

Application of long-term athlete development model in Hungarian speed skating

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ABSTRACT

The Long-Term Athlete Development (LTAD) model has been applied in the areas of theory of training, methodology, and nurture-education in Hungarian speed skating. The goal of our research was to analyse whether the official documents of the Hungarian National Skating Federation contain detailed guidelines on how to use LTAD and to explore the deficiencies when put into practice. We conducted document analysis (N = 5) and semi-structured interviews (N = 15) with coaches, athletes and parents. Both analyses were based on the following three factors: 1) long-term planning and goals, 2) application of LTAD, 3) multi-sided communication. We can state that official documents of the Skating Federation do contain proper guidelines on how to use LTAD. The results of interviews show that coaches have sufficient knowledge to effectively transmit LTAD methods and have actively done so with the athletes they are coaching. The same cannot be stated in regard to informing parents of LTAD. This is despite the fact that it is beneficial for the athletes to get support and confirmation from their parents in addition to their coaches.

Keywords: LTAD, Speed skating, Social network.

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INTRODUCTION

Speed skating has been developing in Hungary over the last 15-20 years. Its progression has been in line with the systematic talent and program development of the Short Track Division of the Hungarian National Skating Federation (HNSF). The critical components of the HNSF's long-term strategy are part of the expansion of the systematic youth development, coaching education programs, and infrastructure as well. As a result of these efforts, there has been great international success at the Olympic Games, World Cups, and other international events.

It has been proven that systematic talent identification and development programs can enhance the quality of youth sport in general and they can also support young athletes in reaching the elite level (Martindale et al., 2007). Research related to youth and talent development primarily centres on factors such as early start or diversification, characteristics of good coaching, deliberate practice, motivation, and the role of parents (Witte et al., 2015). Research on talent development was mainly focused on individual perspectives around the millennium but currently the role of the environment in sport talent development has become an important direction to investigate (Henriksen et al., 2010).

According to Bloom (1985), the three-stage elite athlete development model is described as initiation (i.e., playful activities), development (i.e., achievement-oriented with more practice and dedication), and perfection (i.e., expert performance). Côté's (1999) model is comprised of the stages of sampling (i.e., variety of sports and fun), specializing (i.e., focus on performance and specific skill development), and investment (i.e., elite status). Ultimately, the outcome of sport includes performance, participation, and personal development (Côté and Vierimaa, 2014). It has been recognized that an effective youth development program is the product of a systematically constructed process that is based on a long-term development framework. Hence, sport organizations have adopted long-term athlete development models in order to provide strategy and direction for those working with youth athletes (Côté et al., 2009). The majority of these models were built on Balyi's Long-Term Athlete Development (LTAD) program (Balyi and Hamilton, 1995; Balyi, 2001).

Long-Term Athlete Development (LTAD)

Ongoing coach development programs and optimal training facilities are considered as important factors for successful LTAD programs and practices (Lee et al., 2016). It is considered a compact framework for the management of youth growth, development processes, and skill acquisition (Ford et al., 2011); moreover it has been identified with critical periods of accelerated adaptation to training (Balyi et al., 2013). The LTAD program consists of an appropriate organization of a multi-phased process of optimal training, competition, and recovery for every phase of youth development (McKeown and Ball, 2013).

The key element of the LTAD model is to recognize the characteristics of training and competition based on a specific developmental level. Therefore, the focus on helping young athletes' skill development is grounded upon the athlete's readiness, determined by growth and maturation markers (Balyi et al., 2005). According to the LTAD model, there is a critical "*window of opportunity*" in the youth development when individuals are more sensitive to training-induced adaptation (Balyi and Hamilton, 2004). The emphasis of the program is on those ages of pre-puberty, early puberty and post-puberty, when the development of skills and capabilities are in sensitive periods (Balyi et al., 2016). These periods involve the participation of athletes, where they can optimize development and performance in sport and the training program can have optimal results (Gallahue and Ozmun, 2006).

