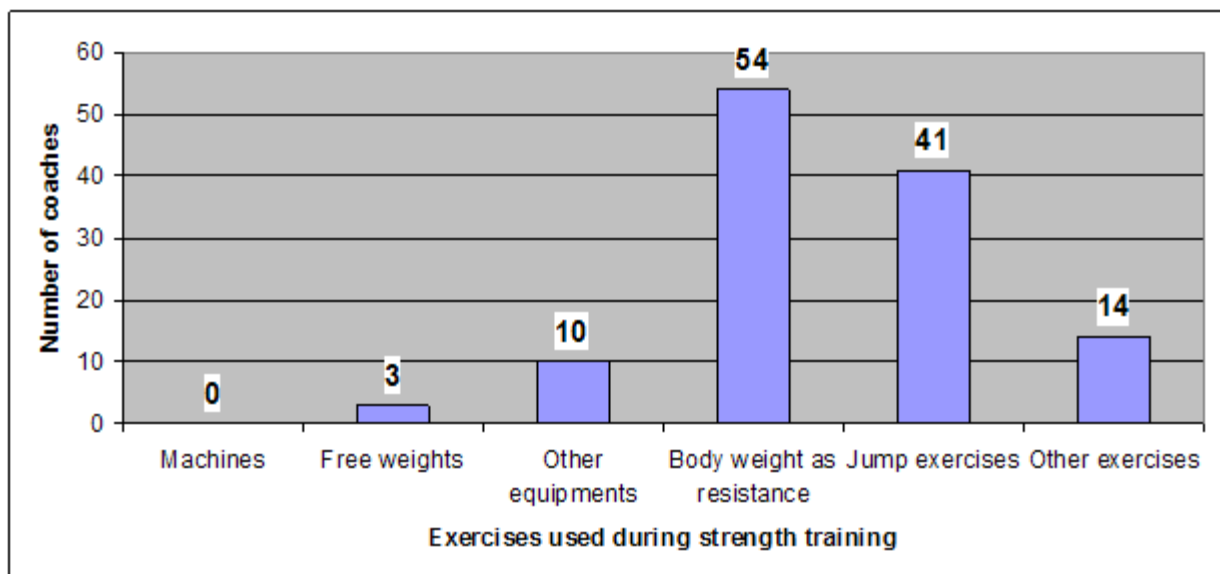


Figure 6. Exercises used by the responding coaches (n=58) during strength training.

Seven of the responding coaches wrote what other exercises they used for strength training.

Those were exercises using different equipments:

- Skipping ropes (n=2)
- Carpets (n=1)
- Lianas (n=1)
- Sets of wall bars (n=1)
- Vaulting-horses (n=1)
- Benches (n=1)
- Hurdles (n=1)
- Gym balls (n=1)

Other exercises that were mentioned to be used were:

- Obstacle courses (n=2)
- Exercises focusing on improving posture, coordination and balance (n=1)

The respondents were of the opinion that the most important factor to consider when children perform strength training was correct technique. A minority of the coaches meant that it was important that the children performed the number of repetitions that the coach had instructed them to do. The respondents had the possibility to choose one or more alternatives. The results are shown in figure 7.

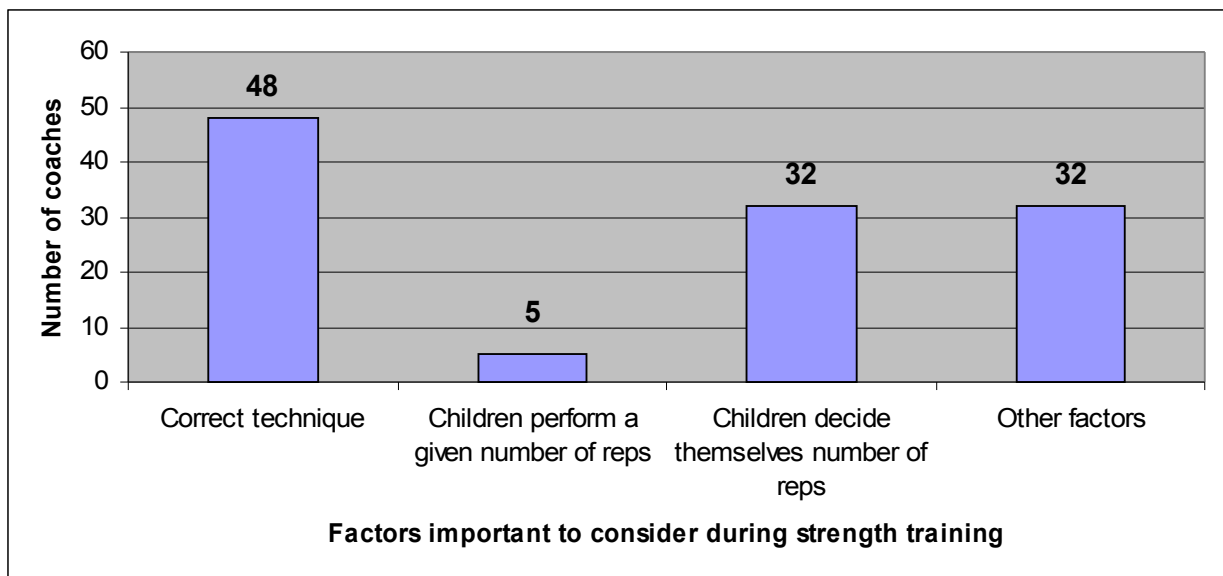


Figure 7. Factors important to consider when the children are training strength, according to the responding coaches (n=58). One or more alternatives could be chosen.

Other factors important to consider when children are training strength were commented by ten coaches. Five of them stressed the importance of a correct technique. Other factors that were mentioned were:

- Strength training should be performed in a playful manner (n=4)
- Strength training exercises should be included in a natural way (n=1)
- Strength training should be performed without any pressure on the children (n=1)
- Children should compete only with themselves and each and every child should try to increase the number of repetitions he or she could perform (n=1)
- Children should have stable core muscles before they start using weights (n=1)

Research question 3

What attitudes do coaches have to strength training for children?

To examine the coaches' attitudes to strength training for children the questionnaire contained 7 statements to which the coaches could answer "I do not agree at all", "I partly agree" or "I totally agree". The results of this examination can be seen in figure 8.

