



RECENT RESEARCHES IN SPORTS SCIENCE

EDITED BY: HENRIETTE DANCS, MIKE HUGHES, ALFONSO PENICHER,
JOEL GAILLARD AND ARNOLD BACA

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RECENT RESEARCHES IN SPORTS SCIENCE

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FOREWORD

It is 12 years since a group of us retired to a restaurant in Opatija in Croatia, to bemoan the lack of presentation skills and research methods knowledge in the current crop of postgraduate students. We had just attended a Research Methods session in the “Kinesiology” Conference hosted, by the University of Zagreb, and were all surprised by the poor levels of performance by the attending presenters. Fortunately, in the group was Henriette, the last true action person, who decided to tackle the problem.

Here we are now – back in Szombathely for the 11th time to implement the Concept of knowledge and experience through ‘doing’ – to learn about the pitfalls of presenting scientific material by actually doing it at an international Conference and receiving positive feedback after the experience. All these Conferences have been aimed at giving young researchers the positive experience of addressing an international audience and in the process perhaps gaining a publication. The way that Henriette has integrated the Conference into the start of the Christmas season has become a huge bonus and a blessing.

In the last 11 years we have staged over 1000 presentations in all disciplines of sport science, and of these, over 600 have resulted in publications in books or journals. These are looked upon as useful additions to developing CV’s.

The Xmas Conference is now the main conference of INSHS, our international network. Despite the success and tradition established, we are entering new phases and are ready (eager?) to embrace new ideas and technologies. We have already established e-posters as acceptable and are exploring other forms of e-presentations through our rapidly developing website. Currently we are sponsored by SPN, our own website, and Pressenger, a communications application, but are looking for more to welcome into our community.

Enough waffle, enjoy yourself in Szombathely, enjoy your presentation, appreciate the efforts of others in theirs and, most of all, have a great Christmas.

Mike.

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Abant İzzet Baysal University, Faculty of Communication, Bolu, Turkey.

ozsoy_s@ibu.edu.tr

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Eötvös Loránd University, PPK-ESI.

University of Physical Education, Department of Sport Management

gosi.zsuzsanna@ppk.elte.hu

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Patrik Ferenc, Michal Varmus and Roman Adámik

Faculty of Management Science and Informatics, University of Zilina,

Univerzitna 8215/1, 010 26 Zilina, Slovakia.

patrik.ferenc@fri.uniza.sk

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¹ University of Split, Faculty of Kinesiology, Split.

² MIUR Campania, Naples, Italy.

³ University of Salerno, Italy.

alfredo.ditore@gmail.com

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Martin Dobiasch¹, Stefan Endler² and Arnold Baca¹

¹ Institute of Sport Science, University of Vienna, Austria.

² Institute of Computer Science, Johannes Gutenberg University of Mainz, Germany

martin.dobiasch@univie.ac.at

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Centre for Performance Analysis, ITC, Carlow, Eire.

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Department of Humanitarian and Socio-Economic Disciplines,

Velikie Luki State Academy of Physical Education and Sport, Russia.

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Romana Caput-Jogunica¹, Sanja Ćurković² and Davor Pavlović²

¹ University of Zagreb, Faculty of Agriculture, Croatia.

² University of Zagreb, Faculty of Agriculture and University office for Sport, Zagreb, Croatia.

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Judit H. Ekler

Eötvös Loránd University

heszterane.ekler.judit@ppk.elte.hu

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Foreign languages department,

Department of Humanitarian and Socio-Economic Disciplines,

Velikie Luki State Academy of Physical Education and Sport, Russia.

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Università degli studi di Salerno, Italy.

alfredo.ditore@gmail.com

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Physiology and Sport Medicine Department,
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Velikie Luki State Academy of Physical Education and Sport, Russia.

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Department of Physical Education and Sports, Faculty of Arts, Matej Bel
University in Banská Bystrica, Slovakia
jozef.Sykora@umb.sk

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Brúnn David, Sýkora Jozef, Pupiš Martin, Švantner Roman and Moravčík Juraj
Department of Physical Education and Sports, Faculty of Arts, Matej Bel
University in Banská Bystrica, Slovakia.
david.brunn@umb.sk

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Ferenc Köteles
Institute of Health Promotion and Sport Sciences, ELTE Eötvös Loránd
University, Hungary.
koteles.ferenc@ppk.elte.hu

INVITED KEYNOTE SPEAKERS



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Ireland



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PROF. ATTILA SZABO
Faculty of Pedagogy and Psychology, Eotvos Lorand University, Hungary.

SOCIOLOGY OF SPORT

Sport and Sport Media as a Culture Industry Product

Selami Özsoy

Abant İzzet Baysal University, Faculty of Communication, Bolu, Turkey.

ozsoy_s@ibu.edu.tr

Abstract

Today, the concept of sports is associated with commercialized and industrialized elite sports instead of the activities that are required to sustain healthy lives. Sport is the first area in which capitalism can deepen its hold on society and renew it. Method: This conceptual study examines how Marxist critical theorists, led by Frankfurt school of thought and French structuralism, address sports. Results: According to critical theorists; culture industry products such as cinema, television and music entertain and divert the masses from thinking about the realities of life. Today's culture industry which is based on commodification serves to spread a shallow culture instead of a culture with depth. Sports, transmitted to the masses via the media, are now a part of this shallow culture. According to culture industry, first conceptualized by the representatives of the Frankfurt school of thought Adorno and Horkheimer, masses have become the objects that are shaped by the culture instead of subjects that establish it. When considered as a part of the culture industry, sports are one of the mass entertainment and diversion tools that define the lifestyle of individuals. Conclusion: According to critical thinkers, sports such as football -the focus of interest for the masses- is a field in which injustice in income distribution is legitimized.

