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# THE PLANNED DEVELOPMENT'S EFFECT ON THE PERFORMANCE IN ICE HOCKEY

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**Abstract:** The sports are growing everywhere in the world, so there is no other way to maintain or to increase the level of quality just the strategic planned development (GÉCZI, 2012), because thousands of specialist are working hardly on the better results worldwide. The aim of this study was to monitor the ice hockey players' physical development in Hungary since 2007, focusing the results after opening the federations' Methodical Center (MC). One can see a remarkable development during the last years in the domestic ice hockey, which is perceptible following the sport performance and results. The first step of the planned development was the reform of the curriculum in the coaches courses (from 2004 continuously) at every level, the second step was the opening our MC in 2010, where the Hungarian players and experts (coaches and officials) can develop their skills and their knowledge about the ice hockey. We examined the effect of the above mentioned procedures, comparing the national try-out test running events (10 m, 60 m, 6×9 m, 400 m, 1500 m) by the best twenty U18 players (N=80). According to the opening of the Methodical Center, we used the data from 2012, 2009, 2008 and 2007.

**Key words:** planned sport development, Methodical Center, testing, development

## Introduction

Ice hockey is one of the fastest sports, which required condition, coordination, and also psychological and mental abilities by the players (VESCOVI, 2001). Also, ice hockey is characterized by high intensity skating, rapid changes in velocity and duration, and also hard body contact (MONTGOMERY, 1988). The success in this sport mainly depends on the player efficacy, and also on other issues, like understanding, communication, cooperation (FELTZ & LIRGG, 1998). There are also positional differences of anthropometric and fitness measures of off-ice hockey tests (BURR et al., 2008). Examined the highest level of university ice hockey (NCAA DIV I.), Peyer et al. (2011) found that the test of leg press, chin-ups, bench press, and repeat sprint performance were significantly correlated with +/- score in their study. The International Ice Hockey Federation (IIHF) tries to develop the sport in every country, as well as in Hungary. The Hungarian Ice Hockey Federation (HIHF) committed to the planned development, and tries to pick up the best practices from the big hockey countries. There is no other way to maintain or increase the level of quality in a sport just the strategic planned development (GÉCZI, 2012), because thousands of coaches, officials are working on the better results worldwide. The observer can see a remarkable development during the last decades in the Hungarian ice hockey, which is perceptible following the sport performance and results. The first step of the planned development was the reform of the curriculum in the coaches courses (from 2004

continuously) at every level, the second step was the opening our MC in 2010, where the Hungarian players and experts (coaches and officials) can develop their skills and their knowledge about the ice hockey. The MC located in a facility which has two ice rink, so all the national team programs can run without any disturbance of the normal training order of a club. MC has two main functions, firstly it can warrant the best possibility to the players of physical development lead by well educated coaches, secondly to give place of the coaching courses also the further education programs of coaches and officials.

## Methods

We tried to measure the effect of the Methodical Center on the players' results, so we presumed that their physical preparation will show us significant differences. In our investigation the test value was in every case the test results of the previous year (4 years, 2007, 2008, 2009 and 2012) of the national try-out test running events best 20 records (N=80). The best 20 players' results were chosen, because the total number of the players and their preparation level had yearly big differences. In two years there were more clubs, which misunderstood the criteria of the requested players, so they sent all players they had. So the yearly 20 best results were compared to each other, and also to the 2012 year results. We used by the scientific investigation the t-test, which allowed the needed comparison of data. We searched the answer, if

the results are differently from the earlier results, before the Methodical Center was opened in 2010. The preferred data was the results of the year 2012 (we thought it was enough time to change to the right physical preparation); we compared to these data the previous year's data. All players that attended this try-out test were preselect and sent by club coaches to participate in the study, so year by year altogether 60–70 U18 players did all off-ice motor tests, and from these players' results we picked up the 20 best results of the year. The collected data was performed by 254 athletes.

The diagram below shows us the circumstance of the investigation, which database was compared to the others and which way.

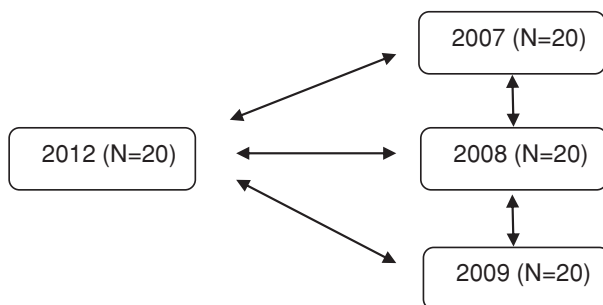


Figure 1. The database (N=4x20)

You can observe afterwards that the arrows will show us the significant difference by the tests ( $p < 0.05$ ). If the data are not significant differ from each other, we don't use arrows.

