LITHUANIAN SPORTS UNIVERSITY

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COACHING OF THE YOUNG BASKETBALL PLAYERS OF SABONIS BASKETBALL CENTER

Summary of the Doctoral Dissertation
Social Sciences, Education Science (07 S),
Physical Training, Motor Learning, Sport (S 273)

Kaunas 2013

The research has been done during 2008–2012 at the Lithuanian Sports University (Lithuanian Academy of Physical Education).
The research was supported by Lithuanian Studies Foundation (by the Research Council of Lithuania) 2010–2011.
The research was supported by Lithuanian Basketball Federation 2008–2012.

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The defence will take place on September 27th 2013 at 14 p.m. in auditorium 218.
Address: Sporto 6, LT–44221 Kaunas, Lithuania.
The summary of the doctoral dissertation was sent out on August 27th 2013.
The dissertation is available at the library of the Lithuanian Sports University.
Address: Sporto 6, LT–44221 Kaunas, Lithuania.

LIETUVOS SPORTO UNIVERSITETAS

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SABONIO KREPŠINIO CENTRO JAUNŲJŲ KREPŠININKŲ TRENIRAVIMAS(IS)

Daktaro disertacijos santrauka
Socialiniai mokslai, edukologija (07 S),
Fizinis lavinimas, judesių mokymas, sportas (S 273)

Kaunas 2013

Disertacija rengta 2008–2012 metais Lietuvos sporto universitete (Lietuvos kūno kultūros akademijoje).
Mokslinį darbą 2010–2011 metais rėmė Lietuvos mokslo ir studijų fondas.
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Disertacija ginama Lietuvos sporto universiteto Edukologijos mokslo krypties taryboje.

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Disertacija bus ginama viešame Edukologijos mokslo krypties tarybos posėdyje 2013 m. rugsėjo 27 d. 14 val. Lietuvos sporto universiteto 218 auditorijoje.
Adresas: Sporto g. 6, LT–44221 Kaunas, Lietuva.
Disertacijos santrauka išsiųsta 2013 m. rugpjūčio 27 d.
Disertaciją galima peržiūrėti Lietuvos sporto universiteto bibliotekoje.
Adresas: Sporto g. 6, LT–44221 Kaunas, Lietuva.

CONTENTS

ACKNOWLEDGEMENTS

It is sad that we do not have a departed Professor Stanislovas Stonkus among us. He was a very important teacher to me as he introduced me to the science of sports, taught me how to emphasize it and understand the benefits of it. I could say that I had lifted myself to the next level thanks to the efforts of the Professor. He was an extraordinary example to me as a personality and as a sports researcher.

I would additionally like to extend my thanks to Professor Antanas Skarbalius. You are a great supervisor and counselor, who would always direct me to the right way in case I had questions or doubts during my work. You have always cared and sought that the work would be performed as consistently as possible, that I would not lose my curiosity and strive for my goals, would be confident in myself and defend my opinion. You have been a great as a supervisor and as a human being.

In addition I would like to express my thanks to each and every person I met and who did help me to reach the targeted goals.

I would like to dedicate this dissertation to my mother Angelė, my father Vytautas and all my family. This dissertation stands as a culmination to your life-long dedication to my education. From you I learned that effort and persistence leads to success, and if you keep trying you will eventually reach your goal.

In addition, I am greatly thankful for my lovely wife Jovita and son Kornelijus for their vast love and understanding that basketball is extremely important thing in my life.

I hope you are proud of this dissertation.

INTRODUCTION

Relevance of the topic. Lithuania is not a large country and sports talents are not emerging very often. It does not depend on the social or economic situation of the country (Schnabel et al., 1994; Cedaro, 2000; Carling et al., 2009). When giving the opportunity for the talent to achieve positive results in sports, the talented personalities have to be selected, the purposeful training program has to be concluded as well as the monitoring of the practical implementation of the program has to be performed (Regnier et al., 1993; Durand-Bush, Salmela, 2001; Abernethy, 2008; Vaeyens et al., 2008; Bailey et al., 2010; Burgess, Naughton, 2010; Philips et al., 2010; Ford et al., 2011). Therefore it is very important that the training of the athletes has to be conceptualized, so a small quantity of the talented athletes is developed as optimally as possible. Inaccurate training system prevents the athletes from revealing their own potential. Thus, only the consistent sports training system shall stimulate a more rapid improvement of the sports results, as it is harder to identify a talent than to develop it (Balyi, Hamilton, 1999; Raslanas, 2001; Malina et al., 2004; Balyi, Williams, 2009; Stafford, 2010).

It was considered for a long time that success in sports depends solely on the athletes, who are physically strong and developed tactically (Krasilshchikov, 2011), however, due to increase of the competition between athletes (De Bosscher et al., 2006) and major political and commercial influence of sports (Green, Oakley, 2001), there is a necessity to create long-term development programs with respect to different sports (Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010).

Long-term development of the young athletes taking place for a period between eight–to–twelve years before becoming elite athlete is a purposeful and integral didactic process (Ericsson, Charness, 1994; Salmela et al., 1998; Balyi, 2001; Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010) which is significantly affected by the body composition of the athletes (genotypic and phenotypic factors) (Heyward, Stolarczyk, 1996; Jebb et al., 2000; Drinkwater et al., 2008; Ostojic et al., 2006; Abraham, 2010), training program (Trninic et al., 2001; Milanovič, 2002; Balčiūnas et al., 2006), exceptionally physical (Drinkwater et al., 2008; Delextrat, Cohen, 2009) and technical fitness

(Apostolidis et al., 2004; Karpowicz, 2006), nature of sport performance (Hucinski, 2004; Dembinski, 2005).

A reasonable long-term development system of young basketball players began to take shape in seventh decade of the 20th century. Different types of training were distinguished in such system: integral, physical, technical, tactical and theoretic (Stonkus, 1992; Butautas, 2002). The scientists have different opinions on the long-term development. Zeldovič and Keraminas (Зельдович, Кераминас, 1964) provide that 50 % of the total training time in the training cycle of the boys aged 11–14 years should be attributed to the physical and technical training. Dobry (1986) and Stonkus (1985) provide that physical training should prevail (at least 40 % of the total training time) in the training of boys aged 11–14 years. Other scientists (Mikulowsky, Oszast, 1976, Butautas, 2002; Milanovič et al., 2002; Cenic, 2004) state that the technical training is the most important type of training. Based on the opinion of the other group of scientists (Литвинов и др., 1996; *Canadian Sports Centres*, 2008), the time attributed to the physical training shall be reduced in parallel to the increase of age of an athlete, i.e. during the first year of training the largest part shall be attributed to physical training.

One of the most important conditions of effective sports training is control and management of sports training in order to determine and assess physical development, physical fitness, change in the level of technical skills (Johnson, Nelson, 1986; Bouchard et al., 1997; Stonkus, 2002, 2003; Graham et al., 2004; Barfield et al., 2007; Mirkov et al., 2008; Balčiūnas et al., 2009; Robinson, 2010).

According to some studies performed, age periods which are the most sensitive for the training of motor abilities (Komi, 1992; Shephard, Astrand, 1992; Kraemer, 1993; Pauletto, 1995; Alter, 1996; Donald, Chu, 1996; Dintiman et al., 1997; Donald, Chu, 1998; Viru et al., 1999; Baquet et al., 2003; Boisseau, Delamarche, 2000; Malina et al., 2004; Ford et al., 2011), technical skills (Schmidt, 1991; Latash, 1993; Burton, Miller, 1998; Schmidt, Lee, 1999; Cabodevilla, 2008; Kasa, 2006; Zambova, Tomanek, 2012) is childhood and adolescence.

Scientists (Impellizzeri et al., 2005; Wolf, 2006; Ljach, 2007) provide that with respect to training of young basketball players fitness objectives shall be important next to the training objectives, as they influence achievement of the results of a young personality.

Considering that the population of Lithuania is just below 3 million (2.96 million; http://www.stat.gov.lt, 2013), the results and achievement of Lithuanian basketball men national team (5th place in the world ranking, 406 points; http://www.fiba.com, 2013) and of national teams of younger age groups (3rd place in the world ranking, 261 points (http://www.fiba.com, 2013) in the Olympic Games, World and European championships should be treated as exceptional phenomena. A case study of an effective training institution could help to form an assumption on the peculiarities of the long-term development program successfully implemented by the Lithuanian coaches. The relevance of the problem is influenced by the following factors:

- a special meaning for the development of a personality has genuine activity in childhood and adolescence (Jovaiša, 1993; 2001);
- basketball is becoming a more important social phenomena as sports results represent the country (Wilson, Spink, 2006; Sakalauskas, 2010; Paulauskas, 2010);
- in order to form a training concept of young basketball players, tendencies of the training of the training and fitness of the best athletes has to be analyzed (Leonardo et al., 2002; Stonkus, 2003);
- train and manage the process of young basketball players so that the best results are achieved in the most important competitions (Balyi, Williams, 2009). It is especially important for Lithuania as it has limited resources of sports talent and finance;
- only the scientifically-sound optimum training program of the young basketball players (aged 7–17 years) shall allow the athletes to realize their individual potential in order to achieve results in sports, as well as to realize sensitive opportunities for the development of personality (Aksen, Gunay, 2010).

Research problem: due to different training of the young basketball players and different concept of the fitness influencing the training, it is important to determine, which peculiarities of the training programs applied effectively while aiming for the best results influence the fitness of the players during different age periods.

Research hypothesis: a case study of coaching of young basketball players of Sabonis Basketball Center aged 7–17 years will reveal the structure of the long-term coaching of the players.

Research object: coaching of young basketball players (aged 7–17 years).

Research aim: conceptualization of the peculiarities of coaching of young basketball players (aged 7–17 years).

Research objectives:

1. Determine the peculiarities of the content changes and amount of load of the training programs of basketball players aged 7–17 years.
2. Evaluate the body composition indicators, physical and technical fitness of basketball players aged 7–17 years by creating the rank scales of the indicators.
3. Determine the model values of the sport performance indicators of basketball players aged 12–17 years.
4. Reveal the selection and coaching model of Sabonis Basketball Center.

Originality and theoretical significance of the research

As basketball is becoming a more complex sport (faster, more athletic and more versatile), the results depend on many internal and external factors (Stonkus, 2003; Wissel, 2012). Training of young basketball players has become multidimensional, systemic process as multidisciplinary knowledge, methods and measures are used.

A revealed phenomenological interaction between training and fitness of young basketball players aged 7–17 years is based on the following aspects:

- a selection and training model of Sabonis Basketball Center has been revealed;
- a training program of young basketball players aged 7–17 years applied in Sabonis Basketball Center has been revealed;
- a rank scale of body composition indicators, physical and technical fitness of young basketball players aged 7–17 years has been formed;
- the most sensitive age periods for the training of motor abilities and technical skills of young basketball players have been determined;
- the characteristics of sport performance of basketball players aged 12–17 years have been formed.

Practical application of the research

Training programs and their peculiarities for different age periods provided in this dissertation shall help Lithuanian coaches to organize, plan and implement the long-term development of young basketball players more effectively. The rank scales of young basketball players' body composition indicators, physical and technical fitness and the model indicator values of sport performance, which have been formed for the purposes of this dissertation, shall help to select and train the players, prepare them for competitions and develop the highly skilled athletes. The established sensitive age periods for the training of motor abilities and technical skills shall assist the coaches in developing the abilities of young basketball players more effectively.

1. REVIEW OF LITERATURE

1.1. Identification and selection of young basketball talents

Majority of basketball researchers (Bale, 1991; Hoare, 2000; Angyan et al., 2003; Carter, 2005; Drinkwater et al., 2007; Young, Pryor, 2007; Drinkwater et al., 2008; Jakovljevic et al., 2011) argue that only the individuals which have certain body composition and athletic skills may become elite athletes.

Coaches pay a lot of attention to the body composition indicators in a search of new basketball talents, such as height, body mass (Heyward, Stolarczyk, 1996; Norton, Olds, 2001; Drinkwater et al., 2008), body fat mass (Jebb et al., 2000; Ostojic et al., 2006; Abraham, 2010), physical fitness (Angyan et al., 2003; Drinkwater et al., 2008; Delextrat, Cohen, 2009), technical fitness (Apostolidis et al., 2004; Karpowicz, 2006), player character, mental peculiarities (Burke, Crace, 2005; Potrac, Jones, 2009; Malinauskas, Bukauskas, 2010) and practical activity (Trninic et al., 2002; Hucinski, 2004; Dembinski, 2005; Sampaio et al., 2010).

The criteria for recognizing basketball talent are defined by Stonkus (2003), who argues that it is not hard to recognize the talented athletes as they stand out from other athletes by four following peculiarities:

- Body composition and physical peculiarities: strength, endurance, speed and coordination. Firstly the movement coordination is assessed as the most sensitive period for training of it is in a young age of a player. Another important factor is height. If a teenager is tall and has a solid coordination skills, he has a great potential to become a good basketball player.
- Technical abilities: body control technique, actions in defence, ball handling, passing, shooting.
- Mental peculiarities: boldness, creativity, mental processes (memory, imagination).
- Character – a whole of constant peculiarities of behaviour, which expresses the relationships of an athlete to the other people as well as himself / herself, his / hers actions.

There are many basketball players, who play basketball adequately, however, the real talents, who become elite athletes, are rare (Stonkus, 2003). Based on the results of scientific research it can be stated that identification of the talents, recognition, development and long-term selection are the main factors in the search and selection of

the talented athletes (Arnot, Gaines, 1986; Williams, Reilley, 2000; Norton, Olds, 2001; Carter, 2005; Young, Pryor, 2007; Drinkwater et al., 2008; Vaeyens et al., 2009; Jakovljevic et al., 2011).

Different views of the scientists with respect to the selection of young basketball players and selection criteria further supports the scientific problem. The recognition of basketball talent is a relevant scientific topic as Lithuania is not large, its population is small therefore it is important that basketball would be played by as many talented children as possible. In order to not lose the talents the selection system and criteria (body composition, physical and technical fitness, sport performance indicators) have to be established for different ages of the athletes, based on which the young basketball players' development process would be executed.

1.2. Long-term development of basketball players

Long-term development of the young athletes taking place for a period between 8 and 12 years before becoming elite athlete is a purposeful and integral didactic process (Ericsson, Charness, 1994; Salmela et al., 1998; Balyi, 2001; Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010).