Key words: Critical Theory, culture industry, sport, media

1 Introduction

When one says sport, instead of the body movements that people do to keep their lives healthy, commercialized and industrialized elite sports come to mind. In the modern sense, sport has transformed into a highly profitable sector with capitalism developing in the 20th century. Football, one of the most widespread sports branches in the world, is one of the areas where capitalism deepens and re-establishes its hegemony over society.

In our age, in order to keep the society healthy, socialist approaches like "sport for all" have been pushed to the second plan. Instead of this approach, a sport concept, which is just being watched, gambled on, reproduces the nationalism/urban nationalism and ultimately turns into violence, arises. The sports media is also an important transporter of these alienated sport concepts to the society. Media sport can be seen to be much more than watching television, catching radio broadcast and reading print texts. Virtually every new communication technology and service seeks a sporting application, because sport is universally seen as a key driver for their uptake. This means that media sport is hunting down customers at every breathing moment and in every conceivable space. The customization of media sport and the enlistment of consumers as co-producers, therefore, can be interpreted within a post-fordist framework of flexible accumulation, production and consumption of cultural goods (Rowe,

2004: 210). The sports media in the culture industry is thinking commercially and rebuilding the current business while presenting content that is dominated by popular sports branches.

1.1 Culture industry

Culture industry means the standardization of popular culture products such as media contents, books, music and cinema. The culture industry term has been used by thinkers of the Frankfurt School, which advocates that such industries are used to reinforce and strengthen the dominance of capitalism.

Frankfurt School of Social Studies which was composed of thinkers such as Theodor Adorno, Herbert Marcuse and Walter Benjamin, was founded by Max Horkheimer in 1923 at the University of Frankfurt. In 1933, the school-members, who were basically Marxist-prone with the capture of the governance by the Nazis, became famous for developing the form of criticism which was known as Western Marxism until the birth of structuralist Marxism in the 1950s and 1960s (Sim, 2006: 262-263). According to the culture industry which was conceptualized by Adorno and Horkheimer - representatives of the Frankfurt School for the first time, masses have become objects that are shaped by culture, not the ones create culture. The Frankfurt School thinkers suggest that the primary purpose of the culture industry is to catalyze the individual's adoption of capitalism. Moreover, the affirmative culture of the culture industry creates amusement and mental distancing by providing a temporary escape with little effort from the responsibility and the heavy-boring affairs of everyday life.

Today's society is not creating a culture of individuals; culture shapes the individuals within itself. When considered as part of the culture industry, sport is one of the means of amusement and determination of life styles of masses.

2 Method

In this study, the sport approaches of the theorists of critical streams such as the Frankfurt School, structuralism, British Cultural Studies, which are based on Marx's political viewpoint, were examined. This conceptual study was conducted by literature review method.

3 Results

According to Critical Theory, cultural industry products such as cinema, television and music occupy masses and keep them from thinking about the facts of life. Today's culture industry based on commodification, serves to spread a shallow culture instead of a deep one. According to Critical Culture, sports reaching reach masses through media, has become a part of this shallow culture.

In their work named *Dialectic of Enlightenment*, the leading thinkers of the Frankfurt School, Adorno and Horkheimer, suggest that the so-called enlightenment project has become a myth that supports the cultural status quo that leads to the control of the individual in an oppressive mass culture. Adorno and Horkheimer's approach to the sport is as follows:

"Sports is not a game, it is a ritual. Those who are restricted, celebrate their restriction. The masters of the mass culture sense the main support, which is the base of their dictatorship, in sports passion and sports passion bases on this. (...) The rules of the sport are like the rules of the market, but everybody is given the equal opportunity to fight, everybody is expected to play fair. Thus, the sport allows the competition which is reduced to its own oppressiveness, to keep its existence in the deceiving world, in which is destroyed. The athlete himself may

develop some virtues that will prove his worth in crucial political moments such as solidarity, helpfulness, and even enthusiasm. These virtues do not remain in the sports viewers, rude watching curiosity becomes dominant. Mass culture wants to transform the consumers into a spectator who shouts at the tribunes, not sportsmen” (Adorno&Horkheimer, 2010: 381-382). Adorno&Horkheimer's writings in the 1940s are also valid in today's sporting environment. Moreover, it can be said that popular culture have become shallower and had a negative impact on society over time.

One of the discussions in the field of sports is that football is dominant in the sports media and other amateur sports branches are not given enough space. It is anticipated that many sports branches will be able to develop further through the media. According to the thinkers of the Frankfurt School, the present structure of the presentation of popular cultural products is nothing but a deception of capital owners. According to Adorno&Horkheimer, while all consumer needs are satisfied by the culture industry, on the other hand these requirements are regulated so that the individual is always a consumer and nothing more than an object of the culture industry. The culture industry not only make consumer believe this deception as satisfaction, but it also imposes on the consumer's mind to be content with what they are presented to. With all its brunches, the culture industry promises an escape from everyday life (Adorno&Horkheimer, 2010: 189).

