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Original Article

Structure of Talent and Individual Sports Profiles in Late Childhood

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Abstract

The purpose of the study was to determine individual profiles of sports preconditions in 6- and 7-year-old children and recommend sports according to test scores and individual sports profiles. Data were collected from 1st graders at elementary schools. The children participated in organized sports practice in sports clubs. The sample included 42 boys and 3 girls. Of these, 16 children engaged in soccer practice and 29 children engaged in ice hockey practice. Children performed 10 motor tests (Měkota & Blahuš, 1983; Šimonek, 2015): repeated routing with a stick, flexed arm hang, standing long jump, shuttle run agility test, 20-meter sprint, endurance shuttle run, sit-ups, sit-and-reach test, and rolling-of-three-balls test. To assess decision-making processes, children played a flag chasing game. The results of the correlation analysis showed that correlations among tests were similar for both groups. The individual sports profiles that were applied to determine the appropriateness of sports preconditions for particular sports showed that sports children played and sports for which children showed talent differed considerably.

1. Introduction

Sport national governing bodies as well as elite sport clubs invest considerable resources to identify young talented athletes who have the potential to excel in specific sport contexts (Cobley et al., 2012; Till et al., 2017; Vaeyens et

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al., 2008). Hirose-Seki (2016) and Reilly et al. (2000) classified four essential key stages by which athletic growth is achieved among elite athletes: detection, identification, selection, and development of talent.

Lots of coaches suggest that research efforts should be transferred from talent identification and detection to talent development in the most appropriate learning environment to realize this potential (Durand-Bush & Salmela, 2002; Reilly et al., 2000). Furthermore, many national federations continue to invest considerable resources to identify exceptionally gifted youngsters at an early age to accelerate the developmental process (Morris, 2000).

Breitbach et al. (2014) and Gagne (1996) point out further important fact that it is crucial to differentiate between giftedness and talent. Giftedness was defined as exceptional competence in one or more domains of ability. Therefore, talent identification is the process of recognizing these gifted participants with the potential to excel in a sport (Suppiah et al., 2015). On the other hand, talent was described as exceptional performance in one or more fields of human activity developing from these domains of abilities considering the presence of relevant environmental and personality factors. Therefore, talent development like providing the most appropriate learning environment to realize this potential plays a crucial role in the pursuit of excellence (Vaeyens et al. 2008; Williams-Reily, 2000).

Various instances of research distinguish three lines of knowledge regarding talent identification and development. Considering the first one, being a sports champion is implicit in the genetics of each person as the predominance of certain genes in an individual and it would enable athlete to succeed in a specific sport (Magallanes, 2011). Phillips et al. (2010) and Starkes et al. (1996) emphasize an environmental perspective, advocating that expertise is acquired as performers specialize at an early age and engage in deliberate practice.

Some of researchers have neglected the role of the environment and focused on organism structure and process in isolation (Phillips et al., 2010; Yarrow et al., 2009). Defenders of the second line say that sporting success is achieved through years of practice and repeated training. Both areas of knowledge generate an ongoing debate among field experts and professionals about whether a sports champion is born or made (Magallanes, 2011).

The third line of knowledge merges the two previous and accepts the importance of the genetic potential of an athlete which through a process of carefully planned and structured training would enable an athlete to achieve the highest sporting level in a specific sport discipline (Quijada, 2016). Integration of polar perspectives on sports performance and expertise into a multidisciplinary approach is according to Philips et al. (2010) way how to enhance understanding of the athlete-environment relationship as dynamical system. This approach should be supported by studies of complex system behavior during match play and competitions, decision- making, motor-learning, coordination etc.

The systems, models and programs designed to identify and provide for the development of talented young people in sport continue to evolve in their complexity and comprehensiveness, often driven by national interests of doing well in sport (Cooke et al., 2010).