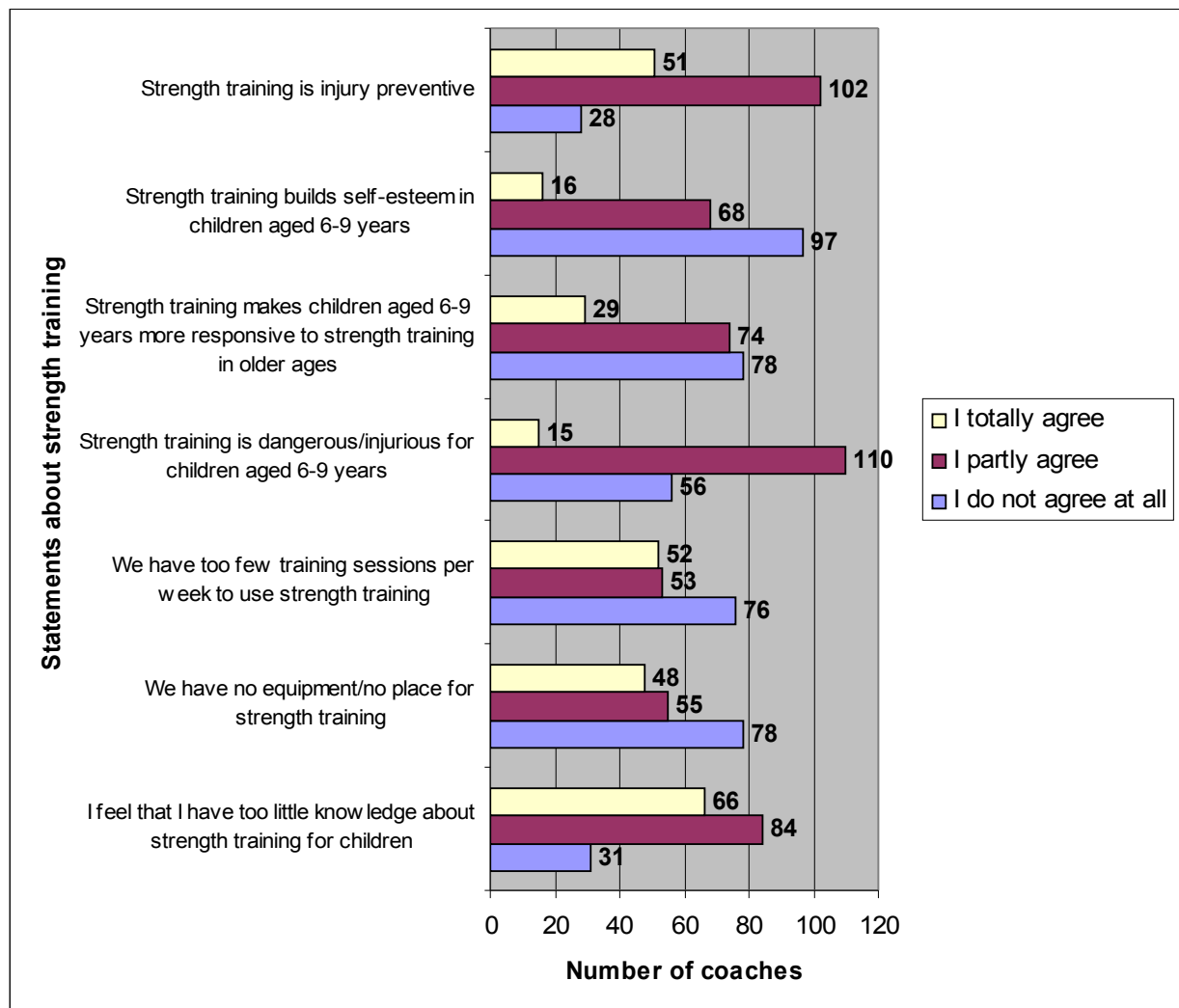


Figure 8. The responding coaches' (n=181) attitudes to strength training for children.

A majority of the responding coaches have the opinion that strength training is injury preventive, whereas a large part of the coaches do not believe that it improves children's self-esteem. It is not obvious for the respondents that strength training makes children more responsive to such training when they get older, and a majority of the coaches partly agree with the statement saying that strength training is dangerous or injurious.

The coaches are of different opinions regarding their prerequisite of practicing strength training with their training group. A majority of the coaches agree totally or partly with the statement saying that they have too few training sessions per week and the results show almost the same situation concerning equipment or place for strength training. There is also a majority feeling that they have too little knowledge about strength training for children.

A total of 74 coaches made comments about the topic “strength training for children” and provided their own experiences of it. An overview over these comments follows below. Many of the coaches made comments on more than one of the categories.

“Strength training” is an unsuitable term in contexts with children (n=5)

- The term has a negative tone (n=1)
- People relate to gyms and weights when talking about “strength training” (n=2)

The term “Strength training” is diffuse (n=3)

- One leg-stand is also a kind of strength training (n=1)
- Shot training not only makes the children better as shooters, but also strengthens their bodies (n=2)

Children should not perform strength training (n=39)

- It is inappropriate for children being 6-9 years old to perform strength training (n=6)
- Strength training may restrain the children’s normal growth (n=1)
- Strength training is harmful to children’s bodies (n=3)
- When youths are around 15-20 years old they are mature to start with strength training (n=8)
- Children should perform a sport for fun, and not perform strength training (n=8)
- Focus should be on learning the sport, get familiarized with the ball and develop team spirit instead of training strength (n=3)
- Children can chose body building if they want to train strength (n=2)
- There is no need for strength training. It is of greater importance to focus on coordination, flexibility and to improve the children’s overall physical condition (n=7)
- There is no need for strength training. Children get strength automatically through other exercises during training (running, ball exercises, playing games, coordination and balance exercises) (n=11)

Coaches being positive to strength training for children (n=48)

- Strength training for children is injury preventive (n=4)
- It is important to make the children understand why and how a certain exercise is performed, to reduce the risk of injuries when the children get older and start to use weights (n=1)
- The only accurate strength training exercises for children are those using their own body weight as resistance (n=25)
- Strength training should be performed through play and games (n=4)
- Children need strength training to get a well developed general strength (n=4)
- Focus should be on strong core muscles and a good posture (n=1)
- Strength training is used to let the children get to know their bodies and to develop their capacity to control their bodies (n=3)
- Strength training is a good training method to use to let the children challenge themselves (n=2)
- Children have done great progress within their sports after strength training was added to their ordinary training (n=2)

Need of education in strength training for children (n=10)

- Coaches want to use strength training as a training method, but lack of education stop them since they do not want to expose the children to something that they do not know enough about (n=4)
- Coaches ask for education or literature about strength training for children (n=2)

Research question 4

Is there a difference in the use of strength training between coaches within different sport categories?