Role of participants in sport talent development

Without supporting particular environmental factors and sound interpersonal relationships, no biological advantages are sufficient to achieve athletic success (Hunt, 2006). The components of talent are genetically determined (Renzulli, 1978; Mönks and Knoers, 1997; Piirto, 1999; Czeizel, 1997, 2000), and its appearance and application in sport depend on several other environmental factors. Moreover, coaching activity goes far beyond the physical and motor skills development (Richardson, 1996), the knowledge, experience, and education of coaches create the basis of effective coaching and talent development in a complex way (Carter and Bloom, 2009).

The advancing of sporting talent is an essential part of competitive sport, and exceptionally rewarding for athletes, coaches, sport clubs, and parents as well (Lloyd et al., 2015). Nurturing talent is vital, and it is considered a social tragedy if gifted children do not have adequate support to develop their full potential (Gallagher and Gallagher, 1994). It is important to include visions, specific guidelines, and concepts on youth development directed to educating coaches, parents, and athletes altogether in order to achieve long-term success (McKeown and Ball, 2013).

In relation to the athletic talent development environment model (ATDE), this study is not related to athletes' levels (micro and macro) and domains (athletic and non-athletic) but to the personal environment and its impact on improvement. It is believed that successful athlete development needs such a personal and physical environment that supports athletes both at sport and personal levels (Henriksen and Stambulova, 2023).

Research proves that parents play a foremost and robust role in providing access to athletic activities early on, giving emotional support, and also supporting preparation and competition that lead to successes or failures (Alfeld-Liro et al., 1998). As their child progresses through the developmental stages, parents experience a shift in their role from exposing the child to different athletic opportunities towards becoming a facilitator and supporter (Côté, 1999).

Purpose of study

In relation to short track skating, it is suggested that the coaching program for young speed skaters incorporates active participation in other sports early on in their sport careers (Hillis and Holman, 2013). Technical development in early ages and also emphasis on development of basic movement skills enhances speed and optimal overall improvement. For a young skater, it is also crucial to plan age and development specific training that includes trainability, stamina, strength, speed, skill, and flexibility (Hillis and Holman, 2014).

Numerous studies identified the process of physical development during childhood and adolescence, and how they can impact short-term and long-term sports development and performance (Boisseau and Delamarche, 2000; Naughton et al., 2000; Viru et al., 1999). It has been proved that the long-term preparation emphasizes the process of cooperation and preparation and not the "*win at all cost*" approach.

According to research, further evidence is needed on how to successfully adopt LTAD programs and practices (Nolte et al., 2017). Research describing the effectiveness of long-term athlete development has been also lacking (McKeown and Ball, 2013). There is need for more empirical research on sport talent identification and development altogether and on specific sport disciplines (Martindale et al., 2007), especially in speed skating (Hillis and Holman, 2014). Hence, the purpose of this study was to demonstrate how LTAD

guidelines was adopted by the HNSF with specific focus on the official regulations, and coaches, athletes, and parents' perceptions.

MATERIALS AND METHODS

To seek convergence and validation (Bowen, 2009) of different data sources, and qualitative methods were used in the course of the research. First, document analyses were conducted to understand the main themes related to LTAD in Hungarian speed skating. Then, based upon the findings of the document analysis, questions were formulated to conduct the interviews.

Document analysis

The analysis included the following documents:

1. HNSF's Strategy,
2. HNSF's Operating Regulations,
3. HNSF's informative publication of Long-Term Athlete Development Program of Skating,
4. HNSF's educational publication of Long-Term Athlete Development Program for Speed Skating,
5. Educational materials of Sport Coaching MSc Program achieved in cooperation with the Hungarian University of Physical Education and Sports Science and the Hungarian National Skating Federation.

The documents were systematically reviewed, analysed, and assessed based on the following factors: 1) practical guidance for long-term planning and goals; 2) application of LTAD-model; 3) guidance for the successful implementation of coach-athlete-parent communication.

Selection of sample

Semi-structured interviews ($N = 15$) were carried out with five coaches (four males and one female), five speed skating competitors (three males and two females) from different levels, and one of the parents of each of the five competitors ($N = 5$, all females). The sample was selected through a simple, random sampling process, based upon the Hungarian National Skating Federation's list of certified coaches and list of competitors of those above 18 years of age.