The athletes must be selected from the crowd, and this selection is achieved through talent identification programs based on certain criteria. These criteria are designed to reflect key skills that project the potential of a young person on his athletic performance in adulthood (Breitbach et al., 2014). Although the criteria have been subjected to multidisciplinary research and detailed discussion, the optimal test design for a reliable prediction of talent has not yet been found (Breitbach, 2014; Davids et al., 2013; Hohmann, 2001).

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2. Material and methods

The sample included 6- and 7-year-old children who were 1st graders at elementary schools. The children included in the study engaged in organized sports practice in a soccer and ice hockey clubs, respectively. Of 46 children, 42 were boys and 3 were girls. To determine the individual profiles of sports preconditions, children performed 10 motor tests in December 2017 and January 2018. Testing sessions took place in the sports academies of Tatran Prešov (*n* = 16) and PSK Arena Prešov (Boys: *n* = 26, Girls: n = 3). Children who participated in the study engaged in two exercise sessions per week, 60 minutes each. The somatic parameters measured included body height and body weight. The sports preconditions were tested by administering 10 motor tests (Měkota & Blahuš, 1983; Šimonek, 2015): repeated routing with a stick, flexed arm hang, standing long jump, 4 x 10 m shuttle run, 20-meter sprint, endurance shuttle run, sit-ups, sit-and-reach test, and rolling-of-three-balls test. To assess the quality of the decision-making processes, children played a flag chasing game called pull-the-flag game.

To determine methods for the assessment of children’s motor preconditions, we decided to address the issue in two stages:

1. To determine variables that form the criterion of "preconditions for sports" – structure of talent;
2. To establish individual sports profiles.

During the first stage, an expert commission was set up to propose factors and variables in order to define the criterion of "sports preconditions". The commission comprised five experts in talent identification whose knowledge was based on individual and group interviews. The group interviews provided the definitions of basic areas of motor preconditions. When assessing particular options of evaluating motor preconditions, the commission decided to focus on four factors that included physical conditioning, technique, tactics, and body build. Specific domains included the assessment of object control skills and decision-making processes. The administered tests were selected according to their degree of reliability and validity in relation to the assessed criterion. Testing yielded data about the levels of particular motor abilities.

During the second research stage individual sports profiles were established. These profiles had to correspond with the demands related to the structure of sports performance in particular sports. The profiles were established by using two relevant indicators. When assessing the structure of individual sports profiles for particular sports, we took into account the structure of sports performance as defined by individual sports associations and federations.

As regards the data processing, raw scores were converted to a 10-point scale. The 10-point rating scale was used to establish individual profiles for particular sports. Subsequently, the test score achieved by a concrete child was compared with the deviations from the particular scales for each type of sport. These deviations were squared and summed to calculate the absolute values. The results included also highly relevant variables (multiplied by coefficient). On the other hand, two non-relevant indicators were excluded from the results. The lowest sum was used to establish order in individual sports and sports games. Each child was recommended three individual sports and three sports games for which the child has the best sports preconditions.

Based on the assessment of normality of the data distribution using the Shapiro-Wilk test (unpublished data), we used parametric methods and characteristics of mathematical statistics for further analysis. The descriptive statistics included the mean as the measure of central tendency and the standard deviation and standard error of mean as the measures of variability.

To determine differences in test scores between groups depending on sports specialization (ice hockey vs soccer), we used the *t* test for independent samples at $p < .05$.

Correlation analysis between the indicators of performance in tests was carried out using the Pearson’s correlation coefficient (r). The strength of the association was defined according to Evans et al. (1996), when $r < 0.19$ represents very low, $r < 0.39$ low, $r < 0.59$ moderate, $r < 0.80$ strong and $r \geq 0.80$ very strong association between the variables. Data were analysed statistically using Statistica, v.13.0, software (StatSoft, Inc.; Tulsa, USA).

