RELATIONSHIP BETWEEN PERFORMANCE OF GYMNASTIC ELEMENTS AND NATIONAL CUP SUCCESS IN OLDER YOUTH CATEGORIES OF ALPINE SKIING

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Abstract

Competitive alpine skiing and gymnastics belong to polystructural sports disciplines. One of the differences between them are the conditions under which they are implemented. The external conditions in gymnastics are constant, in alpine skiing they vary. Due to the wide impact of gymnastics on the development of motor skills, this discipline is used as a means of physical preparation of young alpine skiers. The aim of this study was to determine whether there is a connection between the selected gymnastic elements and competitive performance of young alpine skiers, aged 14 to 15. The sample of variables consisted of eight tests about of gymnastic elements and an overall assessment. The independent variable represented the points scored in the cup for the Mercator Grand prize. The sample consisted of 34 athletes, 22 boys and 12 girls, all of them were competing that season. Considering the results, we can say that the relationship between competitive performance in alpine skiing is statistically typical for the group of boys, but not girls. In the group of boys, the statistically significant predictors of prosperity in alpine skiing were proven to be four of gymnastic elements and the total score of gymnastic elements, whereas in the group of girls only one element proved to be a statistic predictor. Differences in ranking positions influence gymnastic elements scores on performance success at competitions is statistically significant in older boys at a 5% risk level, whereas in the older girls category overall gymnastic elements do not influence total performance.

Keywords: *alpine skiing, acrobatic elements, older boys and girls.*

INTRODUCTION

Alpine skiing is one of the most attractive and exciting sports (Lešnik and Žvan, 2007). Both, recreative and competitive skiing demand a lot of agility, which must be constantly upgraded. Alpine skiing is a polystructural complex sport, which demands a child's early specialization (Lešnik and Žvan, 2010). The environment and its conditions, which can be unpredictable or even obtrusive (Pišot and Videmšek, 2004), determine the complexity of alpine skiing. A competitor must process a lot of different information so he/she can compete in severe conditions with high-risk limit (Slivnik, 2010; Hintermeister et al, 1994). The quality of skiing depends on five features of alpine skiing: speed, accuracy, punctuality, rhythm, and softness (Lešnik, 1999). Pursuance of all five elements shows results in the skiing technique in young developing competitors (Dolenec and Žvan, 2001). In the process of training, it is therefore necessary to plan how to improve not only the skiing technique but also general body fitness (Hintermeister et al, 1992). We can improve body fitness with different types of exercise that enable broad motor skills. One of the most effective training is gymnastics and its acrobatic elements (Krističević et al, 2010; Lešnik, 2009; Bandalo and Lešnik, 2011).

Gymnastics represents a fundamental sports genre, which influences motor development of every person (Bolkovič et al, 2002; Novak, Kovač and Čuk, 2008). It enables conscious control of body movement and position. The goal of gymnastic exercise is to acquire harmonious physical development and psychosocial capability (Bolkovič and Kristan, 2002). Gymnastic exercise affects strength development, coordination, flexibility, precision, balance and speed. To perform acrobatic elements it is necessary to activate specific muscles with specific intensity in accordance with time and space (Bolkovič et al, 2002). Acrobatic elements develop movement capability in space and body control in the phase without support (Bučar Pajek, et al, 2010).

Both alpine skiing and gymnastics are complex sports. The difference between them is that acrobatic elements are always performed in standard conditions whereas the conditions in alpine skiing are variable (Cigrovski, 2007). In alpine skiing, the benefits of learning body control through acrobatic elements are important especially in the phase without support (Bučar Pajek, 2003). In alpine skiing, the result often depends on body control, for example in jumps, quick extreme flexion of the body in technical disciplines where loss of stability can cause incorrect turn or even a fall. Conditions where we can learn acrobatic elements are stabile and when they are automatized, there is a positive transfer into complex skiing situations, where the skier can manage to control loss of stability in high-speed performance (Bosco, 1997; Čoh and Bračič, 2010; Lešnik, 1996).