## Results

First of all, we collected the best 20 players test results by events of the national try-out test to eliminate the weak performers' results, right after we created the means of those records.

The mean of best twenty results was summarized yearly, so there were athletes who only once, but there were players who two or more times appeared in the ranking.

Table 1. The mean of the best 20 results in seconds by tests

Year	60 m	10 m	6×9 m	400 m	1500 m
2012	7,91	1,71	13,94	63,36	342,17
2009	7,94	1,74	14,81	65,13	357,21
2008	8,03	1,75	13,89	66,09	356,3
2007	7,97	1,76	13,91	64,43	351,83

## The tests

**60 m run test:** was measured with digital watches combined with photocells to avoid the mistakes of the human hands and eyes. The coaches need to know their players' results of the 60 m run, because it is very good indicator of the athletes highest velocity by run.

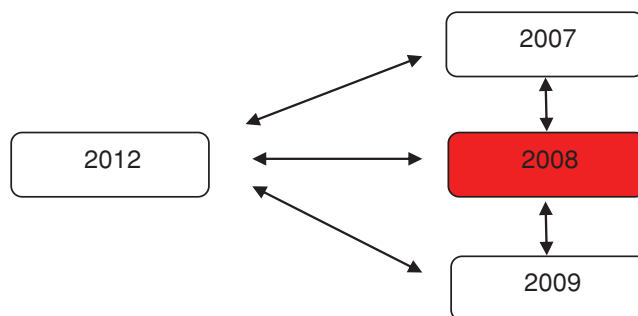


Figure 2. The result of the 60m running test

The results are separated from each other. The worst value was the result of the 2008 with 8.03s mean. The t-test values were the following ( $t_{2012-2007} = 3.64$ ;  $t_{2012-2008} = 4.43$ ;  $t_{2012-2009} = 3.54$ ;  $t_{2007-2008} = 4.12$ ;  $t_{2008-2009} = 4.31$ ). Obviously, the 2008 years' results were in addition of the bad weather condition of the test. Also, we can recognize that the results were significantly better year by year, so the players were more and more well prepared to the try-out test.

**10 m run test:** measured the first ten meter of the 60m run, we got information about the acceleration of the athletes. Acceleration is a determining factor of the ice hockey players, the faster players are the better players. We used the same digital watch with the photocells on the gates than before we wrote down.

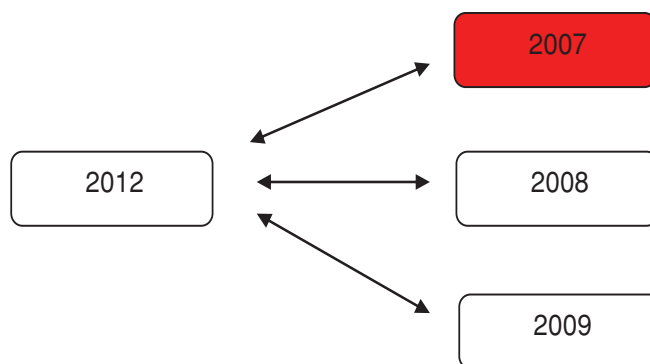


Figure 3. The result of the ten meter run

The results are not separated from each other except the result of the year. The t-test values were the following ( $t_{2012-2007} = 3.452$ ;  $t_{2012-2008} = 3.23$ ;  $t_{2012-2009} = 3.12$ ),  $p$  less than 0.5 in every case. The coaches of the clubs nowadays prefer the dry-land workout as well, not only the on-ice practices. This results show that the examined players in 2012 were significantly faster than the players before.

## 6×9 meter run agility test

The time of the transition from one direction to another is essential factor of a good ice hockey player. Ice hockey requires adequate agility, what we can measure with this test.

The result of 2012 was significantly better than the results of 2009, also we could see difference between the results of 2009 and 2008 ( $t_{2012-2009} = 3.75$ ;  $t_{2009-2008} = 4.02$ ).