The mean age of the interviewed coaches was 41.2 ± 5.2 years, on average they had been coaching for 13 ± 7.7 years. Four of the coaches have a university coaching degree and one of them has an intermediate coaching degree. All the coaches were formerly competitors on the Hungarian National Team.

The mean age of the competitors was 21 ± 2.45 years, on average they had been competing for 15 ± 1.87 years. Two competitors were members of the national team and placed 1-6 places at the World- and European Championship. Two competitors placed 1-5 at the National Championship and one competitor placed 1-5 at the National Junior Championship.

The mean age of the interviewed parents was 45.8 ± 5.91 years. One of them was the mother of a national team member skater, while four of them had children skating at the club level. It is important to note that the parents interviewed were not necessarily those of the competitors, as they were randomly selected.

Semi-structured Interviews

The interviews were conducted face-to-face and lasted 52-88-minutes ($M = 72.2 \pm 14$) with coaches, 42-58 minutes ($M = 52 \pm 6.5$) with competitors, and 35-43 minutes ($M = 39.6 \pm 3.2$) with parents. It involved voice

recording, note taking, and data recording. Numbers (1-5) and letters (A, C, P) were assigned to athletes, coaches, and parents.

The interviews' structure followed the same main guidelines as the document analysis. The interviews with coaches were separated into three main thematic sections focusing on: 1) the coaches' viewpoints on long- and short-term preparation; 2) their goals and certain elements of their training based upon the guidelines of LTAD; 3) the tasks of coaches in terms of creating emotional bonds between the competitors and discipline, and the experiences within the environment, as well as—following the guidelines of LTAD—the communication in the coach-athlete-parent triangle.

The interviews with athletes can be grouped into three main thematic sections as well: 1) mechanism of action on athletes regarding the coaches' views and practices and the goals of athletes; 2) affective effects on athletes through the coaches' long term planning and activity; 3) communication in the coach-athlete-parent triangle.

The three main thematic sections with parents were: 1) to what extent are they aware of the goals and guidelines of the preparation program applied by the coach; 2) how much information do they have on the preparation of their children and based on this, whether the coaches were following the LTAD method, and what are their expectations of preparation; 3) how effective is the communication between parents and coaches, and between parents and the federation.

Table 1. Research methods.

Types of data collection				
Document analysis (N = 5)		Semi-structured interviews (N = 15)		
Points of view				
- Practical guidance for long-term planning and goals - Application of LTAD-model - Guidance for the successful implementation of coach-athlete-parent communication		-Fulfillment of long-term planning and goals -Application of LTAD-model -Fulfillment of coach-athlete-parent communication		
1.HNSF's Strategy-2016. 2. HNSF's Operating Regulations-2016. 3. HNSF's informative publication of LTAD Program of Skating-2017. 4. HNSF's educational publication of LTAD Program for Speed Skating-2020. 5. Educational material of Sport Coaching MSc Program-2017 (Hungarian University of Sports Science & Hungarian National Skating Federation).	Participants	Gender	Mean age	Duration (face-to-face)
	Coaches (N = 5)	4 male 1 female	41.2 yr (SD = 5.2)	52-88 min. (M = 72.2 SD = 14)
	Athletes (N = 5)	3 male 2 female	21 yr (SD = 2.45)	42-58 min. (M = 52 SD = 6.5)
	Parents (N = 5)	5 female	45.8 yr (SD = 5.91)	35-43 min. (M = 39.6 SD = 3.2)

Ethical approval was obtained (Institutional Review Board approval number: RK/680/2022). All interviewees gave permission for this study by signing the informed consent form on a voluntary basis.

Data analysis

The document analysis process combined qualitative content analysis and thematic analysis through which qualifying and quantifying data, coding, deliberating latent and manifest contents, and high-level interpretation was achieved. The systematic review of documentation provided sufficient background information in the pre-interview phase of the research. Similarities, differences, and general patterns were determined during the analytic procedure.