3. Results and Discussions

Significant differences in test scores depending on sports specialization are presented in Table 1. Significant differences between sports were found for body height only ($p < .05$). The results showed no significant effects of engaging in physical activities, regardless of sport. Significant differences between test scores achieved by children engaged in soccer and ice hockey practice, respectively, were found for two motor tests: routine with a stick and flexed arm hang. These tests assess levels of motor coordination and upper-body strength. Children who participated in ice hockey sessions showed significantly higher levels of manipulative skills.

Table 1. *Statistical analysis of differences between sport-specific groups*

		N	*Mean*	*SD*	*F*	*Sig.*	*t*	*Sig.*
***BH* (cm)**	*G1*	29	123.4	4.88	0.003	0.958	2.544	0.016
	G2	16	119.5	5.03				
***BM* (kg)**	*G1*	29	24.2	3.08	0.335	0.566	1.749	0.087
	G2	16	22.4	3.93				
***20 m sprint* (s)**	*G1*	29	4.9	0.46	2.330	0.134	1.979	0.054
	G2	16	4.7	0.35				
***RTB* (s)**	*G1*	29	31.5	8.14	0.345	0.560	-2.929	0.005
	G2	16	38.6	7.14				
***RRS* (s)**	*G1*	29	31.4	8.00	3.529	0.067	-0.126	0.901
	G2	16	31.8	13.44				
***SAR* (cm)**	*G1*	29	5.5	5.49	0.559	0.459	-0.904	0.371
	G2	16	7.3	8.17				
***FAH* (s)**	*G1*	29	5.9	4.03	0.931	0.340	-2.607	0.013
	G2	16	9.4	4.96				
***SLJ* (cm)**	*G1*	29	114.4	18.51	0.361	0.551	-0.490	0.627
	G2	16	117.0	14.39				
***SRA* (s)**	*G1*	29	14.3	1.03	0.803	0.375	0.238	0.813
	G2	16	14.2	1.30				
***SU* (no.)**	*G1*	29	20.8	7.99	0.061	0.806	-1.593	0.119
	G2	16	24.6	7.42				
***ESR* (s)**	*G1*	29	180.3	74.73	0.383	0.539	0.726	0.472
	G2	16	164.8	54.59				
***CTF* (no.)**	*G1*	29	7.6	3.11	2.658	0.110	-0.131	0.896
	G2	16	7.8	6.73				

*Legend **
BH - body height, BW - bod weight, RRS - repeated routine with a stick,
FAH - flexed arm hang, SLJ - standing long jump, SRA - shuttle run agility test,
SU - sit ups in 1 minute, RTB - rolling of three balls, SAR - sit-and-reach,
ESR - endurance shuttle run, PTF - pull the flag, G1 - ice hockey players.
G2 - soccer players.

As shown in Table 2, correlation analysis revealed significant correlation for both children engaging in soccer and ice hockey practice, respectively. Correlations were assessed in five domains: speed (20-meter sprint, shuttle run agility test), strength (flexed arm hang, sit-ups, standing long jump), manipulative skills and motor coordination (rolling of three balls and repeated routine with a stick), flexibility (sit-and-reach test), and decision making (pull-the-flag game). There were no significant correlations between tests that assess object control skills and motor coordination. However, significant correlations were found between tests that assess speed. Test scores in sit-up test significantly correlated with the 20-meter sprint test in both groups of children.

Children who participate in ice hockey practice showed significant correlations between speed and object control skills, which reflects the demands of the game. Children who participated in soccer practice showed significant correlations between flexibility and motor coordination tests that required certain range of movement for proper execution.