Since only three coaches belonged to Team Precision and racket, those were included in Team ball sports to make it possible to perform the Chi-square test. A Chi-square test was employed, to examine whether use of strength training differs between coaches active in different sport categories. The results can be seen in table 3.

Table 3. Distribution of responding coaches (n=181) in three different sports categories and the use of strength training during training in sports clubs.

Sport category	Uses strength training		p-value (from Chi-square test)
	Yes % (n)	No % (n)	
Team ball sports	22 % (30)	78 % (109)	
Team power and motor	71 % (15)	29 % (6)	
Team element	62 % (13)	38 % (8)	<0,001

There is a statistically significant difference in the percentage of coaches using strength training within the three different sport categories ($p < 0,001$). This shows that there is a statistically significant difference in the frequency of use of strength training between different sport categories. The share of coaches using strength training differs between different sports. Consequently, the null hypothesis in Hypothesis 1 can be rejected.

Research question 5

Is there a difference in the use of strength training between coaches with different education in strength training for children?

Concerning coach education in strength training for pre pubertal children 34 (19 %) of 181 respondents had participated in such education. 134 (74 %) had not participated in any education like that and 13 (7 %) coaches did not know or could not remember if they had participated or not. To examine whether use of strength training and coach education were independent or not, a Chi-square analysis was employed (table 4).

Table 4. Distribution of responding coaches (n=181) regarding participation in coach education for pre pubertal children and use of strength training during training in sports clubs.

Coach education	Uses strength training		p-value (from Chi-square test)
	Yes % (n)	No % (n)	
Yes (has participated)	65 % (22)	35 % (12)	
No (has not participated)	24 % (32)	76 % (102)	
Don't know/can't remember	31 % (4)	69 % (9)	<0,001

Table 4 shows that there is a statistically significant difference in the percentage educated coaches using strength training and non-educated coaches using strength training ($p < 0,001$). These results mean that there is a statistically significant difference in the frequency of use of strength training between coaches with different education in strength training for children. The share of coaches using strength training differs between coaches with and without education in strength training for children. Therefore, the null hypothesis in Hypothesis 2 can be rejected.

A total of 147 coaches had not participated in any coach education in strength training for pre pubertal children. 7 (5 %) of them had been offered to participate in such education, 128 (87 %) coaches had not been offered such education and 12 (8 %) coaches did not know or could not remember if they had been offered any education like that.

Research question 6

Is there a difference in the use of strength training between coaches with different experience from coaching children?

Among the responding coaches 34 (19 %) had been coaching children aged 6-9 years for 1 year; 43 (24 %) for 2 years; 38 (21 %) for 3 years; 22 (12 %) for 4 years; and 44 (24 %) coaches had been coaching for 5 years or more. A Chi-square test was employed, to examine whether use of strength training and the coaches' coach experience are independent or not.

Table 5 displays the results of this analysis.

Table 5. Distribution of responding coaches (n=181) regarding number of years as a coach for 6-9 years old children and use of strength training during training in sports clubs.

Number of years as a coach	Uses strength training		p-value (from Chi-square test)
	Yes % (n)	No % (n)	
1 year	21 % (7)	79 % (27)	0,012
2 years	21 % (9)	79 % (34)	
3 years	40 % (15)	60 % (23)	
4 years	23 % (5)	77 % (17)	
5 years or more	50 % (22)	50 % (22)	

There is a statistically significant difference in the percentage of coaches using strength training within the five groups of coaches with different number of years of experience as a coach ($p=0,012$). This shows that there is a statistically significant difference in the frequency of use of strength training between coaches with different experience from coaching children. The share of coaches using strength training differs between coaches with different experience as a coach for children. The null hypothesis in Hypothesis 3 can be rejected.

Discussion

The findings from this questionnaire survey indicate that one third (32 %) of the coaches use strength training during regular training sessions in sports clubs for children aged 6-9 years. The results also point to a relationship between the sport in which the coach is active and the use of strength training. Coaches active in ball sports are less prone to use strength training than coaches in other sports. Furthermore, coaches educated in strength training for children and coaches with five or more years of experience as a coach are more prone to use strength training than coaches without education or with less experience. The results do not indicate whether the coaches have a positive or a negative attitude towards strength training for children since it varies between different statements about the topic. A majority have the opinion that it is dangerous for children to perform strength training whereas most of the coaches agree with the statement saying that strength training makes children more responsive to such training when they get older. Many coaches feel that they are not enough educated in

strength training theory and practice for children and would like to have more education. The findings in this thesis have important sports implications, since they provide data supporting the need of education in the area of strength training among Swedish youth coaches.

Methods

Questionnaire

One method possible to use to reach the aims with this study could have been to make structured interviews with some coaches training children. However, structured interviews are most effective in small sample groups, when complicated questions are needed to be asked and when the answers are expected to vary a lot between the interviewed persons (46).

Another possible method was to construct a questionnaire directed to children's coaches. According to Gratton and Jones a questionnaire is useful in studies where the researcher is in need of simple quantitative information and when the sample group is large. An advantage of making a questionnaire survey is that online or postal questionnaires make it easy to collect data from a sample group that is geographically widely spread. This reduces the costs in comparison to interviews, since the researcher does not need to travel to each and every included coach. Another advantage is the possibility to make the survey anonymous (46). For this study a fairly large sample group was needed and the questions to be asked were not complicated. Therefore, a questionnaire was constructed. To make interviews would have been time consuming and would not result in enough responses as with a questionnaire. One disadvantage with questionnaires is the lack of personal contact with the respondents. If anything is unclear, there is no possibility for the respondent to ask about it, which may limit the answers. Though, in this study there was a need to reach a large population and a questionnaire seems to have been the best choice.

The questionnaire consisted of 21 questions, put together for this study. It would have been better to use a questionnaire that had been used before and tested for reliability, including questions known to be useful in studies like this. Though, no similar study has been found in the literature and therefore the questions had to be put together for this study. The pilot respondents made comments on the questionnaire and changes were made based on these comments before it was sent to the coaches.