Long-term basketball players' development system. Klimantowicz (1999) argues that the long-term development system of basketball players consists of:

- Successful sports orientation of the beginner athletes and purposeful starting training program;
- Practice and competition program;
- Qualified coaches and organizers;
- Appropriate infrastructure, which guarantees the necessary conditions for the development.

A long-term athlete development model created by Balyi (Norris, 2010) is acknowledged as the best recently. Training program is a main element of this model. Due to sensitive period of childhood and adolescence, which allows the athletes to achieve successful results in sports, training is intensified on too much occasions (Armstrong, McManus, 2011). It is not rare in the development of young basketball players (Buceta et al., 2000). Because of this reason Balyi and Hamilton (2004) emphasize that the proportion between amounts of load to young basketball players and specialized amounts of load should be optimal in the childhood and adolescence of an athlete.

It should be noted that other researchers agree with Balyi's long-term athlete development model (Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010). Key peculiarities of six-stage structurized long-term athlete development model are as follows:

1. Fundamental stage (6–10 years).
2. The learning to train stage (10–14 years).
3. The training to train stage (14–18 years).
4. The training to compete stage (18 years and older).
5. The training to win stage (23–30 years and older).
6. The retirement / retention stage (age determined individually).

Based on the above, the opinions of the researchers are quite different independently on whether they approve long-term athlete development model or not. Therefore effective long-term basketball players' development is influenced by the training beginning period and training content.

Training beginning period. Lithuanian basketball researchers Stonkus (1992) and Butautas (2002) state that basketball players begin playing while being 8–9 years of age, whereas FIBA expert Buceta and colleagues (2000) suggest that the children should start training at 6–7 years of age. Even in different countries of former Yugoslavia children begin playing basketball at different ages: 7–10 years of age in Serbia and Montenegro (Cenic, 2004), 10–12 years of age in Croatia (Milanovič et al., 2002). In Spain, other country, in which basketball is considered as being popular, children start playing at the same age as suggested by Lithuanian authors – 8–9 years (Cabodevilla, 2008), whereas in United States of America training beginning period is 8–10 years of age (McCormic, 2006) as in Canada – 6–9 years of age (*Canadian Sports Centres*, 2008).

The accurate period for the beginning to train is not established in scientific research studies. Basketball researchers (Stonkus, 1992; Buceta et al., 2000; Milanovič et al., 2002; Butautas, 2002; McCormic, 2006; Cabodevilla, 2008; Canadian Sports Centres, 2008) have determined that children usually begin playing basketball while being 6–12 years of age.

Training content of long-term development programs. The structures of different long-term development programs are similar, however, the contents of the programs are different (Stonkus, 1992; Butautas, 2002; Cenic, 2004; McCormick, 2006; *Canadian Sports Centres*, 2008, Cabodevilla, 2008) is shown in Table 1.1.

Table 1.1. The recommended amount of load, content distribution and number of matches in different periods of age of different long-term development programs of young basketball players

Age (years)	Annual / weekly load	Distribution of the content in an annual cycle	Number of matches
Stonkus, 1992 (Lithuania)			
8–9	Annual load of 258 hours, 6 hours per week.	Physical – 80 %, technical-tactical – 15 %, theoretic training – 5 % of the time.	More than 10
10	Annual load of 334 hours, 8 hours per week.	Physical – 45 %, technical-tactical – 30 %, theoretic – 5 %, intellectual – 10 %, integral training – 10 % of the time.	More than 10
11	Annual load of 430 hours, 10 hours per week.	Physical – 45 %, technical-tactical – 30 %, theoretic – 5 %, intellectual – 10 %, integral training – 10 % of the time.	20
12	Annual load of 516 hours, 12 hours per week.	Physical – 40 %, technical-tactical – 35 %, theoretic – 5 %, intellectual – 5 %, integral training – 15 % of the time.	20
13	Annual load of 602 hours, 14 hours per week.	Physical – 30 %, technical-tactical – 40 %, theoretic – 5 %, intellectual – 10 %, integral training – 15 % of the time.	25
14	Annual load of 688 hours, 16 hours per week.	Physical – 20 %, technical-tactical – 45 %, theoretic – 5 %, intellectual – 10 %, integral training – 20 % of the time.	25
15	Annual load of 774 hours, 18 hours per week.	Physical – 25 %, technical-tactical – 45 %, theoretic – 5 %, intellectual – 5 %, integral training – 20 % of the time.	30
16	Annual load of 774 hours, 18 hours per week.	Physical – 25 %, technical-tactical – 45 %, theoretic – 5 %, intellectual – 5 %, integral training – 20 % of the time.	30
17	Annual load of 774 hours, 18 hours per week.	Physical – 25 %, technical-tactical – 40 %, theoretic – 5 %, intellectual – 5 %, integral training – 25 % of the time.	More than 40
18	Annual load of 946 hours, 22 hours per week.	Physical – 20 %, technical-tactical – 45 %, theoretic – 5 %, intellectual – 5 %, integral training – 25 % of the time.	More than 50
Butautas, 2002 (Lithuania)			
8–9	Annual load of 246 hours, 41 weeks of practice per year.	Physical – 10 %, technical, tactical and integral – 85 %, theoretic training – 10 % of the time.	Was not indicated
10	Annual load of 344 hours, 43 weeks of practice per year.	Physical – 10 %, technical, tactical and integral – 85 %, theoretic training – 10 % of the time.	Was not indicated
11	Annual load of 344 hours, 43 weeks of practice per year.	Physical – 15 %, technical, tactical and integral – 75 %, theoretic – 5 %, intellectual training – 5 % of the time.	Was not indicated

Table 1.1 (continued)

Age (years)	Annual / weekly load	Distribution of the content in an annual cycle	Number of matches
Butautas, 2002 (Lithuania)			
12	Annual load of 438 hours, 44 weeks of practice per year.	Physical – 20 %, technical, tactical and integral – 70 %, theoretic – 5 %, intellectual training – 5 % of the time.	15–20
13	Annual load of 468 hours, 47 weeks of practice per year.	Physical – 25 %, technical, tactical and integral – 65 %, theoretic – 5 %, intellectual training – 5 % of the time.	20–30
14	Annual load of 510 hours, 48 weeks of practice per year.	Physical – 25 %, technical, tactical and integral – 65 %, theoretic – 5 %, intellectual training – 5 % of the time.	30–40
Milanovič et al., 2002 (Croatia)			
10–12	Annual load of 300–400 hours, 150–200 training days.	Physical – 150 hours, specific – 50 hours, technical and tactical – 200 hours, theoretic training – 10 hours.	30
12–14	Annual load of 500–600 hours, 250 training days.	Physical – 200 hours, specific – 100 hours, technical and tactical – 300 hours, theoretic training – 20 hours.	40
14–16	Annual load of 700–800 hours, 280 training days.	Physical – 200 hours, specific – 150 hours, technical and tactical – 450 hours, theoretic training – 30 hours.	50
16–18	Annual load of 900–1000 hours, 300 training days.	Physical – 250 hours, specific – 250 hours, technical and tactical – 500 hours, theoretic training – 40 hours.	60
18–20	Annual load of 1100–1200 hours, 320 training days.	Physical – 250 hours, specific – 250 hours, technical and tactical – 600 hours, theoretic training – 50 hours.	70
Cenic, 2004 (Serbia and Montenegro)			
11–12	Was not indicated	Physical – 20 %, motor abilities – 50 %, individual and group tactics training – 30 % of the time.	Was not indicated
13–14	Was not indicated	Physical – 25 %, technical – 30 %, group and team tactics (5×5) training – 45 % of the time	Was not indicated
15–16	Was not indicated	Physical – 25 %, technical – 30 %, group and team tactics (5×5) training – 45 % of the time.	Was not indicated
17–18	Was not indicated	Physical – 25 %, technical – 15 %, tactical training – 40 %, matches play – 20 % of the time.	Was not indicated
McCormick, 2006 (USA)			
10–12	Was not indicated	Training – 70 %, matches play – 30 % of the time.	Was not indicated
13–15	Was not indicated	Training – 60 %, matches play – 40 % of the time.	Was not indicated
16–18	Was not indicated	Training – 40 %, matches play – 60 % of the time.	Was not indicated

Table 1.1 (continued)

Age (years)	Annual / weekly load	Distribution of the content in an annual cycle	Number of matches
Canadian Sports Centres, 2008 (Canada)			
6–8	Was not indicated	Basketball fundamentals and motor abilities – 80 %, technical training – 20 % of the time.	Was not indicated
8–9	Was not indicated	Basketball fundamentals and motor abilities – 70 %, technical training – 30 % of the time.	Was not indicated
9–12	Was not indicated	Basketball fundamentals and motor abilities – 40 %, technical – 50 %, tactical training – 10 % of the time.	Was not indicated
12–16	Was not indicated	Basketball fundamentals and motor abilities – 25 %, technical – 30 %, tactical training – 45 % of the time.	Was not indicated
16–18	Was not indicated	Basketball fundamentals and motor abilities – 15 %, technical – 10 %, tactical training – 65 % of the time.	Was not indicated
25 and older	Was not indicated	Basketball fundamentals and motor abilities – 10 %, technical – 10 %, tactical training – 80 % of the time.	Was not indicated
Cabodevilla, 2004 (Spain)			
8–9	Annual load of 55.5 hours, 74 training days.	Defense training – 20 % of the annual load.	Was not indicated
9–10	Annual load of 74 hours, 74 training days.	Defense training – 25 % of the annual load.	Was not indicated
10–11	Annual load of 111 hours, 111 training days.	Defense training – 30 % of the annual load.	Was not indicated
11–12	Annual load of 111 hours, 111 training days.	Defense training – 35 % of the annual load.	Was not indicated
12–13	Annual load of 119 hours, 178,5 training days.	Defense training – 40 % of the annual load.	Was not indicated
13–14	Annual load of 124 hours, 186 training days.	Defense training – 40 % (74.5 hours) of the annual load.	Was not indicated

The studies of long-term development programs-models of basketball players in different countries suggest that a lasting systemic and purposeful process is reflected in the programs analyzed by the researchers (Stonkus, 1992; Butautas, 2002; Milanovič et al., 2002; Cenic, 2004; McCormick 2006; Canadian Sports Centres, 2008; Cabodevilla, 2008), by which it is aimed that mature basketball players

would be ready to compete and deliver good results in official local and international competitions. However, there are certain deficiencies in the programs. The training programs and models are not detailed, lacks information on periodization, normative indicators for the assessment of physical and technical fitness, characteristics of model sport performance for different age periods.

2. METHODOLOGY AND ORGANIZATION

2.1. Methodological conceptions of the research of coaching of young basketball players

The study is based on four **methodological conceptions.**

Personality philosophy theory, which provides that athletic development is a development of the personality (Crum, 1993).

The case study consists of one separate object of the research (person, institution, event). The ground for the analysis – the description of the originality of an object, where comparably low number of cases is investigated and the information on a large number of the peculiarities of each case is analyzed (Yin, 2003; Bryman, 2008; Denzin et al., 2008). By changing or improving the system several different cuts may be used to analyze information. The research is performed as to reveal the specific idea and the means for its realization, the sample consists of the subject of the activities, who successfully puts the ideas into practice (Bitinas et al., 2008).

Based on the **athletes' coaching theory** (Salmela, Regnier, 1983; Riordan, 1988; Russell, 1989; Fisher, Borms, 1990; Du Randt et al., 1992; Cahill, Pearl, 1993; Ericsson, Charness, 1994; Viru,1994; Jenkins, Reaburn, 2000; Stonkus, 2003; Balyi, Hamilton, 2004; Bailey et al., 2004; Kirk et al., 2005; Malina et al., 2004; Stafford, 2005; Abbott et al., 2007; Issurin, 2007; Bompa, Haff, 2009; Armstrong, Van Mechelen, 2008), the major parameters of the training management are as follows: assessment of the initial form of an athlete; prognosis of the targeted form; modeling of the training load and status correction of the actual load and actual status (Skurvydas, 2011).

Theory of quantitative and qualitative interaction of training and fitness (Hull, 1943; 1952) provides that a person is a system (Banister et al., 1975; 1999; Calvert et al., 1976), in which training is the input, whereas fitness is the output. System improvement consists of feedback to the training (Argyle, 1980) or the interaction between the models of training and fitness of the athletes (Skiner, 1978; 1987; Calvert et al., 1976; Schmid, Timothy, 1999; Schmidt, Craig, 2000).

2.2. Subjects

The quantitative research – testing included the data of n = 1096 separate tests of voluntary young basketball players of Sabonis Basketball Center (between 40 to 206 testing subjects in each age group).

The qualitative research – interview included the coaches of the first teams of each age group of Sabonis Basketball Center (n = 10).

It should be noted that the following participants and award winners of various championships were trained in Sabonis Basketball Center:

- Participants of Olympic Games: J. Mačiulis (2008, 2012), M. Kalnietis (2012), P. Jankūnas (2012).
- Bronze medal winners in World Basketball Championships of 2010: J. Mačiulis, P. Jankūnas, M. Kalnietis, M. Andriuškevičius.
- Winners and medal winners of European Championships: G. Gustas (2003, 2007), J. Mačiulis (2007), P. Jankūnas (2007).
- Around 40 elite basketball players, 14 of whom have become the Lithuanian basketball champions.
- School children of Sabonis Basketball Center have become the champions of the Lithuanian School Children Basketball Championships for 45 times in different age groups during the years 1995–2013.

2.3. Methods

The following scientific research methods were applied in the dissertation:

- Meta-analysis;
- Kinanthropometry, physical and technical fitness:
  - Body composition indicators;
  - Testing.
- Qualitative research:
  - Interview.
- Analysis of official documents:
  - Analysis of the protocols of the sport performance.
- Data processing methods:
  - Statistical analysis.

The permissions No. BE–2–19 (2006) and No. BE–2–55 (2011) of Lithuanian Bioethics Committee were received for this dissertation.

2.3.1. Meta-analysis

Scientific and other publications were analyzed by applying the method of the literature analysis (Hart, 1998; Carnwell, Daly, 2001; Cronin et al., 2008), by which the problematics, relevance and novelty of the research were formed. Theoretical study allowed to summarize and assess the anthropometric and body composition indicators of long-term development of young basketball players, as well as the peculiarities of training and fitness, training programs, efficiency of the sport performance. This method was used in order to analyze the sources, compare and interpret the received results of the research.