Table 2. *Correlation analysis for particular motor tests*

	BH	BM	20 m sprint	RTB	RRS	SAR	FAH	SLJ	SRA	SU	ESR	PTF
						Soccer players						
BH		.757**	-.325	-.056	-.022	-.171	-.138	.148	-.276	.285	.021	.252
BM	.811**		-.309	-.085	-.118	.010	-.108	.138	-.222	.282	-.037	.026
20 m sprin	-.750	-.518		.269	.276	-.145	-.298	-.222	.640**	-.606	-.283	-.276
RTB	-.391	-.207	.623**		.227	-.418	-.013	-.179	.257	-.155	-.363	-.235
RRS	-.139	.199	.209	.197		-.400	-.512	-.079	.470*	-.369	-.245	-.166
SAR	-.307	-.438	-.086	-.032	.234		.032	.256	-.353	.093	.309	.073
FAH	-.252	-.065	.178	.358	-.099	.296		.109	-.400	-.030	.114	.039
SLJ	.199	-.088	-.351	-.572	-.048	.375	-.362		-.526	.382*	-.035	.341
SRA	-.413	-.360	.647**	.611*	-.277	-.248	.227	-.362		-.534	-.195	-.428
SU	.286	.039	-.761**	-.434	-.107	.331	-.086	.317	-.501		.312	.266
ESR	.459	.377	-.480	-.396	.098	-.103	-.073	-.136	-.607	.479		.234
PTF	.250	.010	-.496	-.586	-.119	.184	-.035	.537*	-.535	.537*	.368	
						Ice hockey players						

**Legend*

BH - body height, BM - bod mass, RRS - repeated routine with a stick, FAH - flexed arm hang, SLJ - standing long jump, SRA - shuttle run agility test, SU - sit ups in 1 minute, RTB - rolling of three balls, SAR - sit-and-reach test, ESR - endurance shuttle run, PTF - pull the flag, *$p < .05$, **$p < .01$.

As shown in Table 3 that shows data for young soccer players, children who participated in the study did not show preconditions or the sport of soccer but predominantly for rhythmic gymnastics. As for the second individual sport, children showed specific and appropriate motor preconditions for other sports, especially gymnastics and ice skating. Low number of children showed preconditions for track and field, which requires versatility based on a variety of skills.

Table 3. *Recommended sports and games for children who participate in soccer practice*

1st sport	2nd sport	1st game	2nd game
Rhythmic gymnastics	Ice skating	Volleyball	Handball
Track and field - jumps	Track and field - sprints	Handball	Ice hockey
Rhythmic gymnastics	Artistic gymnastics	Handball	Ice hockey
Ski jumping	Rhythmic gymnastics	Handball	Ice hockey
Cross-country skiing	Rhythmic gymnastics	Volleyball	Ice hockey
Rhythmic gymnastics	Ice skating	Volleyball	Tennis
Rhythmic gymnastics	Ski jumping	Tennis	Volleyball
Rhythmic gymnastics	Track cycling	Volleyball	Tennis
Rhythmic gymnastics	Artistic gymnastics	Volleyball	Tennis
Rhythmic gymnastics	Cross-country skiing	Tennis	Volleyball
Ski jumping	Rhythmic gymnastics	Volleyball	Tennis
Rhythmic gymnastics	Ski jumping	Ice hockey	Volleyball
Rhythmic gymnastics	Cross-country skiing	Handball	Ice hockey
Rhythmic gymnastics	Track cycling	Volleyball	Ice hockey
Cross-country skiing	Track and field - endurance	Floorball	Tennis
Rhythmic gymnastics	Ice skating	Handball	Ice hockey

For the team sports, one of which the children have taken up, the most recommended sport is the sport of volleyball. This shows that children should take up a different sport for which the talent they are endowed with is needed. An interesting finding is that no child showed predominant predispositions for soccer itself but rather for ice hockey, which, according to the results, may become their second sport to pursue.