Going through puberty can have a significant impact on athletic performance both in a positive and negative way (Mlakar, 2012; Pišot and Planinšec, 2005). While increases in body size, hormones, and muscle strength can improve athletic performance, there may be a temporary decline in balance skills and body control during the adolescence growth spurt. Quick increases in height and weight effect the body's centre of gravity (Pišot and Šimunič, 2006; Vogrinec, 2008). Sometimes, the brain has to adjust to this higher observation point, and a teen may seem a bit "clumsy." This phase is especially noticeable in sports, which require good balance and body control. Coaches and trainers that are aware of the adolescence growth spurt can help reduce athletic awkwardness by incorporating specific aspects of training into practices and training sessions (Živčić, 2007; Zajc, 1992).

At the age of 15 +- two years, adolescents increase their ability to develop the maximum degree of strength, speed and endurance, the physical abilities which are the main factors that influence sport performance (Pišot and Šimunič, 2006). But the preadolescent period is more unstable in terms of physical growth, coordination and movement control. Changes in uneven growth, especially of extremities, lead to a disharmonic development and can cause instability and discoordination of movement. It is therefore very important to perfect the technique of movement in this period (Berg and Eiken, 1999). To help the young racers overcome the adolescence phase they must first train their coordination and balance through different sports and in stable conditions, such as gymnastics (Lešnik, 2009). Neumayr et al. (2003) say that it is crucial for alpine ski racers to have a high level of aerobic power and muscle strength.

Gymnastic and acrobatic training should represent the component of physical preparation of older boys and girls in alpine skiing in all-year training process (Škof, 2007). With boys at the age of 14, there is a maximum height growth of 8-10 centimetres per year. At this stage, gymnastics should be the main part of the physical preparation, because of its influence on coordination and mitigation of negative growth influence (Schmidtbleicher, 1984). On the other hand, at the girls' age of 14 the growth stops and learning coordination skills should improve their stability and coordinated movement (Mujanović et al, 2014).

The aim of our study was to determine whether the quality of implemented gymnastic elements correlates with competitive performance of boys and girls, age 14-15, in alpine skiing. Given the fact that the presented sample of measured participants is in a teenage period it is interesting to compare the influence of results according to gender. We were interested in how mastering the gymnastic elements affects the performance success in the category of older boys and girls in alpine skiing.

METHODS

Participants

The study included 22 boys and 12 girls, born in 1997 and 1998. They were all active alpine ski racers included in a regular training process in a ski club. They were all without injuries or morphological defects. All the participants trained 6 times a week for 2-3 hours. During the ski season, they had skiing practice 4 times a week and two sessions of gym training. In the off season they trained general endurance, strength, coordination, balance and agility 6 times a week. Part of the trainings was also gymnastics. On average boys and girls trained 8 ± 1 year. They had 14 races per season.

Instruments

We used nine tests of gymnastic elements that most closely coincide with general knowledge of gymnastics and are an indicator of mastering gymnastics. Participants' performance was evaluated for each element on a scale from 0 to 5, 0 being the lowest grade, meaning: did not carry out the element, 1 meaning: tried, but did not succeed, 2 meaning: with a major fault, 3 indicating: performed inadequate, 4 meaning: successful with a minor fault or with difficulties, 5 being the highest grade, meaning: carried out the element correctly in full movement and without difficulties.

The sample of variables included the individual ratings of gymnastic elements, their overall score and the competitive performance based on the ranking and points in the "Velika nagrada Mercator" national cup in the 2012/13 racing season (hereinafter the Cup).

1. STR – straddle vault
2. RFOR – forward roll
3. RBAC – backward roll
4. HS-RFOR – handstands to forward roll
5. CART – cartwheel
6. ROUND – roundoff
7. TRN – back hip circle on uneven bars
8. SQU – squat vault
9. GYM – overall score of gymnastic elements
10. POINTS CUP – points of national cup

Straddle vault is a gymnastic vault in which the body passes over the apparatus in a sitting position with the legs spread wide to each side. Forward roll is a gymnastic movement in which the body is turned heels over head with the back of the neck resting on the ground. Backward roll is a gymnastic roll that is performed with the feet going first and the rest of the body and the head following. Handstand to forward roll is an intermediate gymnastic element in which you do a handstand and then roll forward. Cartwheel is a sideways rotary movement of the body and is performed by bringing the hands to the floor one at a time while the body inverts. The legs travel over the body trunk while one or both hands are on the floor, and then the feet return to the floor one at a time, ending with the performer standing upright. A roundoff is a move in gymnastics similar to a cartwheel, except the gymnast lands with two feet placed together on the ground instead of one foot at a time, facing the direction of arrival. Back hip circle is a gymnastic element where, to perform the skill, the gymnast rests on the bar in a front support. He casts away, returns to the bar and travels around it, returning to a front support. Squat vault: a gymnastic vault in which the body is supported on both hands, the knees are flexed and drawn up toward the chest, and the legs pass between the arms as the body passes over the apparatus.