2.3.2. Kinanthropometry, physical and technical fitness

2.3.2.1. Body composition indicators

The height of the subjects to the nearest 0,1 cm was measured using the anthropometer (Martin, GPM SiberHegner). The arm span to the nearest 0,1 cm was measured using the tape-strip. In addition, the length of a foot to the nearest 0,1 cm of each subject was measured using the divider.

Body mass (kg), body mass index (BMI), body fat mass (%) and body free-fat mass (kg) were measured using the analyzer of body mass components “Tanita Body Composition Analyzer TBF–300” (TBF–300 Tanita, Tanita Corporation, Japan).

2.3.2.2. Testing

The principle of re-testing was used in evaluation of **the reliability of the tests performed**, i.e. by performing the re-testing of the construct, the correlation coefficient was calculated thereby calculating the stability coefficient between the results of the test performed two times in identical conditions (Kardelis, 2002). The reliability of the selected tests was evaluated by calculating the stability coefficient of the tests. At least 40 subjects of each age group were participating in the testing. The testing was taking place in identical day period during two successive days (separate tests taking place 24 hours apart) by replicating the same sequence and conditions of the tests.

Testings. The young basketball players of different ages and age groups were tested in fitness facilities of Sabonis Basketball Center in each October and November of years 2004–2009.

Before the testing the subjects were informed about the testing and its sequence, as well as about the significance of the research. The

testing was taking place Mondays to Fridays at a comparable period of a day (after a lunch between 15.00 and 18.00). 10 minutes before the testing the subjects performed the standard warming-up workout (similar to the one performed during in the practices) led by their coach.

Testing for each age group was performed in a two day period (both testing sessions were performed during 14–day period) in a beginning of a competitive period in October and November. The first testing (around 90–110 minutes) measured the motor abilities and anthropometric indicators of the subjects. Such testing took two days. During the first day of the testing the anthropometric indicators and motor abilities were tested (Table 2.1), whereas the second day was attributed to the determination of body composition indicators and basketball technique skills of the subjects (around 90–110 minutes) (Table 2.2). Testing organizational structure is provided as the testing 14–16 basketball players on average (Tables 2.1.–2.2).

Table 2.1. Content and sequence of the tests during the first testing day

Duration (min)	Measurements, tests	Testing sequence
≈ 10	Anthropometric indicators	1
≈ 10	Dynamometry (kg)	2
≈ 10	Warm up	3
≈ 8–10	Sit and reach test (cm)	4
≈ 8–10	20m sprint test (s)	5
≈ 8–10	20m sprint with dribbling test (s)	6*
≈ 6–8	20m sprint with dribbling two balls test (s)	7**
≈ 6–8	20m running with three hurdles test (s)	8
≈ 10–12	Vertical jump with swings the arms backward (cm) Vertical jump with arms on the hips (cm)	9
≈ 8–10	Illinois agility test (s)	10
≈ 8–10	Illinois agility test with dribbling (s)	11***
≈ 15–16	6 min running test (m)	12****

Notes. * 20m sprint with dribbling was tested to the basketball players of 7–11 years of age;

** 20m sprint with dribbling two balls – to the basketball players of 12–17 years of age;

*** Illinois agility test with dribbling – to the basketball players of 12–17 years of age;

**** 6 min running test – to the basketball players of 10–17 years of age.

Table 2.2. Content and sequence of the tests during the second testing day

Duration (min)	Measurements, tests	Testing sequence
≈ 10	Body composition indicators	1
≈ 10	Warm up	2
≈ 8–10	Control dribble test (s)	3
≈ 10	Modified shooting from close to the basket test (pts)	4*
≈ 8–10	30 free throws shooting test (pts)	5*
≈ 8–10	1 min shooting test (pts)	6**
≈ 6–8	Defensive movement test (s)	7***
≈ 6–8	Speed spot shooting test (pts)	8****
≈ 10–12	Modified shooting from medium and long range test (pts)	9*****

Notes: * modified shooting from close to the basket and 30 free throws shooting test was performed to the basketball players of 9–17 years of age;

** 1 min shooting test – to the players of 9–11 years of age;

*** defensive movement test – to the players of 8–17 years of age;

**** speed spot shooting test – to the players of 11–17 years of age;

***** modified shooting test from medium and long range – to the players of 8–17 years of age.

2.3.3. Interview

The qualitative research interview method was applied (Kardelis, 2002). The method was applied in May–June of 2010. 10 highly-skilled coaches of Sabonis Basketball Center (training 11 different age groups of basketball players) were questioned by applying interview method. The aim of the application of the method was to determine the amounts of load of annual cycle and content of the training programs applied by the coaches to the basketball players of the different age groups as well as determine the main peculiarities of training program in different periods of the training. The interview was stenographed or recorded (dependent on the coach).

2.3.4. Analysis of the official documents

The indicators (statistics) of the sport performance in the Lithuanian School Children' Basketball League are recorded by the statisticians. The analysis of the official documents (match-play protocols) allowed to assess the model sport performance characteristics of young basketball players, which would help to evaluate individual

indicators of the players during the games. In total 123 boys' matches play of the Lithuanian School Children Basketball League Division 1 played in 2009–2010 season were analyzed (matches-played analyzed by age groups: n = 16 of 12 year-olds; n = 18 of 13 year-olds; n = 18 of 14 year-olds; n = 18 of 15 year-olds; n = 19 of 16 year-olds; n = 18 of 17 year-olds). The research data was analyzed by the statistical sport performance data provided in the website of Lithuanian School Children Basketball League (http://www.mkl.lt, 2010).

2.3.5. Statistical analysis

Statistical analysis was performed using program packages Office Excel 2003 and IBM SPSS Statistics 19. The calculations included the determination of the arithmetic average, standard deviation, the reliability of the differences between averages in accordance with the Student criterion for independent samples (different subjects belonging to the different age groups were tested by assessing the differences of indicators between the age groups differing by one year; please note that the normality of the distribution was tested by applying Kolmogorov-Smirnov criterion). In the assessment of the reliability of the results, the difference was deemed to be statistically significance where $p < 0.05$ (the reliability of 95%). In order to evaluate the reproducibility of the test results the intraclass correlation coefficient (Cohen et al., 2003) was calculated. The rank scales for body composition, physical and technical fitness indicators were established using the IBM SPSS Statistics 19 package (90 % and more; 80–89 %; 70–79 %; 60–69 %; 50–59 %; 40–49 %; 30–39 %; 20–29 %; 10–19 %; 10 % and less). The difference in the results of various tests and body composition indicators between different age groups was evaluated with respect to the effect size (Cohen, 1988; Hopkins, 2006). The effect size was assessed using the Hopkins (2002) scale (< 0.2 trivial; 0.2–0.6 – small; 0.6–1.2 – average; 1.2–2.0 large; > 2.0 very large).

2.4. Research design

Young basketball players of different age and different age groups were tested in October and November of years 2004–2009. Sport performance of the players was evaluated based on the statistical results of 2009–2010 season. Qualitative research (interview) took place in June 2010.

3. RESULTS OF YOUNG BASKETBALL PLAYERS

3.1. Body composition

After performing the tests to the Sabonis Basketball Center's young basketball players aged 7–17 years with respect to their body composition indicators, the rank scales assessing height (cm), arm span (cm), body mass (kg), foot length (cm), body mass index, body fat mass (%) and body free-fat mass (kg) were established (Tables 3.1–3.7).

Table 3.1. Rank scale for height (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	136.7	144.8	146.5	154.6	161	170.3	180	186	193.7	197.7	196
80	134	140.2	144.8	151.9	157.3	166.1	176.6	182.7	191	194	193.4
70	131.4	137.7	143.6	150	155.5	164.2	172	179.4	187	190.7	191.4
60	130.8	136.2	141.8	147.5	154	162.5	169.3	176.8	184.6	189	191
50	128.5	133.5	140.5	147	151.4	160	167	174	183	184.7	187.6
40	127.2	132.5	139.9	145.7	149.5	157.3	164	171	180.5	183	186.3
30	125.3	130.6	139.7	144	147.4	155	161.5	169	178.5	181.3	185
20	124.2	129	137.6	141	146	153	160	165	175	179	183.5
< 10	123.1	126.6	136	137	142.4	149	156.3	162.5	172	176	180.6
Range	119.3–145.2	123.8–147.1	131.5–155.4	132–160.5	135–169	146–184.5	143–188	154–194	162–198	169–200.7	175.4–215.3

Table 3.2. Rank scale for arm span (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	137.2	147.7	148.2	161.4	162.5	180	187.3	195.5	203.5	207.4	209.5
80	135.5	144.4	146.5	157.6	159.5	175	184.5	189	201.2	203.9	201.3
70	132	140.5	144.8	153.7	157.5	169.5	181.7	186.2	197.6	200.7	196
60	130.7	136.7	143.5	152.3	156.8	167.5	179.5	184	195.6	194.5	195.2
50	128.5	133.6	143.2	151.8	154.9	166.6	174.7	181.8	192.6	189.5	193.5
40	127	131.4	142	151.6	149.9	166	171.7	180.2	192.4	186	192.3
30	124.5	130.8	140	148.3	148.3	161.6	166.7	178.5	189.5	185.6	189.2
20	123.4	129.3	138.5	146.6	146.7	160.8	164	174.4	186.4	182.9	186
< 10	122.8	127	136.7	145.2	143.8	157.5	162.5	170.4	185	182.3	182
Range	115–145	122.4–149.5	131.2–156.4	143.9–170	140.7–172.2	155.1–188.3	155.7–187.8	162.3–198.5	174–225	108.7–212.1	180.2–218.2

Table 3.3. Rank scale for body mass (kg) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	38.2	38.7	41.5	48	52.3	60	70.3	73.3	86.6	87.5	93
80	31.5	34.7	37.4	41.8	48.2	53.7	63.3	70	76.8	81.3	84.7
70	30.2	32.8	36	39.7	44	51.5	57.2	66.5	74.9	77	82.6
60	29	32.4	34.4	37	41.1	49.3	53.8	63.4	71	74.6	78
50	27.8	30.1	32.9	36	39.8	47	50.1	60.4	67.6	72.6	76.2
40	25.9	28.2	31.6	34.5	38.2	44.1	48.9	57	66	70	74.9
30	25.3	26.8	31.3	33.6	36.9	42.2	45.8	53.5	62	68.6	72.9
20	24.6	25.9	30.6	33	36.1	39.3	44	50	59.9	66	70.9
< 10	24.1	24.4	28.5	29.8	34.9	36.5	40	45.7	55	63.6	67.1
Range	23.2–40.2	22.7–50	27.9–54.9	26.7–57.4	30.1–64.4	32–82.6	29.7–79.9	35.3–97.4	45–99	52.1–106.7	65–104

Table 3.4. Rank scale for foot length (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	21.2	23.5	24	25.7	26.8	28.8	28.5	29.1	30.5	32	30.8
80	21.1	22.5	23.1	25.5	25.6	27.6	27.8	28.6	29.7	30.6	29.9
70	21	21.9	22.5	25	25	27	27.6	28.4	29.6	30.1	29.7
60	20.9	21.6	22.1	24.5	24.5	26.7	27.4	28	29	29.3	29.4
50	20.7	21.1	22	24.1	24.1	26.4	27	27.6	28.5	29	29.1
40	20.6	20.8	21.8	24	23.7	26	26.3	27.3	28.1	28.5	28.6
30	20.3	20.6	21.6	23.9	23.5	25.5	26.1	26.9	27.9	28	28.1
20	20.1	20.2	21.4	23.7	22.8	25	25.6	26.5	27.5	27.1	27.9
< 10	18.6	19.9	20.6	22.5	22.5	24.1	25	26	26.7	27	27.6
Range	18.2–22.7	19.6–23.6	20.3–25	21.8–27.4	21.9–26.9	24–28.9	24.5–29.4	25.2–30.5	26.2–30.7	25.7–37.7	27.1–33.4

Table 3.5. Rank scale for body mass index of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	14.2	14.4	14.8	15.6	15.4	15.8	16.1	18.2	19.5	20.7	20.4
80	14.7	14.9	15.2	15.9	16	16.7	17.1	18.5	20.1	21	21.5
70	15.8	15.4	16	16.1	16.4	17.2	17.6	19.1	20.9	21.3	21.6
60	16	15.6	16.1	16.5	16.8	18	18.1	19.4	21	21.4	22.2
50	16.5	15.9	16.4	16.9	16.9	18.4	18.7	19.6	21.9	21.6	22.6
40	16.7	17.7	16.9	17.4	17.9	18.7	19.6	20.2	22.5	22.1	22.9
30	17.1	18.4	17.8	17.5	18.3	20.2	20.4	20.8	22.6	23	23.3
20	17.8	19.3	18.8	18	18.5	20.5	21.7	22.4	23.3	24.8	23.9
< 10	19.7	20.5	21.5	18.2	19.4	22	23.1	23.1	24.5	26.1	24.5
Range	14–22.2	13–23.3	14.5–25	14.4–23.7	14.6–22	15.1–22.9	14.9–27	17.2–24.7	18.3–26	17.9–26.6	20.2–25

Table 3.6. Rank scale for body fat mass (%) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	24.7	13.9	14.5	13.2	12.5	11.5	9.3	10.8	8.7	7.5	2.6
80	24.9	14.8	15.6	13.9	12.8	12.4	10.7	11.3	10.7	9.7	5.6
70	25.9	15.3	15.9	14.5	13.9	13.1	11.2	12.4	11.2	10.5	6.5
60	26	16.3	16.6	15.1	14.6	13.6	11.9	13	12.8	11.2	6.8
50	26.3	16.6	17	16.1	14.8	13.8	12.5	13.1	13.1	11.9	7.8
40	26.9	17.9	17.4	16.3	15.2	14.2	13	13.3	13.4	12.8	7.9
30	27.5	18.2	18.3	17.1	16.1	14.7	13.7	13.4	14.7	13.7	8.8
20	28.8	20.5	22.3	18.1	17.6	14.8	14.9	15.1	15.3	14.8	9.3
< 10	37	25.9	23.7	20	20.2	17.7	17	16.4	15.9	16.7	10.4
Range	24.4–37.3	12.3–35.3	14.2–30.2	11.9–23.3	10.9–22.8	10.1–22.3	8.3–24	9.9–18	7.9–19.8	3.2–22.1	2.6–26.1

Table 3.7. Rank scale for body free-fat mass (kg) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	22.9	22.8	25.4	30	31.7	35.8	40.6	52.3	56.1	62.1	67.2
80	23.9	22.9	26.7	30.9	33.4	38.4	44.3	53.8	58.1	62.9	72.9
70	24.3	25	27.1	31.1	35.6	40.6	47.5	55.3	61.3	67.3	73.1
60	24.7	25.1	28	32.7	37.8	42.6	50.6	56.7	62.1	68.8	74.4
50	25.3	28.5	29	33	38.5	44.1	52.5	59.9	68.6	70.2	75.2
40	25.4	28.9	29.4	33.8	39.8	45.8	55.3	62.1	69.6	74.2	77
30	25.6	29.5	31.7	34.6	41.3	47.5	57.1	62.9	70.8	76	78.7
20	27	31.6	34	35.7	42.1	50.4	61.8	66	71.1	86.8	83.5
< 10	27.3	34.7	37	39.7	47.7	51	65.6	66.9	80.3	100.1	89.3
Range	21.3–29.4	20.5–37.3	24.3–41.4	29.7–49.4	30.9–53.6	33–66.6	34.3–69.5	52.1–72.3	54–83.3	59.7–103.5	66.6–96

3.2. Physical fitness

After performing the tests to the Sabonis Basketball Center's young basketball players aged 7–17 years with respect to their physical fitness indicators, the rank scales assessing speed (20m sprint test (s), agility (Illinois agility test (s), speed strength (vertical jump with swings the arms backward (cm), strength speed (vertical jump with arms on the hips (cm), special coordination (20m running with three hurdles (s), general endurance (6 min running test (m), flexibility (sit and reach test (cm), hand grip strength (dynamometry (kg) were established (Tables 3.8–3.16).