Study sample

To limit the study geographically, only sports clubs in Scania were included. Perhaps the results would have been different with respondents from other parts of Sweden. For example, winter sports are performed to a greater extent in the northern parts of Sweden compared to the southern parts. Through cooperation with Scania sports federation information about the sports clubs in Scania was accessed which facilitated the selection of clubs. By means of the information, the sports clubs having 3 700 participant occasions for children aged 7-20 years during 2010 were easily identified. By limiting the inclusion of sports clubs to the 305 largest in Scania (regarding youth participant occasions) the chance to reach as many coaches as possible was maximized.

Coaches in question were those training children being 6-9 years old. Many children start with a sport when they are six years old (47) and existing guidelines give the age 7-8 years old as an appropriate age to start strength training (35, 37). By selecting the age span 6-9 years it was possible to explore whether coaches start with strength training immediately when the children start with a sport, or if they add this training method when the children get older.

The included sports clubs were contacted by e-mail and asked to return the e-mail addresses to the appropriate coaches. The large number of non-responding sports clubs (55 %) may have affected the results of the study. However, this method was necessary in order to get e-mail addresses to the coaches included. One possible reason why so many sports clubs did not send the e-mail addresses may be that it would be time consuming to compile an e-mail list, especially for large clubs with a lot of youth coaches. A total of 121 (40 %) sports clubs sent e-mail addresses to 418 coaches which may be a large enough sample. Answers were retrieved from 181 (43 %) coaches which is a fairly good sample size. However, there may be selection bias; since it is impossible to know what the non-responding coaches would have responded. It may be that the responding coaches were interested in the topic and more inclined for participation.

Results

Characteristics of the respondents

Swedish sports clubs engage almost 700 000 leaders which are active as coaches and trainers or being members of the boards. Among them 66 % are male and 34 % female (38). These

numbers are mirrored by the results from this study where 71 % of the coaches were male and 29 % female. The sport that by far has the highest number of participant occasions during one year (for children aged 7-20 years) is football. Riding is the second largest sport, followed by floorball, ice hockey, tennis, basket ball, swimming, handball, gymnastics and track and field (38). Most of the coaches responding to the questionnaire in this study did belong to any of these sports and football was the most represented sport. According to Statistics Sweden 63 % of girls and 67 % of boys aged 7-15 years are members in a sports club. (48). The Swedish Sports Confederation reports that 58 % of girls and 72 % of boys being 7-14 years old are training and competing in sports (38). This is in accordance with the results from this study, where almost half of the coaches were coaching mixed groups with boys and girls and a majority of the remaining coaches were coaching boys. These results indicate that the sample may represent the whole population fairly well.

Research question 1

To what extent is strength training used during children's training in sports clubs?

A total of 32 % of the responding coaches used strength training when training children in their sports clubs. The majority of the coaches had one strength training session per week and used 1-10 minutes for this session. This does not correspond with the recommendations given in the guidelines which recommend at least two strength training sessions per week (35-37) and 20-30 minutes per session (37). However, children have physical education in school and many of the children may be performing more than one sport. Therefore, many of the children may be performing strength training more than once a week. Furthermore, 56 % of the coaches stated that they had one training session per week, which makes it impossible to train strength more than once a week. Remaining 44 % of the respondents had two or three training sessions per week and they would have the possibility to conduct strength training in accordance with the guidelines.

One possible reason to why the coaches only used 1-10 minutes for strength training each session may be the fact that they only have one training session per week. According the general comments on the topic "strength training for children" some coaches mentioned that they gave priority to perform the sport itself, since they wanted the children to learn the game instead of using time for other exercises.

Research question 2

What kinds of exercises are performed during children's strength training in sports clubs?

A majority (93 %) of the coaches using strength training instructed the children to perform 1-7 exercises per strength training session. This is less than what is recommended in the guidelines where 8-12 exercises per session are suggested (35). A total of 105 respondents (58 %) agreed totally or partly with the statement about having too few training sessions per week. This may be a factor "forcing" the coaches to reduce the number of exercises to get more time for sports specific exercises. There were also comments made by the coaches stating that they wanted to make the children learn the game instead of performing strength training. This may be another reason to why a majority of the coaches used rather few strength training exercises.

Exercises with the body weight as resistance and jump exercises were the most commonly used exercises among the respondents. This is in accordance with the recommendations by McDaniel and colleagues, advocating the use of the body weight as resistance when starting with strength training (9). The preference for exercises where no external resistance is added may be due to material published in the 1980' by The Swedish sports confederation. This material contained very cautious recommendations about strength training for children (41, 42). Those recommendations may be what many of the coaches of today base their opinions about "strength training for children" on. The comments made by some of the coaches uncover fear of using exercises with external resistance: Some wrote that the term "strength training" was negatively associated with training in a gym using machines and weights. Many of the "Other exercises" that were used included varying equipment, often resulting in obstacle courses. Such courses do often contain moments of jumping, climbing, crawling, balancing and running, which is strengthening for the body (49). One advantage with obstacle courses is that strength is trained in a fun way, and the children are not aware of that they are performing strength training.

According to previous research one crucial factor when children are performing strength training is that it is performed with correct technique (18). The importance of supervision during strength training is also emphasized. Children should be supervised by a professional

coach guaranteeing that the exercises are safely performed (3, 4, 9, 18, 21, 34, 35). It is favourable that the responding coaches are aware of the importance of a correct technique, but it is uncertain how well supervised the children are during strength training since 91 % of the coaches have ten or more children in their training group. According to the guidelines from the American Academy of Pediatrics each coach should supervise maximum ten children (37). However, a lot of sports clubs have assistant coaches in the training groups, something that was learned when receiving the e-mail addresses to the included coaches. A lot of sports clubs had a head coach and one or more assistant coaches. This indicates that children in those sports clubs can still be well supervised during training.

Many of the coaches did also let the children decide themselves about the number of repetitions. This indicates that the coaches do not want to put too much pressure on the children and let them feel from time to time what their body can perform. Of course, it is of great importance that the children do not push their bodies too hard to minimize the risk of injuries and to increase the enjoyment that sports gives. Though, to get any effect of strength training a certain number of repetitions must be performed (14). Therefore, children may not always decide themselves about how many repetitions they should perform. If they do so the strength training will probably not be as effective as it could be and may have less strengthening effects on the body.

Some coaches emphasize the importance of making the strength training in a natural and fun way and many of the respondents tries to involve strengthening exercises in playing and games. This will make the children feel joy when performing strength training and it is in accordance with McDaniel's statement about making the children develop a positive attitude to strength training (9).

Research question 3

What attitudes do coaches have to strength training for children?