Procedure

Measurements of locomotor states variables were carried out at the Faculty of Sport in November 2012. Autumn measurements represent the ideal physical condition before the start of the competition period. Measurements of body controlled movements were held in the gymnastics hall under the supervision of two gymnastic professors, who are both official arbiters and judges with all qualifications. We asked two judges to cooperate to ensure objectivity of grading. Each respondent was recorded with a video camera while performing gymnastic elements. Both professors evaluated the skiers' performance on a scale of 0 to 5.

The criterion variable is the sum of points, reached in the Cup. We summed the best three results of slalom, giant slalom and super-G. Ski Association of Slovenia determines athletes' prosperity in the national cup using the following scoring system: 1st place 150 points, 2nd place 135 points, 3rd place 120 points, 4th place 108 points, 5th place 96 points, etc.

The data was processed with SPSS – Statistical Package for Social Sciences. We calculated the basic statistical parameters. We used the Spearman correlation coefficient at 1% and 5% risk to establish the correlation results between acrobatic skills and competitive performance. We also used Mann – Whitney U-test separately for boys and girls. We divided both boys and girls into two groups – in the first group were skiers who ranked 1-10 and in the second group were skiers who ranked 11-22 in the National cup.

RESULTS

Table 1
Spearman's rho between gymnastic elements and Mercator cup points in older boys.

	STR	SQU	RFOR	RBAC	HS-RFOR	CART	ROUND	TRN	POINTS CUP
STR	1	.553**	0.395	0.351	0.348	0.42	0.412	0.261	.483*
SQU	.553**	1	0.422	.572**	0.238	.652**	0.358	0.298	0.365
RFOR	0.395	0.422	1	.835**	.526*	.521*	.757**	0.16	0.382
RBAC	0.351	.572**	.835**	1	.572**	.683**	.785**	0.119	.451*
HS-RFOR	0.348	0.238	.526*	.572**	1	.601**	.722**	0.409	.642**
CART	0.42	.652**	.521*	.683**	.601**	1	.695**	0.371	0.302
ROUND	0.412	0.358	.757**	.785**	.722**	.695**	1	0.342	.429*
TRN	0.261	0.298	0.16	0.119	0.409	0.371	0.342	1	.607**
POINTS CUP	.483*	0.365	0.382	.451*	.642**	0.302	.429*	.607**	1

** statistically significant correlation at a 0.01 risk level; * statistically significant correlation at a 0.05 risk level; STR – straddle vault, RFOR – forward roll, RBAC – backward roll, HS-RFOR – handstand to forward roll, CART – cartwheel, ROUND – roundoff, TRN – back hip circle on uneven bars, SQU – squat vault, GYM – overall score of gymnastic elements, POINTS CUP – points in national cup

In Table 1 we can see, that there is a positive correlation between all of the gymnastic elements and Cup points. The most statistically significant correlation was in handstand to forward roll (HS-RFOR) and back hip circle on lower bar on uneven bars (TRN). Statistically significant were also straddle vault (STR), backward roll (RBAC) and round off (ROUND). There was no statistically significant correlation in squat vault (SQU), forward roll (RFOR) and cartwheel (CART).

We calculated the Spearman correlation coefficient, with the help of which we wanted to determine whether and to what extent the individual elements correlate with the points scored in the Cup and we were also interested in the correlation of individual elements among themselves. It turns out that many elements correlate, among which the correlation between forward roll (RFOR) and backward roll (RBAC) stands out, with a 0,835** coefficient at 1% risk indicating a statistically highly significant correlation. Also a statistically highly significant correlation at 1% risk proved to be the connection between cartwheel at 90° backward (CART) and forward roll (RFOR) and between backward roll (RBAC) and handstand to forward roll (HS-RFOR).

In determining the correlation between individual elements to the points in the Cup, the results showed that the highest correlation to the Cup points is between headstand to forward roll (HS-RFOR) at .642**, followed by back hip circle with the correlation coefficient of .607**, both at a risk level of 1%, which puts them in the area of essential statistically significant associations. The skiers ranking higher in the Cup also achieved a higher score in the aforementioned elements.