Marcuse, another theoretician of the Frankfurt School, also criticizes this system established between the media and the masses. According to Marcuse, modern society is irrational as a whole. While explaining the state of mankind, Marcuse emphasizes the role of media pretending as it meets the demands of the society as follows;

“Its productivity is destructive of the free development of human needs, its peace maintained by the constant threat of war, its growth dependent on the repression of the real possibilities for pacifying the struggle for existence – individual, national, and international. Our mass media have little difficulty in selling particular interests as those of all sensible men. The political needs of society become individual needs and aspirations, their satisfaction promotes business and the commonweal, and the whole appeals to be the very embodiment of reason” (Marcuse, 2012: 10).

Walter Benjamin, thinker of the Frankfurt School, not directly touched on sports but also addressed the subject of the entertainment industry. The modern framework of this industry is shaped by global events such as Modern Olympics and the FIFA World Cup. These organizations revealed the scale of the capitalist culture being truly global (Roche, 2000: 12). Sports as the ideological apparatus of the state according to Althusser

According to the structuralist French philosopher Louis Althusser, if the people understand the capitalist system they live in, they will no longer tolerate it. Althusser adds apparatus which Marx refers as state apparatus such as government, administration, army, police, courts, prisons, as well as the state's ideological apparatus of which he describes as public and private apparatus; church, school, family, law, political, union, media and cultural environments (literature, fine arts, sports, etc.) (Althusser, 2006: 90). According to Althusser, the State's Ideological Apparatus (SIAs) cause people to have misconceptions about the world and society they live in. The SIAs in which media and sports are involved, fulfill the function of distracting the society from the reality of the life they live in. Sport plays the most important role in terms of chauvinism. While nations try to outrun each other in international sporting organizations, nationalistic feelings are reproduced. Ethnic streams in nation states announce their presence through football (Althusser, 2006: 92).

Italian Antonio Gramsci, who Althusser was influenced by, is also an important thinker who makes analyses in the framework of the concept of "hegemony". According to Gramsci, domination of the ruling classes is provided by their force usage as well as the consent of the dependent masses. According to Gramsci, hegemony is regarded as establishing certain

superiority in the institution of society, and it also covers the concepts such as family, education, art, religion and so on. Hegemony can never be simple product of the preponderance of a single state or grouping of states exerting power over other states. This is, of course, partly because human beings have consciousness and a degree of free will or agency within the limits of the possible (Yaylagül: 2006: 97).

The dominant ideology is accepted as valid and natural by the functioning of hegemonic apparatus. The domination forced by the state on the public is usually being smoothed within the civil society. For Gramsci, the civil society which stands very closely to economical area hides state's enforcements on the political society. Sport is used as a tool in the establishment of hegemony on the masses and in the gaining of the consent. According to Gramsci, sport has a contradictory role. Economic life is hidden in football and presented as pure entertainment at the same time.

When Gramsci applies hegemony concept to the media, it becomes a tool which conveys the values of the dominant class to the target audience. Every initiative and practice of capital owners' profit and growth purposes are defended as community's benefit. Events and facts that are newsworthy are always presented from the viewpoint of the ruling class. Individualism is promoted, people are blamed in poverty and failure (Yaylagül: 2006: 101).

The thinkers of the British Cultural Studies, examining the structure of the lower classes by taking advantage of Gramsci's approach, also criticize the present system from different angles. Being under the influence of Gramsci, Stuart Hall argues that media produces "consent" in society, effectively. Consent production is the basis for the function of hegemonic relations. The hegemonic relationship does not depend on the intentions of the individual, but on social structures and practices. Thus, people do not realize that they are in a hegemonic relationship and are exposed to a certain dominant ideology. They are in a world surrounded by dominant ideology while shopping, listening to music, watching movies, playing or games movies, traveling, reading newspapers, watching TV, eating or even walking on the streets.

Formation of the body according to Foucault.

According to the French post-structuralist thinker Michel Foucault, power is not driven by the social class, but it invaded into all the tissues of society. Everyone in society makes power. Foucault does not deal with the society in terms of classes and refuses the hierarchical structure. Ruling power cannot be imposed top-down by a small minority. People are involved in the process without being aware that they are surrounded by power and that they themselves play a role in the production of power: "the human-beings are provided with the desire of his/her own body via sports, gymnastics, exercises in the military, etc. This is also a power. It is the application of power on the human bodies by both the others and the one her/him."

The works that Michel Foucault discusses how the body is built through medical, scientific, sexual and sporting discourses has been a pioneer for many feminists and sports sociologists. For example, Bordo (1993: 27) suggested that Foucault's notion of power was very helpful in the analysis of contemporary diet and exercise disciplines, in understanding the importance of eating disorders in the reproduction of normative feminine practices in our culture and the training of the docile female body in accordance with cultural demands. When Foucault's notion of bodily production technologies is considered, sports can be regarded as a structure whose central characteristic is discipline and control. According to Foucault, sport is the whole of disciplinary information and practices that shape the body in the direction of patriarchal capitalism needs. In this context, sport / body combination creates the following illusion: Sport and body are transparent and are dependent of politics, culture and economics. Physical performance and physical strength are the important parts in sports, which mean that since it is a field entirely dominated by biology and physiology, cultural politics cannot manipulate it. But for the very reason, it is precisely one of the ideological mechanisms that best serve social gender ideologies by normalizing existing differences. That means that the

sport environment operates as an area where the differences between men and women are drawn as inequality by normalizing these physical differences around the discourse of transparency and independence. For this reason, it is important to research the power relations in sports generally, not just social gender relations. As Foucault said, our main political task in society is to criticize the functioning of social institutions which appear to be impartial and independent.