Table 3.8. Rank scale for 20m sprint test (s) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	4.01	3.89	3.69	3.43	3.45	3.34	3.19	3.08	2.97	2.92	2.78
80	4.1	3.93	3.73	3.5	3.53	3.4	3.22	3.14	3.03	2.96	2.89
70	4.13	3.96	3.79	3.62	3.59	3.45	3.28	3.2	3.08	3	2.91
60	4.14	4.01	3.87	3.65	3.64	3.48	3.33	3.23	3.1	3.05	2.96
50	4.23	4.05	3.91	3.71	3.69	3.51	3.38	3.27	3.13	3.08	2.98
40	4.29	4.08	3.95	3.77	3.74	3.57	3.45	3.31	3.16	3.1	3.02
30	4.43	4.14	4.01	3.83	3.79	3.63	3.48	3.34	3.2	3.12	3.07
20	4.49	4.26	4.05	3.87	3.85	3.68	3.53	3.4	3.24	3.17	3.11
< 10	4.56	4.37	4.21	3.94	3.95	3.73	3.64	3.5	3.32	3.24	3.18
Range	4.9–3.88	4.61–3.82	4.34–3.64	4.16–3.24	4.4–3.21	4.2–3.19	3.92–2.96	3.99–2.87	3.48–2.96	3.8–2.86	3.52–2.72

Table 3.9. Rank scale for Illinois agility test (s) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	20.7	20.3	19.14	19.03	18.59	17.91	16.71	16.7	16.61	16.46	16.14
80	21.12	20.69	19.61	19.39	18.94	18.05	17.13	17.04	17.03	16.61	16.44
70	21.31	20.89	19.99	19.52	19.17	18.28	17.61	17.3	17.07	16.77	16.61
60	21.53	21.24	20.65	19.7	19.28	18.56	17.65	17.48	17.14	16.97	16.67
50	22.43	21.56	21.38	20.08	19.63	18.73	17.97	17.68	17.35	17.22	16.7
40	22.5	21.64	21.44	20.21	19.84	19	18.47	17.93	17.6	17.27	16.9
30	23.44	21.95	21.72	20.43	20.23	19.28	18.76	18.03	17.65	17.35	17.14
20	24.65	22.15	22.22	20.71	20.77	19.41	18.99	18.22	17.71	17.41	17.2
< 10	26.44	22.82	23.15	21.24	21.8	19.57	19.28	18.62	18.21	17.65	17.57
Range	29.11–20.46	24.58–19.99	25.36–18.79	21.64–18.36	28.65–18.19	21.16–17.68	19.39–16.5	19.6–16.48	19.88–16.32	18.9–16.45	19.54–16.05

Table 3.10. Rank scale for vertical jump with swings the arms backward (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	27.9	30.6	36.2	37.5	36.7	42.8	45.6	50	51.3	55.7	59
80	26.5	28	34	35.7	34.8	40	42.5	46.5	49.9	55.2	57.1
70	26.3	27	32.5	34.3	33.4	37.4	41.3	44.2	48.8	52.2	56.7
60	25.3	26.2	31	33.6	32.3	36.4	39.9	43	46.8	50.5	55.2
50	24.1	25.7	30.2	31.9	30.6	35	39	41.1	45.9	48.6	53
40	23.5	25.1	27.7	30.9	29.7	33.4	37.6	40.2	44.6	48.3	51
30	23.2	23.9	26.6	28.9	28.5	32.6	35.5	39.5	42.5	46.3	49.7
20	22.5	23.6	24.8	28.1	27.5	30.9	33.4	37.2	41.5	45.7	48.3
< 10	18.7	20.6	23.8	27.2	25.3	29.2	32.3	34.2	39.7	43.3	46
Range	16.4–28.7	18.1–31.2	21.4–28.3	21.4–41.2	17.7–40.9	17.9–47.4	24.3–56.6	22.3–61.8	32.3–64.2	39.9–59.9	40.9–62.5

Table 3.11. Rank scale for vertical jump with arms on the hips (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	24.7	25.6	28.1	32	33.2	37.1	39.4	43	44.6	50.3	50.6
80	24.5	25.4	26.5	29.2	30.7	34.7	36.5	39.9	42.1	45.7	49.1
70	23.4	23.7	24.8	28.6	29	32.7	35.3	37.7	40.8	42.2	46.6
60	22.5	23.2	24.5	26.9	28.1	31.5	33.8	36.4	39.1	41.3	45.6
50	21.8	22.5	23.7	25.9	27	30.6	32.6	35.1	37.9	39	43.5
40	21.3	21.5	22.7	25	25.7	29.3	31.3	34	36.7	38.5	41.8
30	20.5	20.4	22.3	23.9	24.3	27.8	30	32.5	35.7	37.7	39
20	19.8	19.6	21.5	22	22.6	26.2	28.4	30.9	34.6	36.5	37.3
< 10	18.7	18.4	21.2	21	20.1	24	26.6	28	32.5	34.7	34
Range	14.1–25.6	15.7–30.5	17.5–28.3	14.0–36.0	12.8–43.0	14.3–39.8	20.6–47.2	21.4–56.7	29.8–67.7	28.4–57.7	30.5–54.0

Table 3.12. Rank scale for 20m running with three hurdles test (s) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	12.64	9.44	8.97	8.25	7.8	7.66	7.2	6.81	7.26	7.06	6.87
80	13.86	9.74	9.08	8.65	8.32	7.99	7.66	7.53	7.41	7.48	6.99
70	14.22	9.89	9.26	9.07	8.63	8.66	8.04	7.74	7.46	7.84	7.31
60	14.96	10.29	9.49	9.42	8.85	8.81	8.24	7.86	7.84	7.9	7.36
50	15.75	10.41	10.18	9.89	9.12	8.95	8.46	8.05	7.99	7.96	7.45
40	16.99	10.71	10.33	9.99	9.36	9.35	8.49	8.25	8.12	8.05	7.65
30	18.47	11.22	10.69	10.19	9.46	9.69	8.56	8.44	8.14	8.3	7.77
20	19.04	11.68	10.89	10.41	10.2	10	8.65	8.87	8.35	8.47	8
< 10	21.13	13.76	11.99	10.72	10.5	10.26	9.55	9.19	8.51	8.74	8.39
Range	23.13–9.95	14.03–9.18	13.98–7.88	13.69–7.94	12.4–7.45	12.77–7.56	10.09–7.19	11.05–6.5	9.98–7.11	8.96–7.0	10.18–6.54

Table 3.13. Rank scale for 6 min running test (m) of Sabonis Basketball Center's young basketball players aged 10–17 years

% rank	Age (years)							
	10	11	12	13	14	15	16	17
90 >	1218	1260	1456	1246	1372	1414	1400	1396
80	1176	1190	1360	1232	1302	1400	1386	1392
70	1148	1148	1288	1218	1276.8	1394.4	1372	1390
60	1134	1106	1232	1209.6	1246	1344	1344	1386
50	1120	1064	1204	1204	1232	1316	1338.4	1372
40	1106	1024	1176	1198.4	1204	1300	1316	1310.4
30	1092	952	1153.6	1176	1176	1288	1288	1302
20	1050	907	1148	1162	1136.8	1274	1260	1282.4
< 10	1024.8	840	1120	1036	1064	1260	1204	1232
Range	938–1260	784–1372	1008–1663.2	980–1274	1008–1414	1064–1442	1162–1428	1120–1400

Table 3.14. Rank scale for sit and reach test (cm) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	23	25	26	26	24	24	35	32	33	35	36
80	22	23	24	23	22	23	28	28	32	32	34
70	21	22	23	21	21	21	27	26	31	29	33
60	20	21	22	19	20	19	25	23	30	28	31
50	19	18	19	17	19	18	23	21	28	27	25
40	18	17	18	16	18	17	20	19	27	24	23
30	17	16	16	15	17	15	19	17	26	23	21
20	15	15	15	13	16	14	18	13	24	22	18
< 10	14	12	14	11	14	11	17	10	19	19	15
Range	10–24	9–27	7–27	4–27	9–28	3–30	14–36	6–36	12–34	16–36	10–37

Table 3.15. Rank scale for right hand grip strength (kg) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	21.5	28	27.5	36	39	50	59	63	81	77	75
80	21	25	26.5	33	33	40	54	56	68	70	72
70	19	22	25	30	32	39	48	53	63	69	67
60	18	21	24	29	31	36	47	51	61	64	65
50	17	20	21.5	28	30	35	44	48	57	62	64
40	16.5	19	21	27	29	34.5	42	44	56	60	60
30	16	18	20	26	28	34	40	42	54	56	59
20	15	17	19	24	27	33	38	40	52.5	52	58
< 10	14.5	16	17	21	22	32	32	37	48	50	51
Range	14–22	14–30	15.5–28	18–45	20–42	27–64	26–65	32–70	42–88	42–80	49–78

Table 3.16. Rank scale for left hand grip strength (kg) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	22	26	25	34	33	42	50	58	72	73	72
80	21	22	23	30	31	40	47	52	62	68	65
70	18	20	22	28	29	36	46	49	57	66	64
60	17	19	21.5	27	28	35	44	46	56	62	63
50	16	18	21	25	26	34	40	43	54	60	62
40	15	17	19	24	25	33.5	39	42	51	57	58
30	14	16	18.5	23.5	24	33	38	40	50.5	56	55
20	13.5	15	18	22	23	31	36	37	50	55	54
< 10	13	14	17	21	20	30	35	33	48	50	50
Range	10–23	12–28	13–26	20–38	19–38	27–66	27–52	26–67	39–86	48–75	48–74

3.3. Technical fitness

After performing the tests to the Sabonis Basketball Center's young basketball players aged 7–17 years with respect to their technical fitness indicators, the rank scales assessing dribbling skills (control dribble test (s), 20m sprint with dribbling test (s), 20m sprint with dribbling two balls test (s), Illinois agility test with dribbling (s)), ball shooting accuracy (1 min shooting test (pts), modified shooting from medium and long range test (pts), speed spot shooting test (pts), modified shooting from close to the basket (pts), 30 free throws shooting test (pts)) and defensive movement test (s) were established (Tables 3.17–3.26).

Table 3.17. Rank scale for control dribble test (s) of Sabonis Basketball Center's young basketball players aged 7–17 years

% rank	Age (years)										
	7	8	9	10	11	12	13	14	15	16	17
90 >	10.78	9.59	9.01	8.34	8.58	8.3	7.81	7.8	7.65	7.4	7.8
80	10.89	9.6	9.23	8.72	8.72	8.46	8.04	7.96	7.85	7.5	7.9
70	11.65	9.68	9.49	9.11	8.98	8.58	8.19	8.12	7.97	7.84	8.08
60	11.73	9.73	9.73	9.21	9.15	8.77	8.3	8.23	8.1	7.96	8.1
50	12.25	9.88	9.85	9.36	9.39	8.98	8.5	8.4	8.19	8.1	8.2
40	12.41	10.09	10.11	9.53	9.5	9.18	8.67	8.6	8.25	8.26	8.3
30	12.76	10.2	10.35	9.72	9.8	9.43	8.8	8.8	8.5	8.35	8.4
20	13.38	10.45	10.69	10.24	10.19	9.56	9.1	8.9	8.7	8.5	8.58
< 10	15.46	10.86	10.82	10.52	10.5	9.9	9.38	9.11	8.9	8.74	8.84
Range	10.58–16.34	9.48–11.88	8.69–11.72	7.98–12.05	8.1–11.7	7.82–11.1	7.37–9.9	7.13–10.4	6.92–9.5	7.11–9.4	7.5–9.59

Table 3.18. Rank scale for 20m sprint with dribbling test (s) of Sabonis Basketball Center's young basketball players aged 7–11 years

% rank	Age (years)				
	7	8	9	10	11
90 >	4.95	4.25	4.04	3.66	3.72
80	5.03	4.55	4.12	3.78	3.92
70	5.24	4.58	4.3	3.82	4.17
60	5.39	4.64	4.42	3.87	4.24
50	5.81	4.69	4.5	3.91	4.36
40	6.09	4.76	4.71	3.99	4.49
30	6.14	4.95	4.83	4.04	4.59
20	6.35	5.13	4.9	4.08	4.76
< 10	6.89	5.3	5.65	4.17	4.85
Range	4.89–7.52	4.23–6.02	3.93–6.18	3.49–4.68	3.42–5.47

Table 3.19. Rank scale for 20m sprint with dribbling two balls test (s) of Sabonis Basketball Center's young basketball players aged 12–17 years