As shown in Table 4 that shows data for young ice hockey players, children who participated in the study did not show preconditions or the sport of ice hockey but rather for a variety of different sports. As for individual sports, not games, 16 children showed specific and appropriate motor preconditions for rhythmic gymnastics, which is in contradiction with the demands of the sport of ice hockey, which requires other preconditions. As far as the sports specialization is concerned, just one child demonstrated skills and preconditions necessary for playing ice hockey. The most recommended sports games for children who specialized in playing ice hockey were volleyball and soccer. The number of children who were recommended to play ice hockey as their second sport increased to three, which is contrary to the idea of individual sports profiles. The most recommended 2nd sports were track and field events, rhythmic gymnastics, and ice skating.

Table 4. *Recommended sports and games for children who participate in hockey practice*

1st sport	2nd sport	1st game	2nd game
Track and field - endurance	Cross-country skiing	Floorball	Volleyball
Cross-country skiing	Mountain biking	Soccer	Volleyball
Track and field - Jumps	Rhythmic gymnastics	Soccer	Volleyball
Rhythmic gymnastics	Cross-country skiing	Soccer	Handball
Cross-country skiing	Rhythmic gymnastics	Soccer	Handball
Track and field Jumps	Ice skating	Ice hockey	Tennis
Rhythmic gymnastics	Track and field - endurance	Volleyball	Tennis
Rhythmic gymnastics	Cross-country skiing	Soccer	Volleyball
Rhythmic gymnastics	Track and field Jumps	Volleyball	Tennis
Track cycling	Track and field Jumps	Tennis	Volleyball
Ice skating	Track and field Jumps	Handball	Ice hockey
Rhythmic gymnastics	Track cycling	Floorball	Volleyball
Rhythmic gymnastics	Cross-country skiing	Soccer	Ice hockey
Rhythmic gymnastics	Ski jumping	Soccer	Handball
Rhythmic gymnastics	Ski jumping	Volleyball	Tennis
Cross-country skiing	Mountain bike racing	Soccer	Volleyball
Rhythmic gymnastics	Track and field Endurance	Soccer	Volleyball
Rhythmic gymnastics	Artistic gymnastics	Volleyball	Handball
Ski jumping	Rhythmic gymnastics	Volleyball	Tennis
Rhythmic gymnastics	Ice skating	Volleyball	Tennis
Rhythmic gymnastics	Ice skating	Volleyball	Floorball
Ski jumping	Track and field Endurance	Tennis	Volleyball
Ski jumping	Rhythmic gymnastics	Volleyball	Tennis
Ice skating	Rhythmic gymnastics	Tennis	Volleyball
Rhythmic gymnastics	Ski jumping	Volleyball	Tennis
Rhythmic gymnastics	Ice skating	Volleyball	Tennis
Ice skating	Track and field - Jumps	Handball	Volleyball
Rhythmic gymnastics	Ice skating	Volleyball	Handball
Rhythmic gymnastics	Ski jumping	Volleyball	Ice hockey

4. Conclusions

The purpose of the study was to determine individual profiles of sports preconditions in 6- and 7-year-old children and recommend sports according to children's test scores and individual sports profiles. The results showed no significant effects of engaging in physical activities, regardless of sport. Significant differences between test scores achieved by children engaged in soccer and ice hockey practice, respectively, were found for two motor tests: routine with a stick and flexed arm hang. These tests assess levels of motor coordination and upper-body strength. There were no significant correlations between tests that assess object control skills and motor coordination. However, significant correlations were found between tests that assess speed. Test scores in sit-up test significantly correlated with the 20-meter sprint test in both groups of children. The results of this study are useful in determining the level of sports preconditions in relation to the type of sports recommended to children according to their abilities and skills.