The latest evidence about strength training exercises being injury preventive (23-25) seems to have been recognized by the coaches, since only less than one fifth of the coaches did not agree at all with the statement about strength training being injury preventive. Remaining coaches did partly or totally agree with it. Though, far from all coaches being aware of the

injury preventing effects did really use strength training. There are indications on coaches being displeased with the prerequisite of conducting strength training since almost 60 % of the coaches agreed with the statement that they have too few training sessions per week and almost as many meant that they did not have any equipment or place for strength training. This displeasure may increase the risk of negative attitudes towards strength training.

A majority of the coaches did partly or totally agree with the statement about strength training being injurious or dangerous for children and the majority did not agree at all with the statement about strength training building self-esteem in children. On the other hand the majority did partly or totally agree with the statement saying that strength training makes children more responsive to strength training when they get older. Consequently, the responding coaches vary in their attitudes towards strength training for children and it is not possible to state whether they have a positive or a negative attitude towards it.

As much as 83 % of the coaches did partly or totally agree with the statement about education in strength training and feel that they are not enough educated in this topic. The importance of education for youth coaches was emphasized by the comments written by the coaches where they asked for more education through courses and literature. The reports from The Swedish Sports Confederation regarding increased numbers of educational arrangements for leaders in Swedish sports clubs (38) may please those coaches in need of education.

Research question 4

Is there a difference in the use of strength training between coaches within different sport categories?

This study shows that the number of coaches using strength training is different in different sport categories. The least number of coaches using it are coaches in ball sports. One reason for the difference between ball sports and other sports may be that the coaches focus on developing the children's feeling for the game and to be familiarized with the ball. They may want to teach how to play instead of use time for other exercises. Perhaps there is more of a tradition within sports demanding power and strength to perform strength training, compared to ball sports where a player can be successful by having a well-developed ball control. Though, in the last years there has been research performed, emphasizing the weight of

performing strengthening exercises also within ball sports, to reduce the number of injuries (23-25). This may increase the number of coaches using strength training as a complement to ball exercises.

Research question 5

Is there a difference in the use of strength training between coaches with different education in strength training for children?

Among the coaches using strength training there is a larger number of coaches educated in strength training for children than the number of coaches without such education. Since only 34 (19 %) coaches are educated in this topic, this may be a reason to why only 58 (32 %) coaches use strength training. There are also comments made by the coaches saying that they are in need of education, but they do not know how to get it. Only 7 (5 %) coaches without education report that they have been offered any education in strength training for children. This shows that there is a need of education among the coaches in Scania. Reports from The Swedish Sports Confederation show that the number of arrangements for education in sports is increasing. During year 2010 there were 760 000 leaders getting education from SISU Sports educators, which was an increase from the two previous years. Scania is one of the districts with least education hours per 100 inhabitants (38). This is mirrored by the results in this study, where the responding coaches are asking for more education. However, the increase of education in sports in Sweden is in a positive trend and it may indicate a coming increase of education also among coaches in Scania. Recent research shows that strengthening exercises can reduce the number of injuries in sports (23-25) which may lead to an increase in the number of education arrangements focused on this topic.

According to previous research children should be supervised by professional coaches during strength training (3, 4, 9, 18, 21, 34, 35). This is impossible in many training groups today, since only one fifth of the responding coaches have any education in strength training. Many coaches stated that they are in need of education in strength training for children and that they are interested in participation in educational arrangements. This, together with the increasing number of educational arrangements in the country may lead to a larger number of educated coaches in the close future.

Research question 6

Is there a difference in the use of strength training between coaches with different experience from coaching children?

Mesquita and colleagues found in their study including Portuguese handball coaches that a broad range of competences are important to get successful in the role as a coach. Coach education was one of the major important competences for coaches (50). The results from this study shows that the number of coaches using strength training differentiates between coaches with more and less experience as a coach. Largest number of coaches using strength training (50 %) appears among coaches with five or more years of experience. Perhaps those coaches feel more comfortable in their role as a coach and dare to test new training strategies. Another possible reason may be that coaches with more experience have participated in more coach educational courses, possibly including strength training for children, compared to coaches with less education.

Limitations

There are a number of limitations with this study. First, only coaches training 6-9 years old children were included. An inclusion of coaches training children in another age group as well would have made it possible to make comparisons of the use of strength training between different age groups. A second limitation is the use of a questionnaire as data collection procedure. When conducting a questionnaire survey there is always an uncertainty about whether the respondents answer honestly or not. There is a risk that they answer what they intend to do, but not what they really do. When Internet-based questionnaires are used, there is a risk for technical problems. Such problems may decrease the number of answers or lead to irritation among the respondents. An Internet-based questionnaire does also exclude persons with no access to the Internet. A third limitation is the fairly low response rate (43 %) which may have affected the results; since it is impossible to know what the remaining coaches would have responded. Another limitation is the time of the year when the questionnaire survey is conducted. Different sports have different peak seasons; some are mainly performed during the winter whereas other sports are summer sports. This influences the training methods which may differ during different periods of the year. This may have had an effect on the results of the study.

Suggestions for further research

Further studies including coaches training children older than nine years old are needed to make comparisons of the use of strength training between different age groups. Studies where the responding coaches are living in other parts of the country are also needed. Different geography and weather may influence children's choice of sports and the use of strength training may be different for coaches in other sports compared to sports represented in this study. To make the results as fair as possible the data collection is needed to be performed regularly over the year. This would enable a detection of differences in the use of strength training between sports with different times for peak season.

Conclusion

The findings in this study indicate that only one third of the coaches use strength training during regular training sessions in sports clubs for children aged 6-9 years. It has been seen that there is a relationship between the use of strength training and the sport in which the coach is active, coach education and coach experience. Coaches in ball sports are less prone to use strength training than other coaches. Education in strength training for children and five or more years of experience as a coach are factors increasing the use of strength training among coaches. There is no indication on whether the coaches have a positive or a negative attitude towards strength training for children. Further studies are needed to elucidate the use of strength training in other age groups and other geographical areas.

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Appendix

Appendix 1. Cover letter



Questionnaire concerning strength training for children

Hello,

My name is Hanna Mellby and I study sports sciences at Lund University. This questionnaire survey is a part of my master's thesis that I am doing in cooperation with Scania sports federation.

The questionnaire survey is

This questionnaire survey is directed to coaches in Scania and is aiming at surveying the use of and attitudes towards strength training for children aged 6-9 years. Your responses are of great value and I hope you will reply the questionnaire. The questionnaire is anonymous and it is voluntary to respond to it. Unauthorized persons will not have access to the responses of the questionnaire and no personal data will be published or announced. It takes about 10 minutes to respond to the questionnaire.