% rank	Age (years)					
	12	13	14	15	16	17
90 >	4.18	3.63	3.53	3.44	3.56	3.4
80	4.22	3.79	3.71	3.66	3.66	3.45
70	4.26	3.92	3.77	3.71	3.74	3.54
60	4.43	4.04	3.87	3.85	3.81	3.55
50	4.46	4.23	4	3.95	4	3.61
40	4.52	4.39	4.15	3.99	4.06	3.85
30	4.73	4.48	4.41	4.04	4.25	3.97
20	4.85	4.72	4.59	4.28	4.31	4.17
< 10	5.08	4.88	4.74	4.45	4.82	4.47
Range	4.13–5.42	3.44–5.06	3.44–5.27	3.39–5.08	3.45–5.46	3.38–5.34

Table 3.20. Rank scale for Illinois agility test with dribbling (s) of Sabonis Basketball Center's young basketball players aged 8–17 years

% rank	Age (years)									
	8	9	10	11	12	13	14	15	16	17
90 >	23	21.45	16.69	19.59	18.6	17.4	17.34	17.36	16.88	16.75
80	23.81	21.85	20.88	19.88	19.11	17.91	17.57	17.43	17.31	16.96
70	24.16	22.99	21.05	20.72	19.64	18.15	18.06	17.76	17.52	16.98
60	24.44	24.26	21.2	21.04	20.17	18.31	18.37	18.16	17.56	17.1
50	24.84	24.97	21.41	21.3	20.41	19.06	18.49	18.21	17.73	17.37
40	25.9	25.78	21.75	21.38	20.59	19.23	18.71	18.52	17.78	17.6
30	27.19	26.83	21.89	22.15	20.9	19.31	18.96	18.73	17.79	17.87
20	27.62	27.08	22.28	22.78	21.27	19.71	19.46	18.76	18.27	18.07
< 10	28.12	29.2	22.6	24.07	21.56	20.35	19.67	19.25	19.02	18.3
Range	22.8–32.65	20.72–35.9	19.2–23.57	19.13–26.38	18.68–22.5	16.81–20.93	17.14–20.83	17.31–20.1	16.79–21.08	16.68–20.1

Table 3.21. Rank scale for 1 min shooting test (pts) of Sabonis Basketball Center's young basketball players aged 10–17 years

% rank	Age (years)							
	10	11	12	13	14	15	16	17
90 >	10	10	12	11	13	14	12	14
80	9	9	10	10	11	13	11	13
70	8	8	9	9	10	12	10	11
60	7	7	8	8	9	11	9	10
50	6	6	7	7	8	10	8	9
40	5	5	6	6	7	9	7	8
30	4	4	5	5	6	8	6	7
20	3	3	4	4	5	7	5	6
< 10	2	2	3	3	4	6	4	5
Range	1–13	1–16	0–16	2–15	2–16	2–18	2–13	2–17

Table 3.22. Rank scale for modified shooting from medium and long range test (pts) of Sabonis Basketball Center's young basketball players aged 11–17 years

% rank	Age (years)						
	11	12	13	14	15	16	17
90 >	30	32	32	34	33	34	32
80	28	30	31	31	30	32	31
70	27	29	30	30	29	31	30
60	26	28	29	29	28	29	29
50	25	26	28	28	27	28	28
40	24	25	27	27	26	27	27
30	23	24	26	26	25	26	26
20	22	23	25	25	24	25	25
< 10	21	21	23	24	23	24	23
Range	18–33	14–35	19–34	17–36	22–34	22–35	18–33

Table 3.23. Rank scale for speed spot shooting test (pts) of Sabonis Basketball Center's young basketball players aged 8–10 years

% rank	Age (years)		
	8	9	10
90 >	22	25	28
80	19	24	27
70	18	23	26
60	17	22	25
50	16	21	24
40	15	20	23
30	14	19	22
20	13	18	21
< 10	11	16	20
Range	10–25	14–26	19–29

Table 3.24. Rank scale for modified shooting from close to the basket (pts) of Sabonis Basketball Center's young basketball players aged 9–17 years

% rank	Age (years)								
	9	10	11	12	13	14	15	16	17
80 >	9	10	10	10	10	10	10	10	10
60	8	9	9	9	10	10	10	10	10
40	7	8	8	8	10	9	9	10	10
< 20	5	7	7	7	9	8	8	9	9
Range	2–10	6–10	4–10	5–10	4–10	6–10	5–10	8–10	7–10

Table 3.25. Rank scale for 30 free throws shooting test of Sabonis Basketball Center's young basketball players aged 9–17 years

% rank	Age (years)								
	9	10	11	12	13	14	15	16	17
90 >	20	23	21	24	25	26	27	28	28
80	19	22	19	22	24	25	26	27	27
70	16	20	18	20	23	24	25	26	25
60	15	16	17	19	22	23	24	24	24
50	14	15	16	17	21	22	23	23	23
40	13	13	14	16	20	20	22	22	22
30	11	12	13	15	19	19	21	20	21
20	10	10	11	13	17	18	20	19	20
< 10	8	7	9	11	13	14	17	17	17
Range	5–21	3–28	4–24	5–27	4–28	5–29	11–29	13–29	13–30

Table 3.26. Rank scale for defensive movement test (s) of Sabonis Basketball Center's young basketball players aged 8–17 years

% rank	Age (years)									
	8	9	10	11	12	13	14	15	16	17
90 >	9.67	9.59	8.88	9	8.3	7.81	7.72	7.27	7.3	7.4
80	9.69	9.66	9.04	9.2	8.7	8.04	8.09	7.7	7.42	7.7
70	10.3	9.94	9.32	9.4	8.9	8.25	8.2	7.54	7.53	7.8
60	10.32	10.15	9.63	9.6	9.03	8.4	8.28	7.73	7.7	8
50	10.43	10.36	9.84	9.7	9.26	8.66	8.4	7.9	7.83	8.11
40	10.5	10.57	9.94	9.8	9.4	8.97	8.67	8.09	7.9	8.2
30	10.79	10.69	10.05	10.03	9.5	9.3	8.9	8.16	8.01	8.3
20	11.08	10.78	10.39	10.3	9.79	9.6	9.17	8.4	8.2	8.61
< 10	11.36	11.09	10.92	10.6	10.3	10.2	9.6	8.78	8.49	8.7
Range	9.61–11.46	9.43–11.59	8.13–11.55	8.29–11.9	7.8–11.2	7.29–11.1	7.1–11.6	6.6–9.53	6.5–8.89	6.7–10.2

3.4. Annual training structure

Annual training periodization structure. The annual training cycle for the young basketball players aged 7–17 years in Sabonis Basketball Center lasts for 39 to 47 weeks (August–June) (Fig. 3.1).

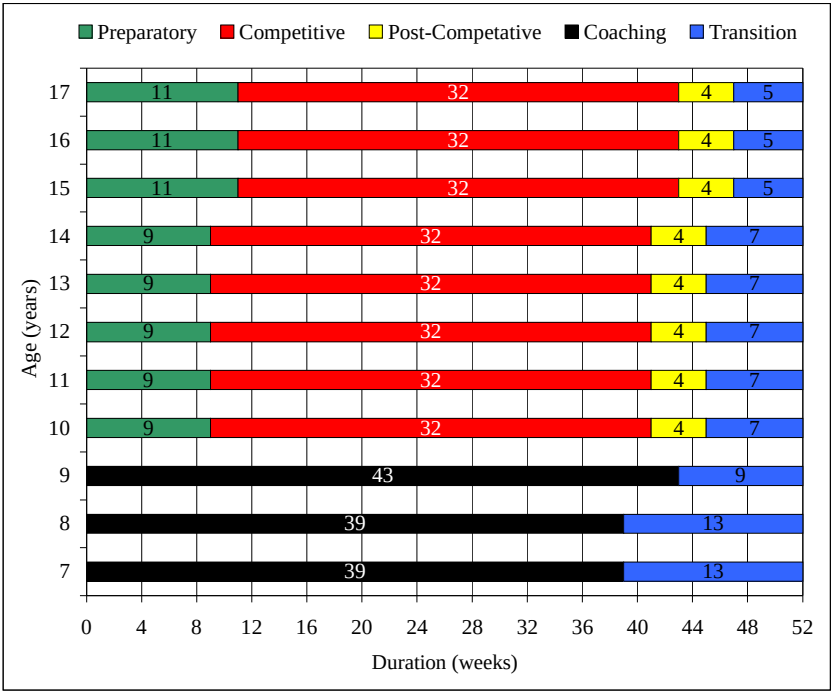

Fig. 3.1. Annual plan for the training of young basketball players aged 7–17 years in Sabonis Basketball Center

Annual training loads. The amounts of load applied to the young basketball players aged 7–17 years in Sabonis Basketball Center constantly increase for different age groups. The number of training sessions and practice time gradually increase during each year of training (Table 3.27).

Table 3.27. Structure of loads for the young basketball players aged 7–17 years in Sabonis Basketball Center

Indicators of loads		Age (years)										
		7	8	9	10	11	12	13	14	15	16	17
Training per week (min)	Preparatory	3×60	3×90	4×90	4×90	5×90	5×90	5×90	5×90	5×90	5×90	5×90
	Competitive				5×90	6×90	6×90	6×90	6×90	6×90	7×90	7×90
	Post-Competitive				4×90	5×90	5×90	5×90	5×90	5×90	5×90	5×90
Number of training days		117	117	172	212	257	257	257	257	267	299	299
Number of training hours		117	175.5	258	318	385.5	385.5	385.5	385.5	400.5	448.5	448.5
Matches per year		0	17	36	56	63	65	65	65	66	70	72

Annual training content. The content elements of the structure of the training program of young basketball players aged 7–17 years in the Sabonis Basketball Center's changes differently (Fig. 3.2).

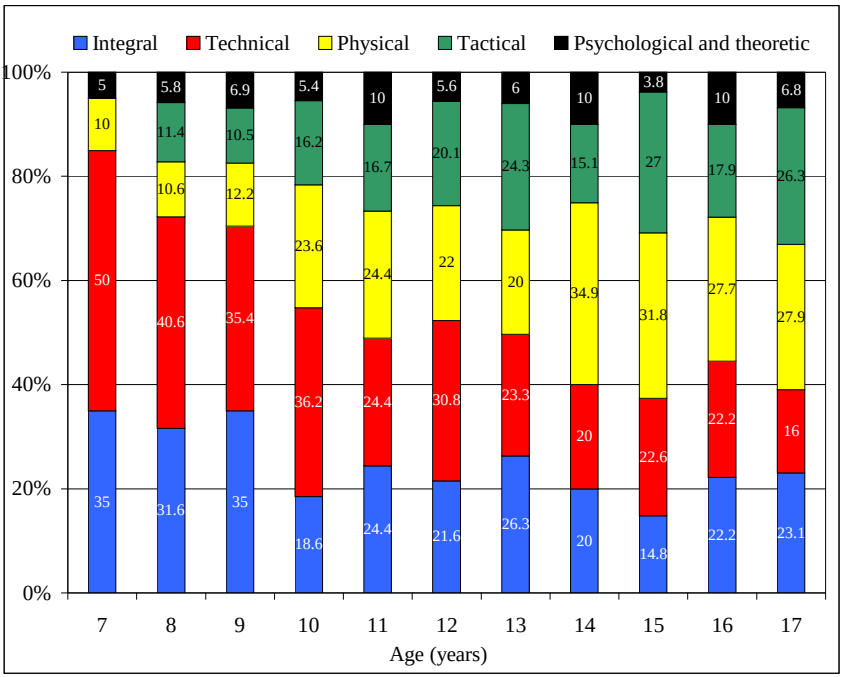

Fig. 3.2. Distribution of the contents of the training of young basketball players aged 7–17 years Sabonis Basketball Center in 2009–2010 season

3.5. Matches played per year

Basketball players of different age groups of Sabonis Basketball Center have played different number of matches in 2009–2010 season. Children begin playing in games while being 8 years old, whereas at 11 years old they play in the official Lithuanian basketball boys' first challenge championship. In order to increase the number of games played the 10 year-olds are allowed to participate in the championship with the year older children (Fig. 3.3).

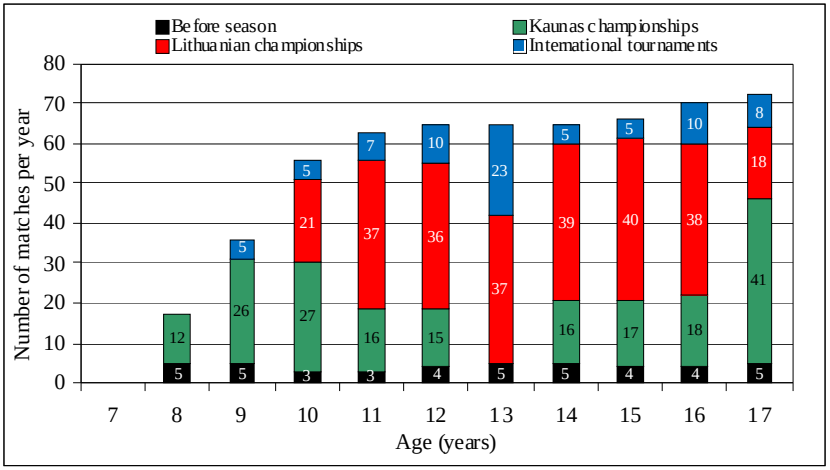

Fig. 3.3. The structure of the competition rank and number of matches played in 2009–2010 season by the players of Sabonis Basketball Center aged 8–17 years

3.6. Sport performance

Per game averages of sport performance indicators of separate basketball players aged 12–17 years in Lithuanian School Children Basketball League in 2009–2010 season were different (Table 3.28).