References

1. BREITBACH, S., TUG, S., & SIMON, P. (2014). Conventional and genetic talent identification in sports: will recent developments trace talent?, *Sports Medicine*, *44 (11)*, 1489-1503;
2. COBLEY, S., BAKER, J., & SCHORER, J. (2012). *Identification and development of sport talent: international perspectives*, Routledge, London, UK;
3. COOKE, C., COBLEY, S., TILL, K., & WATTIE, N. (2010). Searching for sporting excellence: talent identification and development. *British Journal of Sports Medicine*, *44 (66)*, supplement 1;
4. DAVIDS, K., ARAUJO, D., VILAR, L., & PINDER, R. (2013). An ecological dynamics approach to skill acquisition: implications for development of talent in sport, *Talent Development and Excellence*, *5 (1)*, 21-34;
5. DURAND-BUSH, N., & SALMELA, J.H. (2002). The development and maintenance of expert athletic performance: perceptions of World and Olympic Champions, *Journal of Applied Sport Psychology*, *14 (3)*, 154-71;
6. GAGNE, F. (1997). Critique of Morelock's (1996) definitions of giftedness and talent, *Roeper Review*, *20 (2)*, 76-85;
7. HIROSE, N., & SEKI, T. (2016). Two-year changes in anthropometric and motor ability values as talent identification indexes in youth soccer players, *Journal of Science and Medicine in Sport*, *19 (2)*, 158-162;
8. HOHMANN, A. (2001). Leistungsdiagnostische Kriterien sportlichen Talents - dargestellt am Beispiel des leichtathletischen Sprints, *Leistungssport*, *31 (4)*, 14-22;
9. KEVIN, T., MORLEY, D., O'HARAA, J. et al. (2017). A retrospective longitudinal analysis of anthropometric and physical qualities that associate

with adult career attainment in junior rugby league players, *Journal of Science and Medicine in Sport, 20 (11),* 1029-1033;

10. MAGALLANES, C. (2011). La heredabilidad en las ciencias del deporte: entendidos y malentendidos, *Universitaria de Educación Física y Deporte, 4 (4),* 13-19;
11. MĚKOTA, K., & BLAHUŠ, P. (1983). *Motorické testy v tělovýchově, Státní Pedagogické Nakladatelství*, Praha: Czech Republic;
12. MORRIS, T. (2000). Psychological characteristics and talent identification in soccer, *Journal of Sport Science, 18 (9),* 715-726;
13. PHILLIPS, E., DAVIDS, K., RENSHAW, I., & PORTUS, M. (2010). Expert performance in sport and the dynamics of talent development, *Sports Medicine, 40 (4),* 271-283;
14. QUIJADA, M.R. (2016). Is the Successful Athlete Born or Made? A Review of the Literature, *Apunts. Educació Física i Esports, 123 (1),* 7-12.
15. REILLY, T., WILLIAMS, A.M., NEVILL, A., & FRANKS, A.M. (2000). A multidisciplinary approach to talent identification in soccer, *Journal of Sports Sciences, 18 (9),* 695-702.
16. STARKES, J.L., DEAKIN, J.M., ALLARD, F. et al. (1996). The road to excellence: the acquisition of expert performance in the arts and sciences sports and games, Ericsson, K.A, (ed.) *Deliberate practice in sports: what is it anyway?, US: Lawrence Erlbaum Associates,* 81-106;
17. SUPPIAH, H.T., LOW, CH.Y., & CHIA, M. (2015). Detecting and developing youth athlete potential: different strokes for different folks are warranted, *British Journal of Sports Medicine, 49 (13),* 878-882;
18. ŠIMONEK, J. (2015). *Testy pohybových schopností*, Slovakia: Pandan, Nitra;
19. VAEYENS, R., LENOIR, M., & WILLIAMS, A.M., Pandan, Nitra: PHILIPPAERTS, R.M. (2008). Talent identification and development programmes in sport: current models and future directions, *Sports Medicine, 38 (9),* 703-714;
20. WILLIAMS, K., & REILLY, T. (2000). Talent identification and development in soccer, *Journal of Sport Science. 18 (9),* 657-667;
21. YARROW, K., BROWN, P., & KRAKAUER, J.W. (2009). Inside the brain of an elite athlete: the neural processes that support high achievement in sports, *Nature reviews: Neuroscience, 10 (8),* 585-96;