I would like to have your response at the latest **28th** March.

Click on the link below to come to the questionnaire.

If you have any questions or worries you are welcome to contact me:
hanna.mellby.160@student.lu.se

Thanking you in advance for your participation!

Regards,

Hanna Mellby
Anna-Maria Drake, supervisor
Lund University

Nils-Ola Nilsson
Lars Nordmalm
Scania sports federation

Appendix 2. Questionnaire

Questionnaire concerning strength training for children

This questionnaire survey is directed to coaches in Scania and is aiming at surveying the use of and attitudes towards strength training for children aged 6-9 years. Your responses are of great value and I hope you will reply the questionnaire. It is voluntary to respond to the questionnaire. Unauthorized persons will not have access to the responses of the questionnaire and no personal data will be published or announced.

Definition of strength training

In this questionnaire strength training is defined as a training method aiming at improving muscular strength and endurance and to improve the individual's health and capacity to perform a sport. During strength training different kinds of exercises aiming at building muscles should be performed. This is done by gradually increasing the resistance and by varying the speed with which the exercises are performed.

Examples of exercises that can be performed during strength training are exercises using

- machines and free weights, e.g. barbells, dumbbells and wood sticks,
- the body weight as resistance, e.g. climbing exercises, push-ups and sit-ups,
- other kinds of equipments producing resistance, e.g. rubber bands and medicine balls,
- different kinds of jump exercises

1. What year were you born? _____

2. Are you

Man

Woman

3. In what sport are you active as a coach? _____

4. For how many years have you been coaching children aged 6-9 years in this sport?

1 year

2 years

3 years

4 years

5 years or more

5. Are you coaching

Girls

Boys

Mixed group with girls and boys

6. Are you coaching children being

6-7 years old

8-9 years old

Mixed ages 6-9 years

7. How many children are there in your group?

- 1-4
- 5-10
- >10

8. How many times per week do the children in your group exercise?

- 1 time/week
- 2 times/week
- 3 times/week
- >3 times/week

9. Have you heard of the report from the Swedish sports confederation called “Survey of knowledge: strength training for children and youths”?

- Yes
- No

10. Have you read the report from the Swedish sports confederation called “Survey of knowledge: strength training for children and youths”?

- Yes
- No

11. Below follow seven statements concerning strength training for children. How well do those statements agree with your opinion about strength training for children?

The respondents can fill in; "I do not agree at all"; "I partly agree; "I totally agree".

Strength training is injury preventive

Strength training builds self-esteem in children aged 6-9 years

Strength training makes children aged 6-9 years more susceptible for strength training in older ages

Strength training is dangerous/injurious for children aged 6-9 years

We have too few training sessions per week to use strength training

We have no equipment/no place for strength training

I feel that I have too little knowledge about strength training for children

12. Has strength training been included in the children’s training at least twice during the last month?

- Yes
- No

If yes, move on to question 14.

13. Are you planning to start to perform strength training with the children in your group within the next 12 months?

- Yes
- No

Move on to question 19.

14. What kinds of strength training exercises do you use when the children in your training group are training strength? (More than one alternative can be filled in.)

Exercises with machines

Exercises with free weights, e.g. barbells, dumbbells and wood sticks
Exercises with other kinds of equipments producing resistance, e.g. rubber bands and medicine balls
Exercises using the body weight as resistance, e.g. climbing exercises, push-ups and sit-ups
Different kinds of jump exercises
Other _____

15. How many times per week do you include strength training in the children's training?

1 time/week
2 times/week
>2 times/week

16. How long time do you usually use for strength training in each strength training session?

1-10 minutes
11-20 minutes
21-40 minutes
>40 minutes

17. How many different strength training exercises (not repetitions, but exercises) do the children in your group perform in each strength training session?

1-7 exercises
8-12 exercises
>12 exercises

18. What do you think is most important to consider when the children in your group are performing strength training? (More than one alternative can be filled in.)

That the technique with which they are performing the exercises is as correct as possible
That the children perform the number of repetitions that I instruct them to do
To let the children feel how many repetitions they can manage to perform

Own comments

Place for the coaches to write their comments on the question.

19. Have you participated in any coach education including instructions about strength training for children having not reached puberty?

Yes
No
I don't know/I can't remember

If yes, move on to question 21.

20. Have you been offered to participate in any education including instructions about strength training for children having not reached puberty?

Yes
No
I don't know/I can't remember

21. Do you have any other comments on the topic "strength training for children"?
Please, provide us with your own experiences about strength training for children.
Place for the coaches to write their comments on the topic.

Appendix 3. Cover letter (in Swedish)



Enkät gällande styrketräning för barn

Hej,

Mitt namn är Hanna Mellby och jag studerar idrottsvetenskap vid Lunds Universitet. Denna enkätundersökning är en del av mitt examensarbete som jag genomför i samarbete med Skåneidrotten.

Enkätundersökningen vänder sig till tränare i Skåne och syftar till att kartlägga förekomsten av och inställning till styrketräning för barn i åldrarna 6-9 år. Dina svar är mycket värdefulla och jag hoppas att Du vill ta Dig tid att svara på frågorna. Enkäten är anonym och helt frivillig att fylla i. Inga obehöriga personer kommer att ha tillgång till enkätsvaren och inga personuppgifter kommer att publiceras eller offentliggöras. Det tar cirka 10 min att besvara enkäten.

Senaste den **28 mars** vill jag ha Ditt svar.

Klicka på länken nedan för att komma till enkäten.

Om Du har några frågor eller funderingar är Du välkommen att höra av Dig till mig:
hanna.mellby.160@student.lu.se

Tack på förhand för Din medverkan!

Hälsningar

Hanna Mellby
Anna-Maria Drake, handledare
Lunds Universitet

Nils-Ola Nilsson
Lars Nordmalm
Skåneidrotten

Appendix 4. Questionnaire (in Swedish)

Enkät gällande styrketräning för barn

Denna enkätundersökning vänder sig till tränare i Skåne och syftar till att kartlägga förekomsten av och inställning till styrketräning för barn i åldrarna 6-9 år. Dina svar är mycket värdefulla och jag hoppas att Du vill ta Dig tid att svara på frågorna. Enkäten är helt frivillig att besvara. Inga obehöriga personer kommer att ha tillgång till enkätsvaren och inga personuppgifter kommer att publiceras eller offentliggöras. Det tar cirka 10 min att besvara enkäten.