Data gathered from the interviews were summarized and compared question-by-question and finally thematic schemes were completed. The identified themes were compared based on the types of interviews then conclusions were drawn. Amid the analysis we followed Willis's content-based guidelines on detailed summaries of interview scripts (Willis, 2015). The coding approach included systematic coding and recoding.

RESULTS

According to the documents

Long-term planning and goals

All the documents have direct content and definitions on long-term planning. In the HNSF's Strategy long-term plans and tasks are indicated by a timeline containing general goals and tasks, facility development, selection, competitive and professional sport, talent care, education, social inclusion, communication, and sports diplomacy (Table 2). This is the only document in which LTAD model is not mentioned directly, while every other document highlights the most important criteria of LTAD as an example to follow in planning and training. The HNSF's Operating Regulations, the informative publication of LTAD Program of Skating, the educational publication of LTAD Program for Speed Skating, and the educational material of Sport Coaching MSc Program all describe the LTAD model in relation to long-term planning and goals.

Table 2. Formulated strategic subtasks outlined in the federations' strategy.

Strategic subtasks	Description of subtasks
General goals, tasks	Includes the construction of the organization and the full provision of personnel conditions, as well as the creation of a corporation under the association and its economically successful operation. Emphasizes the need for increasing the number of member organizations and operating an Academic System.
Facility development	Includes the construction of the National Olympic Skating Center, also of 3-4 ice rinks for exclusive use in the regional centers.
Selection	Recruitment, wide youth base, reconsidered selection program and competitive system appear as long-term tasks. Involving kindergartens and schools in talent search programs.
Competitive and professional sport	The modernization of competition systems, the employment of foreign specialists and an increase in the number of competition license holders were set as requirements.
Talent care	Reducing attrition, ensuring interoperability between sports, running recruitment development programs and competition systems, high-level operation of selected squads, operation of dual career programs, joining the talent management programs of the Hungarian Olympic Committee are highlighted.
Education, post-graduation	Close cooperation with universities for education of sports professionals and to ensure dual carriers.
Social inclusion	Supporting the sports of disabled, minorities, those at risk or in other disadvantaged situations are expected.
Communication	Communication with sponsors, supporters, public media, fans, and member organizations is detailed.
Sport diplomacy	Strengthening sports diplomacy in the International Skating Union, initiating the formation of the European Skating Union is emphasized.

Application of the LTAD Model

As presented earlier, besides the HNSF's Strategy, all other documents give certain information on the topic. Documents give a general and easy to follow guidance of the LTAD model. LTAD in these documents is phrased as a philosophy that drives change, and is a means of paradigm shift, which helps an athlete-centred development framework to become generally accepted in Hungarian speed skating.

"It is a development path that is understandable for everyone, starting from playgrounds all the way to racetracks or ice-rinks withstands full of spectators." (HNSF's informative publication of LTAD Program of Skating, p.20)

The documents go into detail of the tasks according to ages, mentioning such subtasks as transfer of information, communication and cooperation, and it also provides guidance for planning and approach in terms of sport pedagogy and ethics.

"The central task is to provide a program suitable for the development of early, average or late-maturing skaters in terms of optimal training, competition and regeneration. The harmful effects of early sports specialization are well-documented in the international literature." (Educational material of Sport Coaching MSc Program, p.15)

"The long-term approach to an athlete's development is holistic. It takes into account not only the performance on ice, but also the physical, social, mental development of the participants. (HNSF's publication of LTAD Program for Speed Skating, p.24)

"The program promotes harmony, communication and the flow of information between the Federation, member organizations and clubs. The program covers the teaching of parents of the process of short- and long-term preparation, during which it contributes both theoretically and practically to the development of children to ensure nutrition, regeneration and a lifestyle appropriate for their age." (HNSF's educational publication of LTAD Program for Speed Skating, p.4)

Based on the official documents, all participants of the community have a tangible support for understanding and applying LTAD. The federation has made all documents available for everyone.

Multi-sided communication

Similar to earlier topics, with the exception of the HNSF's Strategy, every document places importance on communication in the 'sports triangle' and the need to introduce the LTAD to every participant in the system. The informative publication of LTAD Program of Skating states that there are gaps in sports, like educating parents on long-term development, which in fact the LTAD provides solutions.