The articulations between Foucault and sport start with his own direct address of the topic, in the context of an ethics of the self and advertisements for fitness to rule others. He undertook this analysis by examining Western philosophy's origins. In ancient Greece and Rome, the body was the locus for an ethics of the self, a combat with pleasure and pain that enabled people to find the truth about themselves and master their drives (Foucault, 1986: 66–9).

Austerity and hedonism could be combined through training: In ancient Greece and Rome, the body was the locus for an ethics of the self, a combat with pleasure and pain that enabled people to find the truth about them and master their drives (Foucault, 1986: 66-9). The metaphor of the match, of athletic competition and battle, did not serve merely to designate the nature of the relationship with the desires and pleasures, with their force that always liable to turn seditious or rebellious; It is also possible that such a confidentiality will be maintained.

The increased medical involvement in the cultivation of the self appears to have been expressed through a particular and intense form of attention to the body. This attention is very different from that manifested by the positive valuation of physical vigor during an epoch when gymnastic and athletic and military training were an integral part of the education of a free man. Moreover, it has something paradoxical about it since it is inscribed, at least in part, within an ethics that posits that death, disease, or even physical suffering do not constitute true ills and that it is better to take pains over one's souls than to devote one's care to the maintenance of the body. But in fact the focus of attention in these practices of the self is the point where the ills of the body and those of the soul can communicate with one another and exchange their distresses; where the bad habits of the soul can entail physical miseries, while the excesses of the body manifest and maintain the failings of the soul... The body the adult has to care for, when he is concerned about himself is no longer the young body that needed shaping by gymnastics; it is a fragile, threatened body, undermined by petty miseries (Foucault, 1988: 56-57).

According to the US opposition thinker Noam Chomsky, sports are used as a brainwashing tool. The sport keeps people from thinking and worrying about what they are doing in what matters most to their lives.

Most of the discourses utilized in society are assiduously learned in institutions. The media, much like in the case of ideology and habitus, have a strong influence in the transmission and assimilation of popular discourses; and, in so doing, contribute to the “manufacturing of consent” (Herman & Chomsky, 1998).

In an interview with Chomsky, he explains his thoughts about sports as follows:

"Sport is another brainwashing tool. The reason for this is that it draws people's attention to a specific direction. This is extremely important. Sport keeps people away from thinking and worrying about what is important for their lives and what they are doing. The intelligence of simple people is used in sports. Sometimes, as we listen to one of the radio channels, people call and make us think how strange our real important issues are. I put an emphasis on this. Because, this is really important. I remember my high school times, I was old enough. Suddenly, I asked why it is so important for my school football team to win the game. I mean, there was nobody I knew on the team. There was no common point with them. Then why am I cheering? That was really irrational. But, in fact, it makes sense, because this is some sort of irrational bow to authority. The group solidarity behind the elements of

leadership is, in fact, an irrational chauvinism. This is also a feature of competitive sports. If you look closely, they usually perform these functions. That is why so much energy is invested in their advertising, supporting or paying" (Chomsky, 2000).

4 Discussion and Conclusion

According to critical thinkers, sport is a field which keeps the oppressed under hegemony from thinking and the injustice of society's income distribution is legitimized. . Especially, football and all other popular sporting branches have become one of the industrial branches of capitalism. These games are now out of sports and have become one of the bourgeoisie's tools of power. In addition, sports media, being a popular cultural product, is also an important actor which completes this process.

Critical thinkers have criticized the present system by revealing the negativity of capitalism-oriented economic, political and cultural structure. The most important criticism directed towards critical theorists is that there is no alternative model beyond criticism of the present situation with a pessimistic point of view.

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SPORTS MANAGEMENT

Analysis of accounting reports from the year 2016 of sport leagues supported by corporate and dividend tax.

Dr Gósi Zsuzsanna
Eötvös Loránd University, PPK-ESI.
University of Physical Education, Department of Sport Management
gosi.zsuzsanna@ppk.elte.hu

Abstract

The study analyzes accounting reports of spectacle team sport federations. Between 2011 and 2016, five different federations received new raised revenue sources thanks to the support made available to them by the corporate and dividend tax. The increase in revenue can be witnessed both on the level of associations and leagues. In the case of federations, not only is the increase in revenue spectacular, but the annual reports also show significant growth of asset. According to the accounting reports, most of the asset is in the form of funds. Research shows that the funds do not belong solely to the federations but sources of sport organizations led by them realized by post-financing are also manifest here. Each of the examined index numbers – proportion of funds, proportion of passive delimitation in time short-term liquidity indicator – justify this fact. Based on the examination of the proportion of fund liabilities it can be said that neither one of the federations suffer from financing problems, they could pay off all their liabilities from their funds. The 2016 accounting reports are also great indicators of the positive processes that have started in the field of sport financing.