Definition av styrketräning

I denna enkät definieras styrketräning som en träningsmetod med syfte att förbättra muskulär styrka och uthållighet samt förbättra individens hälsa och förmåga att utöva en idrott. Vid styrketräning ska olika typer av övningar utföras som syftar till att bygga upp musklerna. Detta sker genom ett stegvist ökat motstånd och att man varierar hastigheten med vilken övningarna utförs.

Exempel på övningar som kan utföras vid styrketräning är övningar där man använder

- maskiner och fria vikter, t.ex. skivstänger, hantlar och tråkäppar,
- den egna kroppen som belastning, t.ex. klätterövningar, armhävningar och sit-ups,
- andra typer av redskap som skapar motstånd, t.ex. gummiband och medicinbollar,
- olika typer av hoppövningar.

1. Vilket år är du född? _____

2. Är du

Man

Kvinna

3. Inom vilken sport är du aktiv som tränare? _____

4. Hur många år har du varit aktiv som tränare för ålderskategorin 6-9 år inom denna sport?

1 år

2 år

3 år

4 år

5 år eller fler

5. Tränar du

Flickor

Pojkar

Blandat flickor och pojkar

6. Tränar du barn som är

6-7 år gamla

8-9 år gamla

Blandad åldersgrupp 6-9 år

7. Hur många barn har du i din grupp?

- 1-4
- 5-10
- >10

8. Hur många gånger per vecka tränar barnen i din grupp?

- 1 gång/vecka
- 2 gånger per vecka
- 3 gånger per vecka
- >3 gånger per vecka

9. Har du hört talas om Riksidrottsförbundets rapport "Kunskapsöversikt: styrketräning för barn och ungdom"?

- Ja
- Nej

10. Har du läst Riksidrottsförbundets rapport "Kunskapsöversikt: styrketräning för barn och ungdom"?

- Ja
- Nej

11. Nedan finns sju påståenden som gäller styrketräning för barn. Hur väl stämmer påståendena med din uppfattning om styrketräning för barn?

Ska här kunna fylla i "Stämmer inte alls", "stämmer delvis", "stämmer helt och hållet"

Styrketräning är skadeförebyggande

Styrketräning stärker självkänslan hos barn i åldrarna 6-9 år

Styrketräning gör barn i åldrarna 6-9 år mer mottagliga för styrketräning i äldre åldrar

Styrketräning är farligt/skadligt för barn i åldrarna 6-9 år

Vi har för få träningstillfällen per vecka för att ägna oss åt styrketräning

Vi har inga redskap/ingen plats för styrketräning

Jag känner att jag har för lite kunskap om styrketräning för barn

12. Har styrketräning ingått i barnens träning vid minst två tillfällen under den senaste månaden?

- Ja
- Nej

Om ja, gå vidare till fråga 14.

13. Planerar du att inom det närmsta året börja styrketräna med barnen i din grupp?

- Ja
- Nej

Gå vidare till fråga 19.

14. Vilka olika typer av styrketräningsövningar använder du när barnen i din träningsgrupp ska styrketräna? (Flera alternativ kan fyllas i.)

Övningar med maskiner

Övningar med fria vikter, t.ex. skivstänger, hantlar och tråkäppar

Övningar med andra typer av redskap som skapar motstånd, t.ex. gummiband och medicinbollar

Övningar med den egna kroppen som belastning, t.ex. klättringar, armhävningar och sit-ups

Övningar med olika typer av hoppövningar

Annat _____

15. Hur många gånger per vecka lägger du in styrketräning i barnens träning?

1 gång/vecka

2 gånger per vecka

>2 gånger per vecka

16. Hur lång tid brukar du ägna åt styrketräning vid varje styrketräningstillfälle?

1-10 minuter

11-20 minuter

21-40 minuter

>40 minuter

17. Hur många olika styrketräningsövningar (inte upprepningar, utan övningar) utför barnen i din grupp vid varje styrketräningstillfälle?

1-7 stycken övningar

8-12 stycken övningar

>12 stycken övningar

18. Vad tycker du är viktigt att tänka på när barnen i din grupp styrketränar? (Flera alternativ kan fyllas i.)

Att tekniken med vilken de utför övningarna är så korrekt som möjligt

Att barnen gör det antalet repetitioner (upprepningar) som jag säger

Att låta barnen känna efter själva hur många repetitioner (upprepningar) som de orkar utföra

Egna kommentarer

Ge plats för tränarna att skriva om de har någon kommentar till frågan.

19. Har du gått någon tränarutbildning där det ingick utbildning som handlade om styrketräning för barn som ännu inte nått puberteten?

Ja

Nej

Vet ej/minns ej

Om ja, gå vidare till fråga 21.

20. Har du blivit erbjuden någon utbildning som handlar om styrketräning för barn som ännu inte nått puberteten?

Ja

Nej

Vet ej/minns ej

21. Har du några övriga synpunkter på området ”styrketräning för barn”? Dela gärna med dig av egna erfarenheter kring styrketräning för barn.

(Ge plats för att kunna skriva några rader.)

Appendix 5. Mail sent when contacting the sports clubs



Questionnaire concerning strength training for children

Hello,

My name is Hanna Mellby and I am a student at Lund University. Now I am completing my master's program in sports sciences by writing a master's thesis about strength training for children. This project is done in cooperation with Scania sports federation.

Our aim is to learn whether strength training is used during regular training sessions for children in sports clubs in Scania and what kind of strength training being performed. We would like to do this by mailing questionnaires to coaches training children in the ages 6-9 years, in the 300 largest sports clubs in Scania. The questionnaire, which is voluntary to reply to, contains 21 questions and it takes about 10 minutes to respond to it. Unauthorized persons will not have access to the responses of the questionnaire and no personal data will be published or announced.

Your sports club is one of the selected clubs and I wonder if you would like to give me the e-mail address to the coach or the coaches in your club training children in the ages 6-9 years? Only training groups where all children are within the age span 6-9 years are adequate groups, not those where any child is older or younger than 6-9 years. If a training group has more than one coach I would like to get into contact with the head coach.

I would be very pleased and it would help me a lot if you would like to send me an e-mail with appropriate coach/coaches e-mail address/addresses. I wish to receive your answer at the latest 16th of March.

Thanking you in advance!