Apart results shown in Table 1, we have calculated a correlation between the overall assessment of gymnastic elements (GYM) and points in the Cup. The results showed that there is also an essential statistically significant correlation with the correlation coefficient of .615** at the risk level of 1%. So we can conclude that the skiers who ranked higher in the Cup also received a higher overall score of gymnastic elements (Table 3).

As seen in Table 2, there is no statistically significant correlation between gymnastic elements and cup points in girls category. We can see an even negative correlation in straddle vault (STR), squat vault (SQU), forward roll (RFOR) and handstand to forward roll (HS-RFOR). There is a positive correlation in backward roll (RBAC), cartwheel (CART), round off (ROUND) and back hip circle (TRN).

When calculating the Spearman's correlation coefficient between the variables, we established that there is a correlation between the execution of the individual elements (Table 2). The strongest correlation is between handstand to forward roll (HS-RFOR) and straddle vault (STR) with the coefficient of .751**, followed by round off (ROUND) and backward roll (RBAC) with a coefficient of .731**, which puts them in the area of statistically highly significant correlations at 1% risk. When determining the correlation between individual elements and the points achieved in the Cup, it can be seen that only the backward roll (RBAC) and round off (ROUND) have a weak correlation to the points in the Cup, wherein the connection is statistically not significant. The correlation of other elements to the points in the Cup is insignificant and in some cases even negative. Calculating the relationship between the points scored in the Cup (POINTS CUP) and the overall score of gymnastic elements (GYM) did also not indicate any correlation between these variables.

Table 2
Spearman's rho between gymnastic elements and Mercator cup points in older girls.

	STR	SQU	RFOR	RBAC	HS-RFOR	CART	ROUND	TRN	POINTS CUP
STR	1	0.505	0.136	0.102	.751**	0.049	0.373	0.494	-0.059
SQU	0.505	1	0.118	-0.203	0.318	-0.112	-0.29	0.169	-0.307
RFOR	0.136	0.118	1	0.402	0.282	0.333	0.063	0.471	-0.231
RBAC	0.102	-0.203	0.402	1	0.429	.583*	.731**	0.493	0.393
HS-RFOR	.751**	0.318	0.282	0.429	1	.591*	.618*	.696*	-0.157
CART	0.049	-0.112	0.333	.583*	.591*	1	0.47	.676*	0.134
ROUND	0.373	-0.29	0.063	.731**	.618*	0.47	1	0.306	0.307
TRN	0.494	0.169	0.471	0.493	.696*	.676*	0.306	1	0.107
POINTS CUP	-0.059	-0.307	-0.231	0.393	-0.157	0.134	0.307	0.107	1

** statistically significant correlation at a 0.01 risk level; * statistically significant correlation at a 0.05 risk level; STR – straddle vault, RFOR – forward roll, RBAC – backward roll, HS-RFOR – handstand to forward roll, CART – cartwheel, ROUND – roundoff, TRN – back hip circle on uneven bars, SQU – squat vault, GYM – overall score of gymnastic elements, POINTS CUP – points in national cup

Table 3
Spearman's rho correlation between the rating in the Cup and the overall score of gymnastic elements in older boys and girls.

		GYMNASTIC ELEMENTS	POINTS CUP
BOYS	GYMNASTIC ELEMENTS	1	.615**
	POINTS CUP	.615**	1
GIRLS	GYMNASTIC ELEMENTS	1	-0.151
	POINTS CUP	-0.151	1

** statistically significant correlation at a 0.01 risk level; * statistically significant correlation at a 0.05 risk level

Table 3 shows us, there is a statistically significant correlation between overall points of gymnastic elements and Cup points in older boys. There is negative correlation in the group of girls.

Table 4
The results of Mann-Whitney U-test of points scored in the Mercator Cup, gymnastic element variables and the total score of gymnastic elements in older boys.