"Parents and coaches have to cooperate for the success of the competitor and not in the least for their mental health." (HNSF's educational publication of LTAD Program for Speed Skating, p.13)

"Monitoring the living conditions of athletes is justified." (HNSF's Operating Regulations, p.9)

The educational publication of LTAD Program for Speed Skating also includes schools in the communication structure. However, the HNSF's Strategy does not include any of this communication structure instead it explicitly limits references to communication to press, sponsors, and supporters. Furthermore, the Federation has a goal to extend communication towards member organizations, audience and fans.

View of the participants

Long-term planning and goals

The coaches were aware of and applied the long-term preparation method. They emphasized the need of balance between success and long-term planning. Moreover, the education of conscious athletes was also among their goals.

"I clearly apply the long-term preparation. The federation supports the long-term preparation." C1

"I believe in the long-term preparation. The work done will have its results." C3

"We prepare in accordance with the long-term preparation. Preparation is more important to me than chasing immediate results. I resist the pressure of parents and through constant education I try to teach them to apply long-term thinking. The federation also expects this direction." C2

The interviews with athletes accurately reflect the views of coaches on long-term preparation, as the athletes stated that preparation for them is considered as important as success at competitions. They mentioned that difficulties of preparation are easily processed with the help of their coach.

"You cannot always win in the long run, but with the coach you can learn from every competition."

A3

"We have to try to win, whenever possible. After all, we have to be flawless in the most important moment. This differentiates the Olympic Champion from the rest." A1

"In the long run, I prepare for the Olympics, it's enough to win that (laughter)." A4

"Everyone makes mistakes. What's important is not to make mistakes at my most important competition." A5

Three national team athletes set long-term goals of qualifying for Olympics. Only one competitor has a short-term goal and explained that she loves what she does and wants to win all the competitions now, since anything can happen in the future.

"I love what I'm doing, I would like to win at every competition if it's possible. I don't think forward, I always try to perform well at the upcoming competition. I don't think it's good to set long-term goals because anything can happen." A4

In the case of parents, the lack of understanding about long-term preparation goals and LTAD model was clearly present.

"I've heard about the program, maybe the coach talked about it. It's about the long-term preparation of the competitors, but I don't have further information on it." P3

"I haven't heard of it, but I guess it's about the preparation of competitors." P1

"I don't know what our preparation was based on. I haven't heard about the program." P5

Application of LTAD Model

All the interviewed coaches are well prepared on the LTAD model and its functions, and they claim that they apply it in their daily work. They follow its suggestions on the affective scope of preparation, as the need for excessive results (winning competitions) can destroy dedication to the sport; for example, the realization of a technical or tactical element by the athlete needs to be highlighted as a result. Their primary goal is to develop an attachment of young competitors to the sport through playful and experience-based exercises. Another goal is for competitors to be on the national team so that they can gain the appropriate experiential and motivating skill development.

The affective effects of LTAD on athletes are shown by the description of their feelings: sport makes them happy, strengthens them mentally, and prepares for life. They enjoy improving their skills and, at the same time, they are involved in participating in sports other than their own, which they believe allows for complex development.

While the coaches clearly know and apply the LTAD program and the competitors advocate the developmental approach of the program, the parental opinions are different. Some of them approach the sport exclusively from the side of performance, while others highlight the educational value of it. Parents do not know if coaches apply LTAD because they do not have enough information about the model. Out of the interviews made with parents, only two declared that the short-term and long-term goals are of equal importance.

"In order to keep developing they must reach better and better results. Their opponents don't rest either, the pressure is continuous." P1

"Everybody wants to win, staying in the national team and going forward demands us to win at every competition." P5

"Sport is about performance. The goal is to succeed at the worldwide competition; the main goal is the Olympics. The possibility of unsuccessfulness, of not performing well at a competition, always makes us learn. Sports are beautiful because in their case accomplishment doesn't need to be explained." P2

It was not important for the rest of the parents to have their child win at every competition because they concentrate on the long-term goals.