Keywords: Accounting report, balance analyses, nonprofit income and expenses, sport financing

1 Introduction

Financing of sports in Hungary has changed a lot in the past years. After the change of regime, neither the market, nor non-governmental organizations were able to reform Hungarian sport by themselves or elaborate a sector that is feasible both economically and sport-wise. Team sports, as parts of the entertainment industry, put on shows both on the field and outside of it in North-America and sometimes in Western Europe, too (Kassay, 2011). In Hungary, however, competitive sport has not been business-based, even in the case of the most popular sport (Bakonyi, 2007). Since 2010, the government has been trying to aid the expansion of financial sources through modifications of laws. One of the initial steps of the process was the introduction of subsidy provided by the corporate tax system, preparations for which began in 2010 but sport organizations were provided this type of income for the first time only in the second half of 2011. Thus began the era of a type of sport-support system that is unique in the whole of the European Union. The aim of this new support system is the promotion of the participation of younger generations in sports and inspiration for a sporty lifestyle. As a long-term goal, it is important to mention that the system also increases the social base of pastime

sport activity (Bardóczy, 2014), improving the health of the population in the long run. In an economic sense, this is also important because sport activities that are suitable for improving the health of those practicing it are not only durable goods for consumption but are also capital goods (Lechner, 2009; Downward et al., 2009). Apart from all this, sports can contribute to the social development of a locality (Chalip, 2006; Oakley, Rhys, 2008). Expenses devoted to sports can also increase economic efficiency. It also has to be taken into consideration that competitive sports are often seen by certain nations as special kinds of resources that can improve national well-being (Green, Houlihan, 2005).

The essence of the corporate and dividend tax system is that companies can offer part of their corporate tax to be given to a sport organization. Studies show that in the sector of companies, small and medium-sized ones are less willing to do so than bigger ones. (Farkas, Fancic 2013) Companies may offer up to 80% of their profit (Böröczkyné, 2016). Sport organizations that may get this type of support are the ones that belong to spectacle-type sports, have an accepted sport development concept, and whose application for support has been approved for that season. Only after their application has been approved can they search for a sponsor (Gösi, 2017). The change of law happened because of the 2011 amendment of “Law LXXXI of 1996 on the Corporate and Dividend Tax” and its later modifications (Infojegyzet 2014/16). Support through the corporate tax system was concerned with five types of sports at the beginning: football, handball, basketball, ice hockey and water polo. Since the second half of 2017, volleyball has also become included.

The study analyzes the revenue and expenditures of sport federations. Sport federations are – in terms of specific sport activity – associations whose unique form of operation includes organizing sport events, protecting the rights of members, creating a legal person to deal with services provided to them and with international relations and having a government (Law I of 2004). Initially, these associations spread the fastest in countries with English supervision. This is the fact that later called for the synchronizing norms and national and international leading and coordinating bodies for the organizations (Kun, 1984). In Hungary, the first federation was formed in 1885, and today’s biggest federation, the football federation in 1901 (Szilágyi, 2015). The financing of the federation is in connection with the financing of the body system of the sport. With the creation of a sport system, not only did the direct expenses of doing sports grow, but also the expenses of association coming about to create and operate a system of competition, which was at the beginning covered by the athletes. The increase of expenses also brought with the growing importance of business elements. The system of modern sports carries a kind of value for societies, especially the organizing of civil associations. The recognition of this is what made communities cover one part of the expenses (Dénes, 2015). There are many options for the financing of federations even in Hungary; a communal financing that means both a central budget and governmental support. Federations can have the following types of income sources: sponsors, supporters, selling of advertisement platforms, selling of names of cups and championships, selling of broadcast rights, requisitioning of corporate and dividend tax support, income coming from the organizing of events (Bodnár and Czeglédi, 2016).

2 Methods, index numbers, interpretation

The study was created by analyzing documents. Accounting reports of the five spectacle team sport federations up until 2016 were examined, as well as their supplementary appendixes. This research concentrates mostly on data from 2016. Accounting reports contain the data of the current year and the years before it in all cases. In this case, the economic years of 2015 and 2016 are the ones that are taken into consideration. We have also utilized the results of our

previous research in which we analyzed the time period between 2010 and 2015 in a similar way. The applied analyzing techniques are the following: traditional financial index numbers, vertical balance sheet analysis and efficiency indicators.

The requirements of content and structure of financial reports is stated in Law C of 2000 on Accounting. Sport federations as special forms of association count as non-governmental organizations, so they have to fill in non-profit report forms. The changes in law suggest that from 2017, they have to fill in the simplified form of other organizations based on Government Regulation 479/2016 (December 28th). The report provides the necessary information for the assessment of the federations financial, monetary and revenue situation (Takács, 2016). Non-governmental organizations, including sport federations and associations, now have a unified format for their reports (Khaultits, 2014). For the sake of the comparison, we examined the same index numbers in the case of the five federations, whose introduction can be read below. After a liberal analysis, the ones that were different from those of a typical association were object to further examination.