	MANN-WHITNEY U TEST	EXACT SIG (2-TAILED)	RANK	MEAN RANK	SUM OF RANKS
STR	39	0.122	1	13.6	136
			2	9.75	117
SQU	45.5	0.345	1	12.95	129.5
			2	10.29	123.5
RFOR	36.5	0.099	1	13.85	138.5
			2	9.54	114.5
RBAC	38	0.145	1	13.7	137
			2	9.67	116
HS-RFOR	18	0.002**	1	15.7	157
			2	8	96
CART	43.5	0.254	1	13.15	131.5
			2	10.12	121.5
ROUND	32	0.061	1	14.3	143
			2	9.17	110
TRN	18	0.002**	1	15.7	157
			2	8	96
GYM	23	0.013*	1	15.2	152
			2	8.42	101
POINTS CUP	0	0	1	17.5	175
			2	6.5	78

** statistically significant difference at a 0.01 risk level; * statistically significant correlation at a 0.05 risk level; STR – straddle vault, RFOR – forward roll, RBAC – backward roll, HS-RFOR – handstand to forward roll, CART – cartwheel, ROUND – roundoff, TRN – back hip circle on uneven bars, SQU – squat vault, GYM – overall score of gymnastic elements, POINTS CUP – points in national cup

Table 4 shows that the influence of gymnastic elements scores (GYM) on performance success at competitions (POINTS CUP) is statistically significant in older boys at a 5% risk level (sig=0,013). The first group represents boys, who ranked places 1-10 in the Mercator Cup competition, the second group represents boys who ranked 11-22. The results show that boys from the first group had better values in handstand with forward roll (HS-RFOR), back hip circle (TRN) and overall points of gymnastic elements (GYM). On the other hand, in all others gymnastic elements measured, there is no statistical significance between groups. The calculated results confirm, that the gymnastic variables which are more difficult to perform (HS-RFOR, TRN) are correlated with the criterion variable more than others.

Table 5
Results of Mann-Whitney U-test of points scored in the Mercator Cup, gymnastic element variables and total score of gymnastic elements in older girls

	MANN-WHITNEY U TEST	EXACT SIG (2-TAILED)	RANK	MEAN RANK	SUM OF RANKS
STR	17	1	1	6.67	40
			2	6.33	38
SQU	14	0.697	1	5.83	35
			2	7.17	43
RFOR	16.5	1	1	6.25	37.5
			2	6.75	40.5
RBAC	5	0.048*	1	8.67	52
			2	4.33	26
HS-RFOR	18	1	1	6.5	39
			2	6.5	39
CART	15.5	0.864	1	6.92	41.5
			2	6.08	36.5
ROUND	9	0.156	1	8	48
			2	5	30
TRN	13.5	0.598	1	7.25	43.5
			2	5.75	34.5
GYM	16	0.788	1	6.83	41
			2	6.17	37
POINTS CUP	0	0.002	1	9.5	57
			2	3.5	21

* statistically significant difference at a 0.05 risk level; STR – straddle vault, RFOR – forward roll, RBAC – backward roll, HS-RFOR – handstand to forward roll, CART – cartwheel, ROUND – roundoff, TRN – back hip circle on uneven bars, SQU – squat vault, GYM – overall score of gymnastic elements, POINTS CUP – points in national cup

Table 5 shows that overall gymnastic elements (GYM) do not influence total performance (POINTS CUP) in the older girls category. We divided girls into two groups, in the first group there were girls who ranked 1-6 in the Mercator Cup competition and in the second group there were girls ranked 7-12. The results indicate a significant difference only in backward roll (RBAC) at the 5% risk level (sig=0,048). There is no statistical significance from the first group of girls in any other gymnastic element.

DISCUSSION

This article explains how body control, physical endurance, strength and coordination influence the racing results of older boys and girls in alpine skiing. We found statistically important differences, at under 1% risk level with boys, whereas there was no statistically important difference among girls.

Adolescents have coordination problems due to their growth, therefore it is necessary to train specific skills that will help young athletes overcome their loss of physical ability during adolescence and acquire even grater abilities of strength, coordination, and balance along with their skiing technique when they pass the adolescence phase.

Lešnik et al. (2015) researched how performing acrobatic elements impacts alpine skiers age 12 and 13. The results they acquired were similar to those of our study, except theirs were in favour of girls. There was a statistically important difference in positive correlation between acrobatic elements and success in the National cup skiing competition. There was no statistically important difference in the group of younger boys. If we compare both researches, we can define how much impact adolescence has on strength, balance, speed, coordination and after all on sports performance of young athletes. Girls are usually two years ahead of boys in adolescent development, which is the exact confirmation of why girls were more successful at a younger age (12-13) than boys (14-15). There are no differences in the development of ordinary boys' and girls' physical abilities until they reach puberty. Because of girls' earlier entry into adolescence, a change in the progress of motor development and their physical abilities is to be expected. Secondary signs of adolescence affect the awareness of body scheme, which is the reason why physical abilities are not developing at the same rate as the growth process proceeds (Glinšek, 2013).