Table 3.28. Average quantitative per game values of basketball players of Sabonis Basketball Center ($\bar{x} \pm s$) in 2009–2010 season by the players of Sabonis Basketball Center aged 12–17 years

Average quantitative per game values		Age (years)					
		12	13	14	15	16	17
Points		6.85 ± 3.81	7.51 ± 3.72	7.45 ± 5.05	7.95 ± 5.31	7.76 ± 6.17	8.07 ± 3.84
Rebounds	Offensive	1.41 ± 0.77	1.80 ± 1.60	1.49 ± 1.33	1.78 ± 1.09	1.47 ± 1.11	1.19 ± 0.80
	Defensive	2.40 ± 1.10	2.17 ± 1.49	2.79 ± 1.94	3.13 ± 1.45	2.85 ± 2.10	3.21 ± 2.14
	Total	3.81 ± 0.94	3.97 ± 1.54	4.28 ± 1.28	4.91 ± 1.63	4.32 ± 1.27	4.40 ± 1.61
Assists		0.85 ± 0.49	1.19 ± 1.01	1.57 ± 1.64	1.40 ± 1.18	1.32 ± 1.41	1.77 ± 1.27
Steals		0.84 ± 0.39	1.50 ± 0.61	1.30 ± 1.27	1.04 ± 0.38	0.93 ± 0.60	1.22 ± 0.54
Blocks		0.25 ± 0.17	0.28 ± 0.25	0.35 ± 0.56	0.29 ± 0.21	0.43 ± 0.51	0.56 ± 0.55
Fouls		2.06 ± 0.94	1.72 ± 0.38	1.87 ± 0.54	1.47 ± 0.48	1.75 ± 0.91	2.11 ± 1.00
Turnovers		1.69 ± 0.89	1.89 ± 0.72	1.95 ± 1.01	1.40 ± 0.65	1.99 ± 1.26	2.13 ± 1.00

Quantitative and qualitative indicators of shooting. Quantitative shooting indicators of the basketball players of all age groups from different distance are provided in Table 3.29. The average close and medium range shooting efficiency indicators of players were different for basketball players of Sabonis Basketball Center aged 12–17 years.

Table 3.29. Efficiency of shots from different ranges in 2009–2010 season by the players of Sabonis Basketball Center aged 12–17 years ($\bar{x} \pm s$)

Attempted and made shots per match		Age (years)					
		12	13	14	15	16	17
Free throws	Attempted	1.97 ± 1.04	2.95 ± 2.03	1.93 ± 1.44	1.99 ± 1.55	1.96 ± 1.64	1.79 ± 1.25
	Made	1.20 ± 0.65	1.78 ± 1.37	1.03 ± 0.87	1.31 ± 1.25	1.26 ± 1.10	1.15 ± 0.87
Shots from close and medium range	Attempted	4.71 ± 2.52	4.82 ± 2.44	4.19 ± 2.99	5.62 ± 3.05	4.03 ± 2.97	5.29 ± 2.85
	Made	1.96 ± 1.29	2.28 ± 1.28	2.22 ± 1.96	2.96 ± 1.98	2.22 ± 2.02	2.56 ± 1.51
Shots from long range	Attempted	2.08 ± 1.56	1.41 ± 1.26	2.47 ± 1.53	2.06 ± 1.69	2.55 ± 2.58	2.03 ± 1.86
	Made	0.58 ± 0.54	0.39 ± 0.41	0.66 ± 0.43	0.51 ± 0.49	0.69 ± 0.80	0.60 ± 0.65
Total	Attempted	8.77 ± 1.55	9.18 ± 1.71	8.59 ± 1.18	9.67 ± 2.17	8.54 ± 0.68	9.12 ± 0.80
	Made	3.74 ± 0.69	4.45 ± 0.98	3.91 ± 0.82	4.78 ± 1.25	4.17 ± 0.64	4.31 ± 1.86

4. DISCUSSION

4.1. Peculiarities of body composition

It was determined that the players of Sabonis Basketball Center are accidentally taller and body mass more than their contemporaries, which are not active in sports (Kuczmarski et al., 2002; Castro et al., 2013). Most researchers (Karpowicz, 2006; Drinkwater et al, 2008; Viswanathan, Chandrasekaran, 2011) argue that the taller boys have bigger chances to become elite athletes. According to Bajin (1987), anthropometric indicators are the most important in the selection of the athletes considering that the athlete, who does not match the body composition indicators for certain kind of sports, has smaller chances to achieve elite results. The largest difference between anthropometric indicators (height, body mass) of athletes in comparison to the general population is evidenced in the late adolescence – between 15–17 year-olds (Kuczmarski et al., 2002; Malina et al., 2004; Ostojic et al., 2006). The research has established that the changes in height of young basketball players of Sabonis Basketball Center aged 7–17 years match the tendencies of the changes in body composition indicators determined by the other researchers (Norton, Olds, 2001; Olds, 2001; Kuczmarski et al., 2002; Ostojic et al., 2006), however, the largest indicators of height and body mass of the basketball players of Sabonis Basketball Center are significantly larger. The largest breakthroughs of height growth of basketball players of Sabonis Basketball Center were evidenced to occur in different age periods compared to the studies performed by the other researchers (Malina, Bouchard, 1991; Kuczmarski et al., 2002; Malina et al., 2004; Balyi, Williams, 2009). The largest spurt of young basketball players of Sabonis Basketball Center were determined to occur during 12^{th} (an increase of height of 8.7 cm compared to the year-younger players) and 15th year (an increase of 8.6 cm) ($p < 0.001$). On the other hand, Malina et al. (2004) provided that the largest increase of height of European boys is evidenced between 13.8 and 14.2 years of age.

It was also determined that the arm span of the basketball players of Sabonis Basketball Center is significantly larger than the arm span of Turkish children and teenagers (Mamtuz et al., 2009). The correlation between the height and arm span of the basketball players of Sabonis Basketball Center was strong or very strong during all age periods (7–17

years), as correlation coefficient varied in a range of 0.82–0.93. The findings of Zverev and Chisi (2005) where r = 0.98 and Yabanci et al. (2010) where r = 0.89–0.92 is in line with our results and proves that there is a strong correlation between the height and arm span. Therefore the assumption could be made that the arm span anthropometric indicators are the most reliable in order to make a prognosis on the height of a basketball player.

The tendency of a decrease of a body fat mass by the age aspect (McCarthy et al., 2006) was determined to the basketball players of Sabonis Basketball Center. The largest body fat mass decrease (in comparison to the one year younger subjects) was evidenced in the eight year-olds (8.7 % decrease). The body fat mass may have decreased due to the fact that the children were training systematically for a whole year period, whereas it had not been done before training or the leisure time had not been regularly spent actively. Moreover, the boys with the weakest characteristics commonly terminate the basketball training due to various reasons.

4.2. Peculiarities of physical fitness

The results of a research established that the most sensitive periods for speed training are during 8^{th}, 9^{th}, 10^{th} ($p < 0.05$) and 13^{th}, 14^{th}, 15^{th}, 16^{th} and 17^{th} years ($p < 0.001$) in comparison with the one year younger athletes. The results of a research of basketball players of Sabonis Basketball Center are in line with the results of other studies (Viru et al., 1998; Casperson, 2000; Malina et al., 2004; Balyi, Williams, 2009; Stafford, 2010), so the speed is trained the best during 8–9th years in childhood and 13–17th years in adolescence. After comparing the results of 20m sprint test received by us and the other researchers it was determined that the results of all age groups were in line with a solid or very solid level of fitness (Zelezniak, 1984; Santo et al., 1997, Staff, 2000; Gore, 2000; Hoare, 2000; Butautas, 2002; Dežman et al., 2002; Stonkus, 2003; Skernevičius et al., 2004; Karpowicz, 2006; Drinkwater et al., 2007; Balčiūnas et al., 2009).

It was determined that agility (based on the results of Illinois agility test) is most sensitively trained during the following age periods: 8^{th}, 10^{th}, 12^{th}, 13^{th}, 14^{th} ($p < 0.001$) and 16^{th} , 17^{th} ($p < 0.01$) years of life. Results of our research only partially concur with the results received by other researchers (Graham, 2001; Vorontsov, 2002; Malina et al., 2004),

based on which the most sensitive period for the training of agility is in the early age period – between 7^{th} and 13^{th} years of life. By comparing the results of agility test of basketball players of Sabonis Basketball Center and results received by the other researchers we concluded that the indicators were in line with solid level of fitness (Asadi, Arazi, 2012).

The differences in the indicators of speed and agility between different age groups of children and teenagers may be explained by the individual growth and maturity (Asadi, Arazi, 2012). In addition, such differences may have been received as the training programs implemented by the coaches of Sabonis Basketball Center (Trinic et al., 2001; Alarcón et al., 2009; Kocic et al., 2009; Aksen, Günay, 2010) concentrated on these motor abilities. However, strong correlation was determined between height and speed ($r = 0.88$) and between height and agility ($r = 0.97$) during only the 17th year of life. It may have been affected by the body composition, which changed insignificantly compared to the one year younger players; by the training program, in which a large proportion of time (42.9 %) of an annual cycle was attributed to the motor abilities.

Speed strength and strength speed (jumping). According to the researchers (Aragon-Vargas, Gross, 1997; Kollias et al., 2001; Tomioka et al., 2001), jumping is an integral motor skill dependent on other skills such as strength, speed, coordination. Jumping is determined as a complex skill of speed strength of a human (Young et al., 1999). It was determined that the most sensitive period for the training of speed strength (vertical jump with swings the arms backward) in 8^{th} ($p < 0.05$), 9^{th}, 10^{th} ($p < 0.001$) and 12^{th}, 13^{th}, 14^{th}, 15^{th}, 16^{th}, 17^{th} ($p < 0.001$) years of life with the only exception of 11 year-olds. It may have been affected by the fact that the increases of the anthropometric indicators of the basketball players of Sabonis Basketball Center were the smallest in this age period compared to the differences between other subsequent age groups. Speed strength (vertical jump with swings the arms backward) indicators of Sabonis Basketball Center players were lower than the indicators provided in the studies of the other authors (Trninic et al., 2001; Hoffman, 2006; Drinkwater et al., 2007). With respect to the training of jumping with arms on the hips, the differences are the largest during the 8^{th} and 9^{th} years ($p < 0.05$), 10^{th} ($p < 0.01$) and 12^{th}, 13^{th}, 14^{th}, 15^{th} ($p < 0.001$) year and 16^{th}, 17^{th} year of life. The results of jumping with arms on the hips of the players of Sabonis Basketball

Center are better than the results provided in the researches of the other authors (Santo et al., 1997; Kellis et al., 1999; Matavulj et al., 2002).

Therefore in the training of the basketball players of Sabonis Basketball Center more attention should be paid to the training of speed strength, especially for the 7 year-olds ($r = 0.46$), 11 year-olds ($r = 0.31$) and 12 year-olds ($r = 0.52$), but as stronger correlation was evidenced between the increase of the vertical jump with swings the arms backward and jump with arms on the hips during the other periods of age, i.e. during the 8^{th} ($r = 0.76$), 9^{th} ($r = 0.71$), 10^{th} ($r = 0.79$), 13^{th} ($r = 0.83$), 14^{th} ($r = 0.74$), 15^{th} ($r = 0.89$), 16^{th} ($r = 0.98$) and 17^{th} ($r = 0.92$) years of the life. Markovic et al. (2004) determined a strong correlation ($r = 0.89$) between the results of jumping with swings the arms backward and with arms on the hips after analyzing the junior basketball players.

Researchers (Beunen et al., 1992; Deforche et al., 2003; Eisenmann, Malina, 2003; Ortega et al., 2005) have established that the changes of the flexibility (sit and reach test) indicators are closely related to the chronological age of children and teenagers. With respect to the flexibility indicators of the players of Sabonis Basketball Center the indicators decreased in the 8 year-olds, 10 year-olds, 12 year-olds and 14 year-olds in comparison with the one year younger athletes. According to the scientists (Pangrazi, Corbin, 1990; Casajus et al., 2007), body flexibility is not increasing gradually in the childhood and adolescence and instead it can remain unchanged or decrease. Based on the results of our research, the largest breakthrough of the body flexibility indicators is during 13^{th} and 15^{th} year of life (Данько, 1984; Eisenmann, Malina, 2003). Ortega et al. (2008) argues that the changes in body flexibility indicators may be affected by the biological age. The results of our studies with respect to the body flexibility indicators are similar to the results of other researches (Castro-Pinero et al., 2013).

In regards to coordination skills, they tend to improve the most during the periods of 9^{th}, 10^{th}, 13^{th} and 15^{th} years. It partially agrees with the results of other studies (Hirttz et al., 1985; Ljach, 2007), which claim that the most sensitive period for the training of coordination is between 7^{th} and 12^{th} year.

According to the results of 6 min running test, the general endurance indicators of basketball players increase the most for the 12 year-olds ($p < 0.001$) and 15 year-olds ($p < 0.001$) in comparison to the one year younger players. This may have been affected by the

significant increase of body composition indicators (height, body mass). Mero (1998) argues that the aerobic endurance should be developed most sensitively beginning from 15th year, whereas anaerobic endurance – beginning from 17th year.

4.3. Peculiarities of technical fitness

We have determined that during the initial years of training (between 7, 8, 9 and 10 year old age groups) the dribbling skills are improving the most (between 7th and 8th year-olds – 20m sprint with dribbling test ES = 2.176, $p < 0.001$; control dribble test ES = 1.862, $p < 0.001$; Illinois agility test with dribbling – between 9th and 10th year-olds ES = 1.823, $p < 0.001$). According to Paulauskas (2012), children of 6–7 years of age learn to perform the basic elements of basketball technique in standard conditions. Whereas the same actions or combinations thereof are repeated significant amount of times, the skill is developed: motions are performed automatically, actions have characteristics of economics and reliability (McMorris, Hale, 2006; Robinson, 2010, Wissel, 2012), thus, we would think that the largest increases of the indicators are related to the practice experience of the subjects. Important period of age for the training of basketball technique skills was determined during 12th and 13th years (ES = 1.380, $p < 0.001$). During this period (12th and 13th years of life) the improving dribbling technique may be influenced by the improvement of locomotion skills and motor abilities (speed, coordination, agility) influencing them, if they are developed on the basis of already formed actions of basketball technique (Stonkus, 2003).

Based on the indicators of young basketball players of Sabonis Basketball Center, it was determined that the most sensitive period for the training of shooting from below the basket and from close range is during 9–10th year ($p < 0.001$) as the largest changes were evidenced during this age period. Free throws as well as shots from medium range and long range in varying conditions tend to improve the best during 12–13th, 13–14th, 14–15th years in comparison with the one year younger players.

Researchers (Dick, 1985; Stonkus, 2003; Balyi, Hamilton, 2004; Paulauskas, 2012) claim that the optimal time for the training of technical skills is during 9–12th years of life. Frontera and Braun (1999) provide that the children of 10–12 years of age are capable of learning

complex technical skills by successfully playing the team games. The determined indicators of the shooting tests form the assumptions on the fitness level of the players‘ technique (Pojskic et al., 2011).