- The proportion of non-profit income and business activity. Based on the civil law, federations can have income from business activity and non-profit activity. Non-profit activity is not defined by law. What a federation considers non-profit income in connection with their activities is stated in their founding documents, so it differs federation by federation. When comparing their activities with those described in the founding document and they are identical, then it is non-profit activity that we are talking and if they differ, they count as business activity (Gottgeisl, Láng, 2017). Usually income from advertisements is the one that is the most ambiguous, categorized either as non-profit or business activity.
- The proportion of funds compared to the total asset. When carrying out a balance sheet analysis, it is worth examining the proportion of parts of the asset compared to the total asset in the case of assets and sources that are in direct connection with the profile of the federation. Index numbers are such aggregate values that serve the purpose of expressing phenomena in concentrated forms (Musinszki, 2013). The proportion of funds of federations was examined because compared to regular association it is especially high. The primary reason for this is the difference in the accounting period (January 1st–December 31st) and the corporate and dividend tax support period (July 1st – June 30th). The other reason is the amounts of money intended to cover projects realized by post-financing are temporarily put on separate accounts of the federations.
- Liquidity of funds. In accounting analysis, liquidity index is used to define solvency. The liquidity of funds, in other words, immediate liquidity, shows the proportion of funds and short-term liabilities (Kresalek, 2016), that is, to what extent could a federation fulfill its short-term liabilities (within a year) right away.
- Proportion of passive delimitations in time. The index number is the indicator of the comprehensive analysis of the balance with distribution ratio. It is the quotient of passive delimitation in time and the sum of sources. Passive delimitations in time are shown by economical events of several years. The proportion of passive delimitation in time in the case of an ordinary business is usually low; its percentage is a one-digit number. The reason for this is that in a continual operation, incomes and expenditures are connected to the current year and the generation of such items at economic association has a high tax risk. It has already been mentioned that the period of corporate and dividend tax support and accounting period are different from each other, which in itself determines the high value of delimitations in time. Its generation is simple because the corporate and dividend tax support and other supports can be regarded as non-profit income so there is no obligation for paying tax. Delimitations in time thus bring with them no tax risk in the case of sport federations.
- Division of incomes and expenditures, based on the report and supplementary appendixes. Besides non-profit and business activity, the reporter categorizes activities as other

or financial income, indicating the total sum of membership fees and supports is obligatory. As further information, central budget and governmental support also appears, as well as income from offerings of personal income tax. The supplementary appendix contains even more detail about the income proportions in the case of all of the federation. It has to be noted, however, that these categories are created by the federations themselves but we can still find similarities. These similarities are present because of the identical economic and legal environment. For the division of expenditures, the accounting report has the following main categories: material expenditure, personal expenditure, depreciation. The proportion of expenditures clearly shows the characteristic expenditures of the federations. In our study, we chose to look further at total revenue and total expenditures.

2.1 Hungarian Football Federation

In Hungary, according to recorded data, the football federation is the largest. This proves to be true when examining the number of workers, annual income, the number of member organizations and certified athletes. The number of certified footballers was 158,682 in 2011 and 255,525 on December 31st 2016 (Fazekas, 2017). Its annual revenue in the year preceding the corporate and dividend tax, that is, in 2010, grew to a considerable extent. Its annual revenue in 2010 was 4.6 billion forints and by 2016 it reached 36.3 billion forints. Its biggest increase of 11 billion forints happened between 2015 and 2016. The federation lists its activities both in the founding document and its supplementary appendixes, which also includes the creation of its operation and economic conditions. Based on the detailed list and its formation, the federation categorizes all its activities as non-profit, no matter if they are income from advertisements, royalties or selling of tickets. So they had no income generated by business activities neither in 2016, nor the years before that.

The balance sheet analysis of the federation's asset indicates interesting results. The total asset is 66 billion forints, which far exceeds the annual revenue. The proportion of funds is 77.23%, 48.3 million forints, which is also higher than the federation's yearly revenue. The reason is that sums of supports not yet spent are also deposited on the accounts of the federation, although they are incomes of years to come or will increase the income of the supported sport associations, not of the federation. The liquidity of funds is 3.74, so the federation's funds are more than three times as large as its sheet date liabilities. Most of its debts come from corporate and dividend tax investment liabilities. This 69% part in the corporate tax support system of spectacle sports is an investment-type payment obligation towards companies. The proportion of passive delimitations in time is 73.96%. This especially high number can be explained with the 27.1 billion forint budget support and the corporate and dividend tax support of 1.8 billion forints, which are proportionately delimited. Royalties and income from sponsors are delimited pro rata based on the duration of contracts.

In 2016, the biggest part of the revenue came from supports (46.11%) and television broadcasts (35.64%), as shown in Figure 1. Supports can come from various sources. The direct budget support is 3.4 billion forints, that 20.2% of total supports. The division of expenditures indicates (Figure 2) that broadcast royalties received as income are also present among expenditures to the same extent because the federation transfers this income to teams participating in the championship.