"It's not a problem if they don't win at every competition, as we prepare for the Olympics. Until then, they will lose many times at competitions, but they will learn and gain experience from that. As an Olympic Champion, they won't even remember they lost these competitions." P3

Multi-sided communication

In the opinion of coaches, establishing a supportive environment and a close parental partnership is a major condition for effective work. It can be stated that coaches are satisfied with the communication between them, the athletes and the parents. Moreover, they emphasized the need for keeping a distance, as some parents try to cross boundaries. Similarly, the competitors shared positive experiences regarding the coaches' communication; according to their experiences the coaches regularly talk to their parents. The parents' opinions, however, were diverse due to the coaches' inappropriately defined goals and the lack of deep conversations.

"If the coach told me what their goals are with my child, I could support that process at home." P5

DISCUSSION

There has been little scientific attention on the impact of applying LTAD in speed skating (Telegdi, 2020). Our former analysis on the LTAD function pointed out that applying the program was not successful in every area, thus further development in this sport was not guaranteed. It was concluded in that study, that coaches were mostly working based upon a short-term preparation system. This was due to pressure to achieve results, which came from their own misconception and expectations from parents. Moreover, coaches emphasized the lack of parents' involvement and well-working communication.

The findings of this research demonstrated that the absences found in our earlier research have begun to decrease. Most of the coaches' work based on the principles of long-term preparation, which is also reflected by the views of competitors.

In the course of our document analysis, we came to the conclusion that most of the Federation's documents and publications are written in accordance with the principles and guidelines of LTAD. Part of these are easily accessible through the website of the Federation. There are still deficiencies in communication that can especially be seen in the coach-parent relationship. Moreover, it was observed that the parents' knowledge of LTAD was lacking.

The education of parents, knowledge of the principles of LTAD, and continuous communication assists the effectiveness of the coaches' work, as parents can help the efficiency of the LTAD program by providing support outside of trainings. In Hungarian speed skating the deficient communication and education obstruct the optimal and effective operation of the program, due to the lack of support from the side of the parents. Communication with parents as a strategic element in the strategy of the federation seems justified, which

we regard as an effective way to terminate deficiencies.

Our results support earlier study (Dorsch et al. 2021) in stating that sport-parenting programs are clearly needed in youth sport and educating parents can result in parents helping their children fulfil their athletic and human potential. According to recent findings (Trudeau et al., 2021), coaches are more likely to adopt LTAD concepts into their practices, if they have sufficient understanding of LTAD, they have a coaching certification, and a perceived organizational support. However, coaches interviewed by Beaudoin et al. (2015) believed that short-term financing was still predominant and this was the main barrier to implementing LTAD in their respective sport. It is imperative to understand that parent involvement is multidimensional and thoughts, emotions, and family sources (i.e., money, time) related to the child's sport activity define parents' behaviour in terms of support and pressure (Dorsch et al., 2018). It is suggested that HNSF work out a complete parent-education program for appropriate parental involvement.

Burke et al. (2021) examined the efficacy of several parent-education programs across a range of sport disciplines and concluded that developing longitudinal programs should be continued to facilitate extended parental involvement and interaction. The parental involvement model proposed by Hellstedt (1987) describes overinvolved, under involved and moderately involved types of parents. From this an educational program should be built up systematically, emphasizing all positive and negative consequences of parental behaviours that guides and teaches parents through specific counselling for optimal involvement (Sacks et al., 2008).

Our research proves that parents need education on the LTAD model in order to better understand its aims, stages, expectations, and preparation required. This solution is in the hand of sport leaders. Our conclusion is that application of LTAD in Hungarian speed skating is promising and moving in the right direction, which can be seen in the results of the athletes. Thorough communication with all parties requires change on the part of the Federation in order to create the optimal environmental conditions for athletes' development.

AUTHOR CONTRIBUTIONS

Attila Telegdi, Gabriella Trzaskoma-Bicsérdy and József Bognár conceived and designed the investigation, analysed and interpreted the data, drafted the manuscript, and approved the final version submitted. Attila Telegdi collected data.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

DECLARATION

The experiment complies with the current law of Hungary. Ethical approval was obtained (Institutional Review Board approval number: RK/680/2022).

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