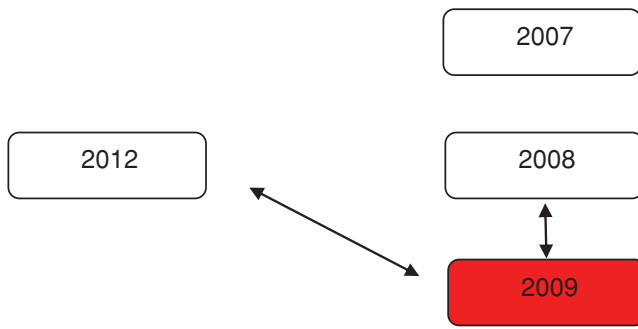


Figure 4. The results of the 6x9 meter agility run

**400 meter run test:** we measured in an official track and field stadium; the surface of the track was granulated rubber. By this test we didn't use the digital watch, just handy watches.

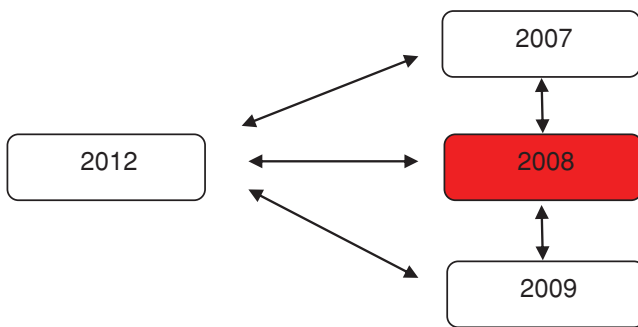


Figure 5. The results of the 400 meter run test

We can observe differences year by year. The worst results were the data of 2008, the t-test values are the following ( $t_{2012-2007} = 5.01$ ;  $t_{2012-2008} = 6.23$ ;  $t_{2012-2009} = 4.86$ ;  $t_{2007-2008} = 4.43$ ;  $t_{2008-2009} = 3.93$ ).

**1500 meter run test:** 3 and 3/4 circuits on the official track was the last test of the national try-out test. We let them enough rest time before the event. The results give us information about the players' stamina and coping skills too.

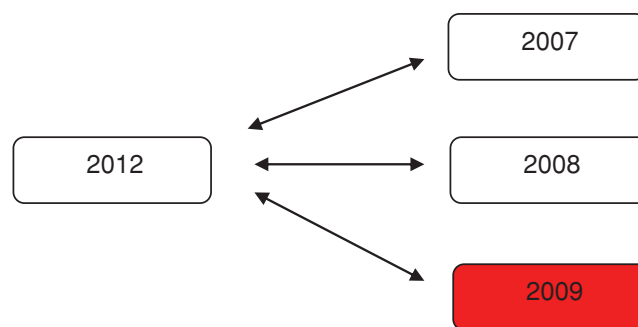


Figure 6. The result of the 1500 meter run

The results didn't differ from each other year by year, but if we compared to the results of 2012 we can see the supposed differences. In this case the results of the 2007, 2008 and 2009 are pretty similar (observing the standard deviation as well). The t-test values are the following ( $t_{2012-2007} = 7.14$ ;  $t_{2012-2008} = 7.98$ ;  $t_{2012-2009} = 8.21$ ).

## Discussion

The financial cost of the time on ice is very high, that is why the off-ice preparation and the checking of the off-ice work are more and more important in ice hockey. The certain tests and measurements are crucial to know the development of the young players. The practice on a track significantly influences the on-ice performance. Greer and colleagues (1992) studied the effects of off-ice training on performance measures related to ice hockey. Domer (2005) examined the off-ice speed and quickness for ice hockey, these kinds of skills provide dimension to overall athleticism. Also he justified, that the off-ice training could provide a much-needed break from the ice after a long season. Using off-ice tests to evaluate hockey players, the 40-yd sprint is the best predictor of skating performance (KRAUSE et al., 2011). Manners (2004) wrote down that strength and conditioning are crucial factors in the training programs with specific exercises; for example balance, skating strength, power, and agility in ice hockey players. Goudreault's investigation (2002) showed that the muscle coordination patterns stayed the same albeit the velocity results in more muscle activation are increasing.