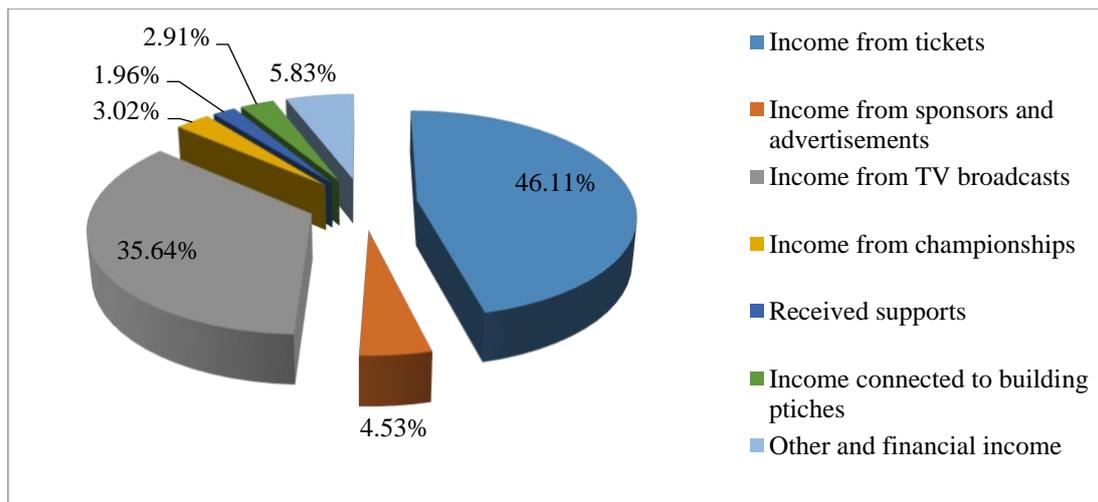


Figure 1. Distribution of the revenue of the Hungarian Football Federation, 2016.

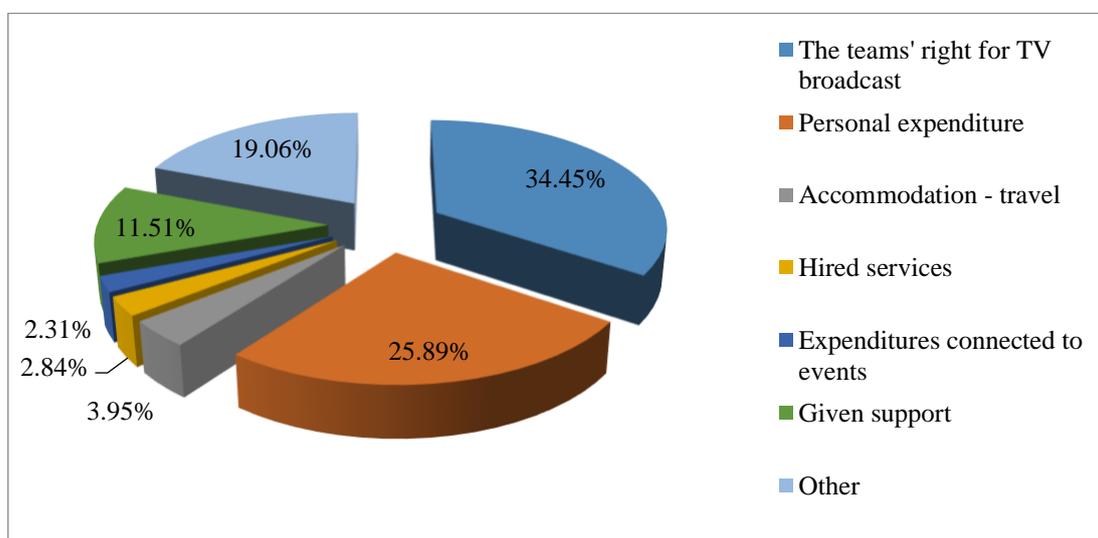


Figure 2. Distribution of the expenditure of the Hungarian Football Federation, 2016.

2.2 Hungarian Handball Federation

The number of players grew from 24,000 in 2011 to 53,059 in 2016 (Fazekas 2017). In the case of the handball federation, those of the year 2010 are the starting data when the total revenue was 655 million forints. This amount grew to 10,903 million forints by 2016. The difference between the years 2015 and 2016 is salient. Compared to the 4.63 billion forints in 2015, it has increased by 6.54 billion forints. The highest proportions in terms of business activity belong to the years 2011 and 2014 when it reached 23%. In 2016 this proportion was 5%. If we were looking at proportions only, this is less than half of that of the previous year. Although the business activity also grew from 481 million forints to 527 million forints, the pace of its growth is slower than the pace of non-profit activity.

When analyzing balance sheets, it is worth starting with the fact that the total asset of the federation increased to an incredible extent from 6.62 billion forints in 2015 to 29.04 billion

forints. The proportion of funds is 93.48%. This growth in funds was caused by the support received from the Ministry of National Development with further transfer purposes. The funds increased by 554.6% within one single year. Supports received with further transfer purposes were invested into the following: handball work hall building program, multi-functional sport hall building program, outdoor field building program. The total value of funds covers all the liabilities, and within those, the short-term ones as well. The proportion of short-term liabilities is 1.24.