Regards

Hanna Mellby
Lund University

Nils-Ola Nilsson
Lars Nordmalm
Scania sports federation

Mail: hanna.mellby.160@student.lu.se

Appendix 6. Mail sent when contacting the sports clubs (in Swedish)



Enkät gällande styrketräning för barn

Hej,

Jag heter Hanna Mellby och jag är student vid Lunds Universitet. Just nu håller jag på att avsluta min masterutbildning inom idrottsvetenskap, genom att skriva ett examensarbete om styrketräning för barn. Detta gör jag i samarbete med Skåneidrotten.

Vårt mål är att ta reda på hur det ser ut i de skånska idrottsföreningarna idag – utförs det någon styrketräning för barn och vilken typ av styrketräning handlar det om? Detta vill vi göra genom att maila ut ett antal enkäter till dem som tränar barn i åldrarna 6-9 år, i de 300 största klubbarna i Skåne. Enkäten, som är helt frivillig att fylla i, innehåller 21 frågor och det tar cirka 10 minuter att fylla i svaren. Inga obehöriga personer kommer att ha tillgång till enkätsvaren och inga personuppgifter kommer att publiceras eller offentliggöras på annat sätt.

Er förening tillhör de utvalda och jag undrar om Du vill vara vänlig och uppge mailadress till den eller de tränare i Din klubb som tränar barn i åldrarna 6-9 år. Det är bara de grupper där alla barn är inom åldersspannet 6-9 år som är aktuella, inte de grupper där det finns barn som är äldre eller yngre än 6-9 år. Om en grupp har flera tränare önskar jag få kontakt med huvudtränaren.

Jag skulle bli mycket glad för Din medverkan och det skulle vara till stor hjälp för mig om du vill skicka ett mail till mig med aktuell/a tränares mailadress/er. Senaste den **16 mars** önskar jag få Ditt svar.

Tack på förhand!

Hälsningar

Hanna Mellby
Lunds Universitet

Nils-Ola Nilsson
Lars Nordmalm
Skåneidrotten

Mail: hanna.mellby.160@student.lu.se

Appendix 7. Reminding mail sent to the sport clubs



Questionnaire concerning strength training for children

Hello,

My name is Hanna Mellby and I am accomplishing a questionnaire survey in cooperation with Scania sports federation and Lund University.

I would be very pleased if you would like to send me an e-mail with the e-mail address to the coach in your sports club training children in the ages 6-9 years (see the letter below). If you do not have any training for children in those ages I would be pleased if you let me know. Then I would know the reason to why you can not participate in this study.

Please send me a mail with the e-mail addresses as soon as possible, but at the latest the 20th March.

Thanking you in advance!

Regards,

Hanna
Hanna.mellby.160@student.lu.se

Hello,

My name is Hanna Mellby and I am a student at Lund University. Now I am completing my master's program in sports sciences by writing a master's thesis about strength training for children. This project is done in cooperation with Scania sports federation.

Our aim is to learn whether strength training is used during regular training sessions for children in sports clubs in Scania and what kind of strength training being performed. We would like to do this by mailing questionnaires to coaches training children in the ages 6-9 years, in the 300 largest sports clubs in Scania. The questionnaire, which is voluntary to reply to, contains 21 questions and it takes about 10 minutes to respond to it. Unauthorized persons will not have access to the responses of the questionnaire and no personal data will be published or announced.

Your sports club is one of the selected clubs and I wonder if you would like to give me the e-mail address to the coach or the coaches in your club training children in the ages 6-9 years? Only training groups where all children are within the age span 6-9 years are adequate groups, not those where any child is older or younger than 6-9 years. If a training group has more than one coach I would like to get into contact with the head coach.

I would be very pleased and it would help me a lot if you would like to send me an e-mail with appropriate coach/coaches e-mail address/addresses. I wish to receive your answer at the latest **16th** of March.

Thanking you in advance!

Regards

Hanna Mellby
Lund University

Nils-Ola Nilsson
Lars Nordmalm
Scania sports federation

Mail: hanna.mellby.160@student.lu.se

Appendix 8. Reminding mail sent to the sport clubs (in Swedish)



Enkät gällande styrketräning för barn

Hej,

Jag heter Hanna Mellby och jag genomför just nu en enkätundersökning i samarbete med Skåneidrotten och Lunds Universitet.

Jag skulle bli mycket tacksam om Du vill vara vänlig och uppge mailadressen till de tränare i Din förening som tränar barn i åldrarna 6-9 år (se brevet nedan). Om ni inte har någon träning för barn i dessa åldrar så får Du gärna meddela detta, så vet jag anledningen till att ni inte kan delta i studien.

Skicka gärna ett mail med tränarnas mailadresser så snart som möjligt, men senast **söndag 20 mars**.

Tack på förhand! Hälsningar Hanna
Hanna.mellby.160@student.lu.se

Enkät gällande styrketräning för barn

Hej,

Jag heter Hanna Mellby och jag är student vid Lunds Universitet. Just nu håller jag på att avsluta min masterutbildning inom idrottsvetenskap, genom att skriva ett examensarbete om styrketräning för barn. Detta gör jag i samarbete med Skåneidrotten.

Vårt mål är att ta reda på hur det ser ut i de skånska idrottsföreningarna idag – utförs det någon styrketräning för barn och vilken typ av styrketräning handlar det om? Detta vill vi göra genom att maila ut ett antal enkäter till dem som tränar barn i åldrarna 6-9 år, i de 300 största klubbarna i Skåne. Enkäten, som är helt frivillig att fylla i, innehåller 18 frågor och det tar cirka 10 minuter att fylla i svaren. Inga obehöriga personer kommer att ha tillgång till enkätsvaren och inga personuppgifter kommer att publiceras eller offentliggöras på annat sätt.

Er förening tillhör de utvalda och jag undrar om Du vill vara vänlig och uppge mailadress till den eller de tränare i Din klubb som tränar barn i åldrarna 6-9 år. Det är bara de grupper där alla barn är inom åldersspannet 6-9 år som är aktuella, inte de grupper där det finns barn som

är äldre eller yngre än 6-9 år. Om en grupp har flera tränare önskar jag få kontakt med huvudtränaren.

Jag skulle bli mycket glad för Din medverkan och det skulle vara till stor hjälp för mig om du vill skicka ett mail till mig med aktuell/a tränares mailadress/er. Senaste den **15 mars** önskar jag få Ditt svar.

Tack på förhand!

Hälsningar

Hanna Mellby
Lunds Universitet

Nils-Ola Nilsson
Lars Nordmalm
Skåneidrotten

Mail: hanna.mellby.160@student.lu.se