It was determined that the specific technique of body management (based on the results of defensive movement test) is most sensitively training during 10^{th}, 12^{th}, 13^{th} and 15^{th} years ($p < 0.001$). The results of movement in defense test of basketball players of Sabonis Basketball Center are in line with the solid level of fitness (Johnson, Nelson, 1986; Balčiūnas et al., 2009).

4.4. Peculiarities of sport performance

The research established that the young basketball players of Sabonis Basketball Center aged 12–17 years aiming to become elite athletes should have the targeted per game averages of 6.85–8.07 points, 3.81–4.91 rebounds in defense and offense, 0.85–1.77 assists, 0.84–1.50 steals, 0.25–0.56 blocks. Determined shooting percentages: from close and medium range – 41.7–53.6 %, from long range – 26.7–30.9 %, from free throw line – 54.4–63.9 %, are lower than the percentages of young basketball players studies by Butautas (2002). It may be influenced by different execution systems of basketball children championships applied during different periods.

The points per game average of the young basketball players is significantly related to the rebounds per game ($r = 0.97$, $p < 0.001$), shooting percentage from close and medium range ($r = 0.72$, $p < 0.01$) and free throw percentage ($r = 0.72$, $p < 0.01$).

4.5. The variety of training structure

One of the exceptional peculiarities of development in Sabonis Basketball Center is that beginning from the 10 year-olds the annual cycle of training is divided to the following four stages: preparatory, competitive, post-competitive and transition. There are no publications, which would analyze the periodization in the development of the young basketball players, with the exception of Butautas (2002), who provides the training program, which divides the development of the boys of 12 year old and older to different periods.

It was determined that the basketball players of Sabonis Basketball Center aged 7–17 years have between 117–299 practice

sessions annually, the duration of the training and matches is between 117 and 448.5 hours, whereas up to 72 games are played in a year. Most researchers suggest to apply larger load to the young basketball players in their long-term development programs than it was applied to our subjects of Sabonis Basketball Center. Based on the model development program of Stonkus (1992), basketball players aged 8–18 years should be training and playing in the matches between 258 and 946 hours a year, whereas the recommended amount of games to be played is between 10 and 50 a year depending on the age of the players. Butautas (2002) analyzing the development of 8–14 year old players suggests the annual training and competitive period of 246–510 hours with the annual match count of 0–40 depending on the age of the players. Milanovic et al. (2002) provides the development program for 10–20 year old players which recommend the training day's count of 150–320 days a year, training duration of 300–1200 hours a year and match count of 30–70 games a year. However, the Spanish basketball expert Cabodevilla (2008) argues for a lower load for the players in his long-term development program for 8–14 year-olds than it is recommended in the program of Sabonis Basketball Center and other authors: the program recommends 74–124 training sessions of just 55.5–124 hours total length annually. It can be concluded that the determined optimal load allows the Sabonis Basketball Center's teams to achieve excellent results in the competitions of different age groups as well as develop elite athletes.

Zeldovič and Keraminas (Зельдович, Кераминас, 1964) and Milanovič et al. (2002) provides that 50 % of training time should be allocated to both physical and technical development in the annual development cycle. Dobry (1986) and Stonkus (2003) suggest that for the boys aged 11–14 years physical development should constitute at least 40 % of the total time in the annual development cycle. However, other researchers (Busnel, 1967; Mikulowsky, Oszast, 1976, Butautas, 2002, Cenic, 2004) argue that technical development is the most important in the development of basketball players. Butautas (2002) determined that with the increase of age of basketball players, the less time should be attributed to the technical training. Distribution of the sports development provided by Cenic (2004) is similar to the one established based on the indicators of basketball players of Sabonis Basketball Center (the major proportion in a younger periods should be allocated to the technical development and it should be reduced

gradually as the players become older): for 11–12 year-olds – 70 % of time allocated to technical training, for 13–14 year-olds – 50 %, for 15–16 year-olds – 30 %, for 16–17 year-olds – 15 %. However, the Canadian researchers (*Canadian Sports Centres*, 2008) recommend paying the larger proportion of training to the physical training: for 6–8 year-olds it constitutes 80 % of total training time, for 8–9 year-olds – 70 %, for 9–12 year-olds – 40 %, for 12–16 year-olds – 25 % and for 16–18 year-olds – 20 % of total time.

Buceta et al. (2000) argue that more elite athletes would be developed if the physical, technical and mental trained of young basketball players would be treated as equally important.

4.6. Selection and coaching model

It is hard to identify talented athletes therefore their search should be well organized and sound from the science perspective (Winfried, 2001; Malina, 2009).

The players aged 7 to 17 years are divided into three different teams within each age group based on their playing level by the coaches (44 to 73 basketball players are training in each age group). Development model in Sabonis Basketball Center begins at the age of 6–7 years and continues to 17 years. The development model of Sabonis Basketball Center consists of the three following stages: fundamental (7–9 years old), basic (10–14 years old), specialization (15–17 years) (Fig. 4.1). It should be noted that talented players of various Lithuanian cities as well as other Eastern European countries are training in Sabonis Basketball Center. Excellent results of the teams and individual players prove a success of a long-term selection and development model. The model of Sabonis Basketball Center is similar to the distributions of the models proposed by the other researchers (Stonkus, 1985; Velensky, 1988; Dobry, 1988; Carmenati, 1998; Klimantowicz, 1999; Bompa, 1999; Bompa, Haff, 2009). The studies of the latter authors (Stonkus, 1985; Velensky, 1988; Dobry, 1988; Carmenati, 1998; Klimantowicz, 1999; Bompa, 1999; Bompa, Haff, 2009) emphasize a new stage – motor abilities development, which occurs at the beginning of training of the young athletes. Coaches of Sabonis Basketball Center apply this model and develop the skills of body and ball skills. According to the coaches, it is one of the main objectives in the initial phase of development.

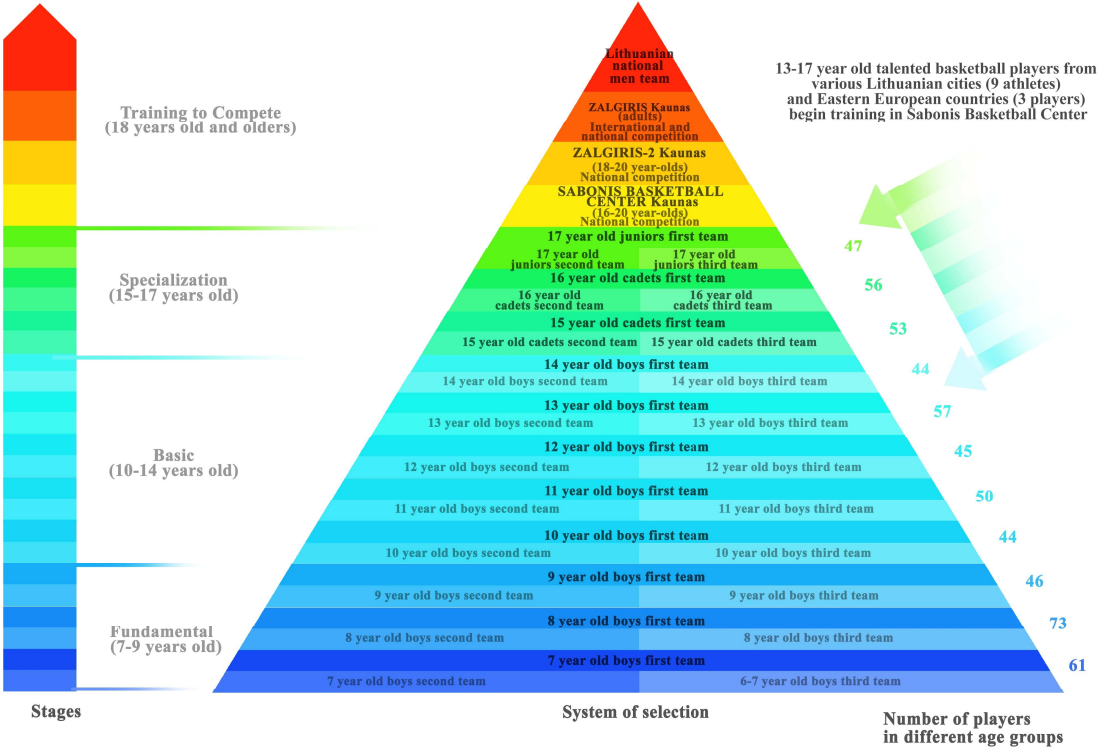

Fig. 4.1. Selection and development model of basketball players in Sabonis Basketball Center (numbers of players in different age groups provided as of 2009–2010 season)

CONCLUSIONS

1. It was determined that aiming to develop the basic skills of basketball technique and game awareness the specialized development prevails even in the fundamental stage of training (technical training – 50 %, integral training – 35 %), whereas the physical training constitutes only 10 % of the training time. During the latter years of training the change of specialized development and motor abilities development is adequate to the periods of growth and maturation. Specific age periods for the development of diversified technical skills (8–10 years – dribbling, 12–15 years – shooting) were determined.

During the first three years of training of young basketball players, the elements of annual periodization are not applied. Beginning from the basic stage (at 10 years of age) the annual cycle consists of four periods: preparatory (9–11 weeks), competitive (32 weeks), post-competitive (4 weeks) and transition (5–7 weeks).

2. The rank scales of young basketball players aged 7–17 years for the body composition indicators (height, arm span, body mass, body mass index, body fat mass, body free-fat mass), physical fitness indicators (speed, agility, general endurance, special coordination, speed strength, strength speed, strength, flexibility) and technical fitness indicators (body and ball control) were established, which would allow the practice experts to evaluate the fitness level of specific age basketball players.

3. The targeted absolute values of the indicators for the sport performance where competing with the certain age opponents, which are adequate to the values of elite basketball players, were determined for young basketball players aged 12–17 years. It was determined that the points per game of a basketball player is mostly affected by the rebounds per game value ($r = 0.97$, $p < 0.001$), shooting efficiency from close and medium range ($r = 0.72$, $p < 0.01$) and free throw shooting efficiency ($r = 0.72$, $p < 0.01$).

4. Natural and selective young basketball players' selection models are applied in Sabonis Basketball Center. Selective model is based on the excellence principle (expert assessment of the coaches). Development model of Sabonis Basketball Center consists of three stages: fundamental (7–9 year old players), basic (10–14 year old players) and specialization (15–17 year old players). Sabonis Basketball Center teams are reinforced by talented young players of 13 years and older from other Lithuanian cities and Eastern European countries.

SANTRAUKA

Temos aktualumas. Lietuva – nedidelė valstybė, kurioje sporto talentai iškyla ne taip dažnai. Tai nepriklauso nuo šalies socialinės ar ekonominės padėties (Schnabel et al., 1994; Cedaro, 2000; Carling et al., 2009). Norint išugdyti talentingą sportininką, siekiantį didelių sportinių rezultatų, reikia atrinkti gabias asmenybes, sudaryti kryptingą rengimo programą ir nuosekliai ją įgyvendinti praktikoje (Regnier et al., 1993; Durand-Bush, Salmela, 2001; Abernethy, 2008; Vaeyens et al., 2008; Bailey et al., 2010; Burgess, Naughton, 2010; Philips et al., 2010; Ford et al., 2011). Todėl labai aktualu konceptualizuoti sportininkų rengimą ir taikyti optimalius talentingų sportininkų ugdymo metodus. Netiksli rengimo sistema neleidžia sportininkams iki galo atskleisti savo galimybių, o nuosekli sportinio rengimo sistema gali paspartinti sportinių rezultatų gerėjimą, padėti atrasti talentą ir jį išugdyti (Balyi, Hamilton, 1999; Raslanas, 2001; Malina et al., 2004; Balyi, Williams, 2009; Stafford, 2010).

Daugelį metų buvo manoma, kad didelių sportinių laimėjimų gali pasiekti tik fiziškai stiprūs ir gerai taktiškai pasirengę sportininkai (Krasilshchikov, 2011), tačiau vis didėjant konkurencijai tarp sportininkų (De Bosscher et. al., 2006) ir stiprėjant sporto sektoriaus politinei bei komercinei reikšmei (Green, Oakley, 2001) kyla būtinybė kurti kiekvienos sporto šakos daugiamečio rengimo programas (Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010).

Jaunųjų sportininkų daugiametis rengimas, trunkantis 8–12 metų, kol šie tampa didelio meistriškumo sportininkais, yra kryptingas, vientisas pedagoginis vyksmas (Ericsson, Charness, 1994; Salmela et al., 1998; Balyi, 2001; Balyi, Hamilton, 2004; Balyi, Williams, 2009; Stafford, 2010), kuriam didelę įtaką turi žaidėjų kūno sudėjimas (genotipiniai ir fenotipiniai veiksniai) (Heyward, Stolarczyk, 1996; Jebb et al., 2000; Drinkwater et al., 2008; Ostojic et al., 2006; Abraham, 2010), treniravimo programa (Trninic et al., 2001; Milanovič, 2002; Balčiūnas et al., 2006), ypač – atletinis (Drinkwater et al., 2008; Delextrat, Cohen, 2009) bei techninis parengtumas (Apostolidis et al., 2004; Karpowicz, 2006), varžybinės veiklos pobūdis (Hucinski, 2004; Dembinski, 2005).

Europoje ir Lietuvoje jau nuo XX a. septintojo dešimtmečio ėmė formuotis pagrįsta jaunųjų krepšininkų daugiamečio rengimo sistema, atskirianti rengimo rūšis: integralųjį, atletinį, techninį, taktinį ir teorinį

(Stonkus, 1992; Butautas, 2002). Apie daugiametį treniravimą mokslininkų nuomonės yra skirtingos. Mokslininkai Zeldovič ir Keraminas (Зельдович, Кераминас, 1964) teigia, kad 11–14 metų berniukų atletiniam ir techniniam rengimui metiniame treniruočių cikle reikėtų skirti po 50 proc. viso treniravimosi laiko. Dobry (1986) ir Stonkus (1985) mano, kad rengiant 11–14 metų krepšininkus turėtų vyrauti atletinis rengimas (40 proc. ir daugiau viso pratybų laiko). Kitų mokslininkų (Mikulowsky, Oszast, 1976; Butautas, 2002; Milanovič et al., 2002; Cenic, 2004) nuomone, svarbiausias yra techninis rengimas. Yra mokslininkų (Литвинов и др., 1996; *Canadian Sports Centres*, 2008), teigiančių, kad atletiniam rengimui skiriamas laikas turi nuosekliai trumpėti didėjant amžiui, vis dėlto pirmaisiais treniravimosi metais didžioji treniruočių laiko dalis turėtų būti skiriama atletiniam rengimui.