Motor, physical, cognitive, emotional and social development is a comprehensive process, which takes place simultaneously with the physical growth, maturation of the functions in the social environment. They interact with heredity, the environment and child's own activity (Videmšek and Pišot, 2007). Genetics holds the biggest influence on the physical development, but despite the fact that genetic factors determine the growth limits, environmental factors and the factor of own activity play an important role in the extent to which these limits are then reached. The most important environmental factors affecting physical growth are nutrition, physical activity, injury, delay by development disease and climatic conditions (Videmšek and Pišot, 2007). As a rule, early maturation brings benefits in sports to both girls and boys. This advantage is usually expressed in competitions, where early maturing children achieve more visible results simply because they have developed a variety of skills, such as strength, speed, tenacity and psychological maturity at a very early age, enabling them superiority over children who are still developing. In some cases, early maturation and the associated rapid physical growth also brings disadvantages, which are mainly related to the reduction of equilibrium and coordination skills (Lešnik and Žvan, 2014).

Competitive alpine skiing is a complex sport discipline, where the conditions in which the athlete competes are constantly changing. It is the changing conditions in conjunction with high-speed movement or sliding and the pressure of large forces that generate the environment in which injuries are an integral part of both trainings and competitions for professional skiers. It is impossible to completely annihilate the possibility of injuries in alpine skiing, but we can try to reduce the risk limit to the individual's minimum value with adequate physical preparation (Lešnik and Žvan, 2013). We often hear about young talents winning in the lower age categories, but when or if they reach the older categories, they do so without success. It is therefore essential that we use the appropriate means and methods in different age periods to influence the individual's bio-psycho-social status to such an extent, that it will facilitate a successful transition into membership categories. At all stages of the training process it is important to use weaker methods before resorting to stronger ones, which will gradually build the motor basis for potentially outstanding achievements in the future (Mujanović et al, 2014).

One of such methods of physical preparation of young alpine skiers is gymnastics or acrobatics. Gymnastics i.e. acrobatics can influence many motor skills in different age groups, among which coordination of movement, various forms of body strength, balance and flexibility stand out. Successful implementation of individual acrobatic elements requires precise muscle activity of a certain intensity at a specific time and place. Acrobatic elements also fully develop the ability to move in space and master the body in the without support phase (Bolkovič and Kristan, 2002).

Based on this, it seems reasonable to incorporate i.e. insist on acrobatics program when designing fitness programs for alpine skiers. Children in the age period of 14-15 years fall into the category of older boys and girls. Particularly in boys, this age period coincides with the period of accelerated body growth, which may in many of them disrupt coordination and sense of body position, namely body segments. By practicing acrobatics the negative effects of accelerated growth may be mitigated. On the other hand, growth slows in girls at this age, allowing the effects of gymnastics or acrobatics on the development of movement coordination and body awareness in space to increase even further. According to the obtained results, coaches' aim could be not only to learn and improve gymnastic elements, which were the subject of the thesis, but also to implement derivatives of certain elements, which would then lead to a generalization of the learned. Therefore, it may seem reasonable to emphasize learning and perfecting a variety of acrobatic elements which are implemented on different planes of movement, or elements, which are a combination of more individual elements. This is where, in fact, the subjects had more problems or received poorer scores.

The obtained results indicate that the correlation between the control of gymnastic elements and performance success is statistically significant in older boys categories. We cannot confirm statistical significance with older girls, but that does not mean that mastering gymnastic elements is not necessary for their overall physical ability to perform in ski racing. In the overflow of attractive modern ski disciplines competitive alpine skiing will become even more dangerous. The skiing speed is constantly growing (Lešnik and Žvan, 2010) and therefore presents more possibilities for falls and more serious injuries. Mastering acrobatic elements will therefore become even more important for skiers in terms of better body control in solving complex motor tasks while skiing, as well as in the case of falls, when the movement of the skier can be controlled (Kostelić, 2005). In the future, it will be necessary for the acrobatics training to move even closer to the contemporary ski movement trends. The training of "ski acrobatics" should be implemented in the training process and the training conditions should resemble the ski sliding conditions.

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