The success in ice hockey mainly depends on not only the player efficacy, but more on humbleness of the players, communication, cooperation, understanding, team efficacy and team performance (FELTZ & LIRGG, 1998). The performance of the team depends on the physical preparation of the players as well, which is measurable by the investigated tests. According to the related literature, most young players don't have the required skills and/or abilities to use psychological skills during the games (HUMARA, 2000). On elite level ice hockey requires adequate gift and talent that is assessed and developed by well-trained coaches (GÉCZI & BOGNÁR, 2004), good conditional (GEITHNER et al., 2006; GREEN et al., 2006) and coordination skills (WU, 2002), as well as tactical preparedness (CERNJUL, 1999). From these factors we measured more the conditional skills during the try-out test, but seeing the results of the 6x9 m agility run we can have information about the coordination skills too. Successful players demonstrate pretty high level of hockey sense (MARTELL & VICKERS, 2004) and good psychological characteristics (GÉCZI et al., 2008; LAUER, 2005). Besides ice hockey demands the athletes need well-trained aerobic and anaerobic energy systems and also an optimal body composition for ice hockey (GREEN et al., 2006). The test battery is adequate to examine the aerobic and anaerobic workout, so the coaches of the national teams and also the coaches of the clubs got feed-back about the stamina and dynamics of their players. The tests are nowadays very common in ice hockey in Hungary, so the development in that field is easily traceable.

Returning to our investigation, we can observe, that the results of the 2012 are differed from the other years' results. We can say that our presumed hypothesis is justified; the results of the ice hockey players show significantly the effect of the Methodical Center. The proper physical preparation will help the players to be better, and the faster, stronger athletes can achieve better results as a team at the world championships

## Conclusion

According to our results, the Methodical Center of the IIHF helps the players to be better, helps the coaches to create better development. Testing, especially the try-out tests in the ice hockey are unconventional, began in the past few year. Our scientific paper about the changes of the test results justifies the necessity of the adequate dry land development and also verifies the effect of the Methodical Center on the workout of the physical preparation in the clubs. Practice needs the results of sports science, and of course sports science needs directions assigned by the practice. The practice and the science in the field of sport work for the same aim, to achieve better results, but neither can exist without the other.

Summarizing the findings it is recommended to do similar investigations with a broader sample, in more age groups or in more players. The results which were found in this examination are very useful for the Hungarian ice hockey because the physical preparation is essential to be competitive on world elite level. Coaches in ice hockey practice should know the exact method of measurements and have an appreciation of the results (GÉCZI et al., 2007).

It is also crucial in all sports to know the procedure of the scientific measurement, and to know the feedback from the players to the planned development program. The authors hope that this paper contributes some value to ice hockey in Hungary.

Ice hockey is one of the fastest team sports, requiring multiple skills and talent. A lot of years, humility, tolerance and work lie in a successful career in this sport. These kinds of players are developed in the youth programs in every country (IIHF, 2008).

The philosophy of the direction of the development depends on the knowledge and humility of those who are working in this spectacular sport. The happiness of the practice, the games and the training camps is the pedagogical tool for the coaches to develop their players, and the way for the players' successful career. Life-long learning is a basic criterion to be a very good and successful coach, and it is also a criterion for a good ice hockey player.

Ice hockey players should play in all the positions, because situations are always changing during a match, it is very important in ice hockey that the transitions of the game roles should flow continuously without any break to transform. Seeing an ice hockey match the left wing should defend on the right side, and the right defender should try to score goal depending on the situation. For this reason, the modern development of the players is full with game role transitions, and the early period of the development means trying all the possible roles (goalie, defender, forward) in practice and matches.

At this stage the results of the games are not, but the performance of the players during the matches is important. The U18 players have different individual periods in their maturation that is why a lot of accelerated players are very depressed in the time when the less developed team mate is getting better than they are. A well educated and good coach

knows the signs of these factors, and he/she is interested in all players' development, instead of achieving good results in early age (GÉCZI et al., 2007).

In sports there are a lot of athletes, who are disappointed after 6-8 years of practice who retire from elite sport, but they will be the next generations' parents or they will support the sport financially in the future if the retirement was not experienced with negative feelings. In Hungarian ice hockey the philosophical values involved are transmitted to individuals, who are playing ice hockey, not only ice hockey players. A lot of parents emphasize result but are not aware that this is secondary to players' development. If someone is very frustrated because of the result they cannot master the skills which are required at an older age and on the higher level of development. The learning of ice hockey should be based on multiple and strong fundamentals, meaning that firstly the skills should develop and after that the motor skills to reach the adequate level. If the players own all the required skills and motor ability, the coaches can teach tactics and strategy for the players.

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