Viena iš svarbiausių veiksmingo sportinio rengimo sąlygų – sportinio rengimo kontrolė ir valdymas žaidėjų fiziniam išsivystymui, atletiniam parengtumui, technikos įgūdžių kaitai nustatyti ir įvertinti (Johnson, Nelson, 1986; Bouchard et al., 1997; Stonkus, 2002, 2003; Graham et al., 2004; Barfield et al., 2007; Mirkov et al., 2008; Balčiūnas ir kt., 2009; Robinson, 2010).

Moksliniais tyrimais nustatyta, kad judamiesiems gebėjimams (Komi, 1992; Shephard, Astrand, 1992; Kraemer, 1993; Pauletto, 1995; Alter, 1996; Donald, Chu, 1996; Dintiman et al., 1997; Donald, Chu, 1998; Viru et al., 1999; Baquet et al., 2003; Boisseau, Delamarche, 2000; Malina et al., 2004; Ford et al., 2011), technikos įgūdžiams (Schmidt, 1991; Latash, 1993; Burton, Miller, 1998; Schmidt, Lee, 1999; Cabodevilla, 2008; Kasa, 2006; Zambova, Tomanek, 2012) lavinti palankiausi amžiaus tarpsniai yra vaikystė ir paauglystė.

Mokslininkai (Impellizzeri et al., 2005; Wolf, 2006; Ljach, 2007) teigia, kad jauniesiems krepšininkams greta rengimo tikslų turi būti svarbūs ir parengtumo tikslai, skatinantys jauną asmenybę siekti rezultatų.

Atsižvelgiant į tai, kad Lietuvoje gyvena tik 2,96 mln. gyventojų (http://www.stat.gov.lt, 2013), Lietuvos vyrų (5 vieta pasaulio reitinge, 406 taškai; http://www.fiba.com, 2013) ir jaunesnio amžiaus grupių (jaunučių, jaunių, jaunimo) (3 vieta pasaulio reitinge, 261 taškas; http://www.fiba.com, 2013) krepšinio rinktinių laimėjimus olimpinėse žaidynėse, pasaulio ir Europos čempionatuose reikėtų vertinti kaip išskirtinį fenomeną (De Bosscher et al., 2006). Tačiau nėra pakankamai

išanalizuotas jaunųjų krepšininkų kryptingas daugiametis rengimas. Veiksmingai sportininkus rengiančios institucijos vieno atvejo studija galėtų padėti nustatyti sėkmingai Lietuvos trenerių įgyvendinamos daugiamečio rengimo programos ypatumus. Problemos aktualumą lemia šie aspektai:

- asmenybės ugdymui ypatingą reikšmę turi veiksminga veikla vaikystėje ir paauglystėje (Jovaiša, 1993; 2001);
- krepšinis tampa vis svarbesniu socialiniu reiškiniu, o šalies sporto laimėjimai reprezentuoja valstybę (Wilson, Spink, 2006; Sakalauskas, 2010; Paulauskas, 2010);
- parengti jaunųjų krepšininkų rengimo koncepciją galima tik ištyrus geriausių sportininkų rengimo ir parengtumo tendencijas (Leonardo et al., 2002; Stonkus, 2003);
- svarbu organizuoti ir kryptingai valdyti jaunųjų krepšininkų rengimo vyksmą taip, kad svarbiausiose varžybose jie pasiektų geriausių rezultatų (Balyi, Williams, 2009). Tai ypač aktualu Lietuvai, turinčiai nedaug sporto talentų ir ribotas ekonomines galimybes;
- tik moksliškai pagrįsta optimali jaunųjų krepšininkų (7–17 metų) treniravimo programa gali padėti jiems išnaudoti individualias potencines galias siekiant sportinių rezultatų, sudaryti palankias sąlygas asmenybei ugdyti (Aksen, Gunay, 2010).

Tyrimo problema – dėl skirtingo jaunųjų krepšininkų rengimo ir jį lemiančios parengtumo sampratos aktualu nustatyti, kokie veiksmingai taikomų treniravimo programų ypatumai lemia žaidėjų, siekiančių geriausių rezultatų, parengtumą skirtingais amžiaus tarpsniais.

Tyrimo hipotezė – Sabonio krepšinio centro jaunųjų (7–17 metų) krepšininkų treniravimo(si) atvejo studija padės nustatyti jų daugiamečio treniravimo(si) struktūrą.

Tyrimo objektas – jaunųjų krepšininkų (7–17 metų) treniravimas (is).

Tyrimo tikslas – konceptualizuoti jaunųjų krepšininkų (7–17 metų) treniravimo(si) ypatumus.

Tikslui pasiekti keliami šie **uždaviniai:**

1. Nustatyti 7–17 metų krepšininkų treniravimo programų turinio kaitos ir krūvių dydžių ypatumus.

2. Įvertinti 7–17 metų amžiaus krepšininkų kūno sudėjimo rodiklius, atletinį ir techninį parengtumą ir sudaryti rodiklių rangines skales.
3. Nustatyti 12–17 metų krepšininkų varžybinės veiklos rodiklių modelines reikšmes.
4. Ištirti Sabonio krepšinio centro (SKC) atrankos ir rengimo modelį.

Tyrimo naujumas ir teorinė disertacijos vertė

Krepšinio žaidimas tampa vis sudėtingesnis (greitesnis, atletiškesnis, įvairiapusiškesnis), jo rezultatai priklauso nuo daugelio vidinių ir išorinių veiksnių (Stonkus, 2003; Wissel, 2012). Jaunųjų krepšininkų rengimas tapo daugialypiu, sisteminiu vyksmu, naudojant įvairių mokslų žinias, taikant įvairius metodus ir priemones.

Išanalizuota jaunųjų krepšininkų (7–17 metų amžiaus) fenomenologinė daugiamečio rengimo ir parengtumo sąveika grindžiama šiais aspektais:

- ištirtas Sabonio krepšinio centro jaunųjų krepšininkų atrankos ir rengimo modelis;
- išanalizuota Sabonio krepšinio centro jaunųjų krepšininkų treniravimo programa;
- sudaryta 7–17 metų jaunųjų krepšininkų kūno sudėjimo rodiklių, atletinio ir techninio parengtumo ranginė skalė;
- nustatyti amžiaus tarpsniai, palankiausi jaunųjų krepšininkų judamiesiems gebėjimams ir technikos įgūdžiams;lavinti;
- sudaryta 12–17 metų amžiaus krepšininkų varžybinės veiklos charakteristika.

Praktinė disertacijos vertė

Pateiktos įvairaus amžiaus tarpsnių krepšininkų treniravimo programos ir jų ypatumai galėtų padėti Lietuvos treneriams veiksmingiau organizuoti, planuoti ir vykdyti jaunųjų krepšininkų daugiametį rengimą. Sudarytos jaunųjų krepšininkų kūno sudėjimo, atletinio ir techninio parengtumo ranginės skalės, varžybinės veiklos modelinės rodiklių reikšmės galėtų pagerinti krepšininkų atrankos kokybę ir vėliau juos veiksmingiau rengti varžyboms, ugdyti didelio meistriškumo sportininkus. Nustatyti palankiausi amžiaus tarpsniai judamiesiems gebėjimams ir technikos įgūdžiams lavinti turėtų padėti treneriams veiksmingiau ugdyti jaunųjų krepšininkų gebėjimus.

Išvados

1. Nustatyta, kad ugdant pirminius krepšinio technikos ir žaidimo suvokimo įgūdžius jau pirmaisiais treniravimo metais vyrauja specialusis rengimas (techninis – 50 proc., integralusis – 35 proc.) ir tik 10 proc. – atletinis rengimas. Vėlesniais metais specialiojo rengimo ir judamųjų gebėjimų lavinimo kaita yra adekvati augimo ir brendimo amžiaus tarpsniams. Nustatyti konkretūs amžiaus tarpsniai, palankūs diversifikuotiems technikos įgūdžiams (8–10 metų – kamuoliui varyti; 12–15 metų – metimams) lavinti.

Per pirmus trejus jaunųjų krepšininkų treniravimo metus vienų metų periodizacijos struktūra netaikoma. Nuo bazinio rengimo etapo (10 metų amžiaus) metinį ciklą sudaro keturi laikotarpiai: parengiamasis (9–11 savaitės), varžybinis (32 savaitės), povaržybinis (4 savaitės) ir atsigavimo (5–7 savaitės).

2. Sudarytos jaunųjų (7–17 metų amžiaus) krepšininkų kūno sudėjimo rodiklių (ūgio, ištiestų rankų ilgio, kūno masės, kūno masės indekso, riebalų masės, neriebalinės masės), atletinio (greitumo, vikrumo, bendrosios ištvermės, specialiosios koordinacijos, greitumo jėgos ir jėgos greitumo (šoklumo), plaštakų jėgos, lankstumo), techninio parengtumo (kūno ir kamuolio valdymo) ranginės skalės, kurios galėtų padėti praktinės veiklos ekspertams įvertinti tam tikro amžiaus krepšininkų parengtumo lygį.

3. Nustatytos jaunųjų (12–17 metų) krepšininkų, kurie varžosi su tam tikro amžiaus ir meistriškumo varžovais, varžybinės veiklos rodiklių siekiamos absoliučios reikšmės, adekvačios elito krepšininkų rodiklių reikšmėms. Nustatyta, kad per rungtynes krepšininko vidutinį pelnytų taškų skaičių labiausiai lemia atkovotų kamuolių skaičius ($r = 0,97$ $p < 0,001$), metimų tikslumas iš artimo bei vidutinio nuotolio ($r = 0,72$, $p < 0,01$) ir baudos metimų nuotolio ($r = 0,72$, $p < 0,01$).

4. Sabonio krepšinio centre taikomi jaunųjų krepšininkų natūralios ir išrenkamosios atrankos modelis. Išrenkamoji atranka pagrįsta meistriškumo principu (trenerių ekspertiniu vertinimu). SKC jaunųjų krepšininkų rengimo modelį sudaro trys etapai: pradinis (7–9 metai), bazinis (10–14 metai), specialusis (15–17 metai). Sabonio krepšinio centras kviečia išskirtinio meistriškumo jaunuosius (nuo 13 metų) krepšininkus iš Lietuvos miestų ir Rytų Europos šalių.

PUBLICATIONS

Journal articles

1. **Matulaitis, K.,** Stonkus, S. (2009). Įvairaus amžiaus krepšinio komandų žaidimo rezultatyvumo ir metimų įvairovės rodiklių analizė. *Ugdymas. Kūno kultūra. Sportas,* 1 (72), 54–64.
2. Balčiūnas, M., **Matulaitis, K.,** Stonkus, S. (2009). Įvairaus amžiaus krepšininkų pagrindiniai fizinio ir techninio parengtumo rodikliai ir jų kaita. *Sporto mokslas,* 2 (56), 58–64.
3. **Matulaitis, K.,** Skarbalius, A., Pukėnas, K., Balčiūnas, M. (2010). Jaunųjų krepšininkų (10–17 metų) daugiamečio atletinio ir techninio parengtumo rodikliai. *Ugdymas. Kūno kultūra. Sportas,* 2 (77), 55–62.
4. **Матулайтис, К.,** Скарбалюс, А. (2013). Исследование сенситивных периодов для развития быстроты и ловкости у юных баскетболистов 7–17 лет. *Теория и практика физической культуры*, 1, 27–30.

Other publications

5. **Matulaitis, K.,** Skarbalius, A., Pukėnas, K., Balčiūnas, M. (2010). Jaunųjų krepšininkų (10–17 metų) daugiamečio atletinio ir techninio parengtumo rodiklių kaita. *Kūno kultūra ir sportas universitete – 2010: tarptautinės konferencijos pranešimų medžiaga* (pp. 80–81), Kaunas: Kauno technologijos universitetas.
6. **Matulaitis, K.,** Skarbalius, A. (2010). Evaluation and assessment of selected indices of physical fitness in basketball male players (10–17 years old). *Physical Activity and Sport in Changing Society: Research, Theory, Practice and Management. 3rd Baltic Sport Science Conference: Abstracts* (p. 35). Riga: Latvian Academy of Sport Education.
7. **Matulaitis, K.,** Skarbalius, A. (2010). Evaluation and assessment of selected indices of technical fitness of basketball male players aged 10–17 years. *International Conference of Young Scientists: pranešimų tezės* (p. 1) [elektroninis išteklius]. Šiauliai: Šiaulių universitetas.

8. **Matulaitis, K.,** Skarbalius, A., Pukėnas, K. (2011). Jaunųjų krepšininkų (7–17 metų) techninio parengtumo: kamuolio varymo rodikliai ir jų kaita. *Sportininkų rengimo valdymas ir sportininkų darbingumą lemiantys veiksniai. Treniravimo mokslo katedros mokslinė konferencija: pranešimų tezės* (p. 13). Kaunas: Lietuvos kūno kultūros akademija.

9. **Matulaitis, K.,** Skarbalius, A. (2011). Case study long-term training of male basketball players aged 7–17 years in "Sabonis' Basketball Centre". *Acta Kinesiologiae Universitatis Tartuensis. 4th Baltic Exercise and Sport Sciences Conference: Abstracts* (p. 45). Tartu: University of Tartu.

10. **Matulaitis, K.,** Skarbalius, A. (2011). Physical, technical fitness & body composition profile in youth basketball aged 7–17 years. *New Horizons from a World Heritage City. 16th Annual Congress of the ECSS: Book of Abstracts* (pp. 188–189). Liverpool: Liverpool John Moores University.

11. **Matulaitis, K.,** Skarbalius, A., Pukėnas, K. (2012). Coaching peculiarities & fitness profile of youth basketball players aged 7–17 years old: case study. *Current Issues and New Ideas in Sport Science 5th Baltic Sport Science Conference: Abstracts* (p. 140) [elektroninis išteklius]: Kaunas: Lietuvos kūno kultūros akademija.

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Education

2002–2006	Undergraduate studies in Lithuanian Academy of Physical Education
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Working Experience

2004 – present Head coach at Basketball Academy SNAIPERIS

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Monitoring training status and performance, time motion and coaching analysis, and long-term athlete development