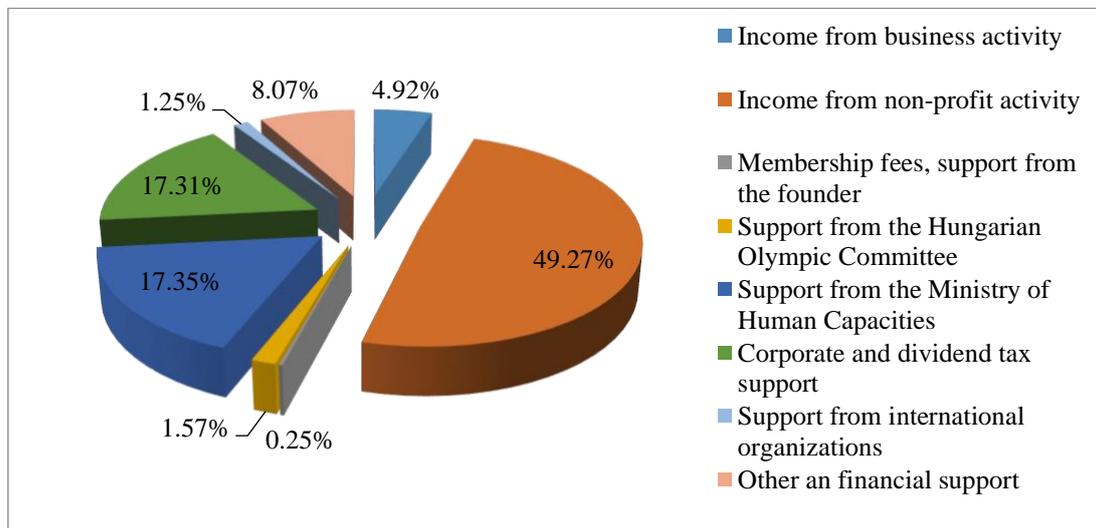


Figure 3. Distribution of the revenue of the Hungarian Handball Federation, 2016.

2.3 Hungarian Basketball Federation

The number of certified basketball players grew from 24,642 in 2011 to 53,861 by 2016 (Fazekas 2017). The Hungarian Basketball Federation only had 197 million forints of total revenue in 2010 but this rose to 3,630 million forints by 2016. In the case of the basketball federation, income comes only from non-profit activities; there is no separate category for business activity. These non-profit activities are categorized according to service registration numbers which are the following: 9319 – other sport activities, 9312 – sport organization activities, 7312 – media advertisement. The total asset of the federation was 6.5 billion forints in 2016. The proportion of funds was 72.95%, while the proportion of passive delimitation in time was 29.78%. The value of the deposit accounts of corporate and dividend tax is present both in the case of funds and short-term liabilities; this item exceeds 3 billion forints in itself. The report of the federation is unique from the perspective of high-value fixed assets because it is the owner of the basketball hall in Székesfehérvár. The two defining sums of passive delimitations in time are the contributor fees connected to the corporate and dividend tax and the delimitation of support of fixed assets. The proportion of the short-term liability of the funds is 1.41.

A high proportion of its revenue comes from support provided on the bases of the sport law, as Figure 4 suggests. 68.52% of its total asset is made up of different kinds of supports. The support from the central budget is 82.9 million forints, while the support from the local government is 9.75 million forints – these sums are insignificant within the total of supports.

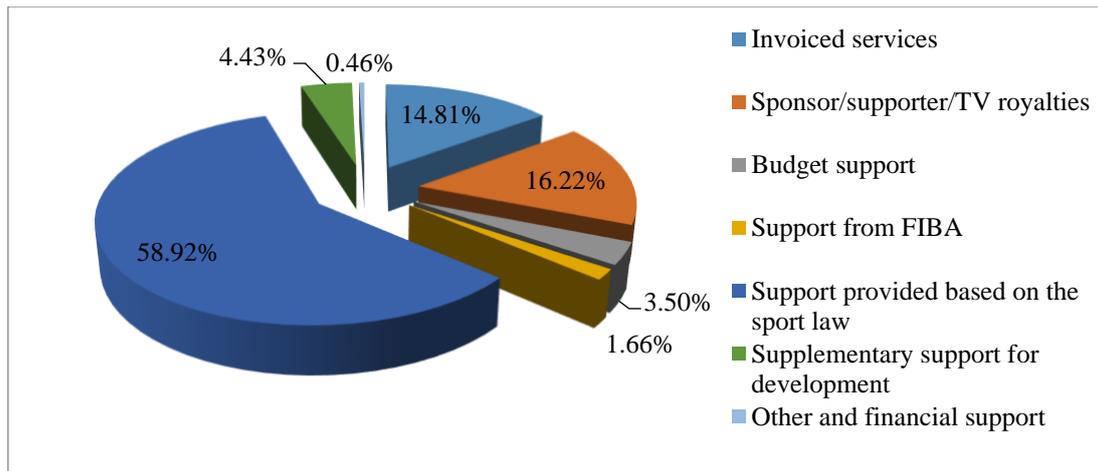


Figure 4. Distribution of the revenue of the Hungarian Basketball Federation, 2016.

The proportion of material expenditures is 73.25% and the proportion of personal expenditures is 17.64%. Personal expenditures of the federation include the expenses of the operation of the federal office, a part of the expenses of the experts preparing the team and the salaries of the referees. On annual bases, it has 22 full-time employees and the total number of appointees is 942. When it comes to material expenditures, advertisements and marketing rights represent a remarkable sum, as well as sport events and rental fees.

2.4 Hungarian Water Polo Federation

The number of certified players grew from 4,223 in 2011 to 6,708 by 2016 (Fazekas, 2017). The total revenue of the water polo federation in the year 2010 was 559 million forints, which grew to 2,171 million forints by 2016. The growth is remarkable in the case of the water polo federation, too, but not as extensive as in the case of the previously examined federations. One part of the two-fold reason for this is that water polo as a sport had had great achievements even before the introduction of the corporate and dividend tax, especially at the Olympic Games, receiving championship title at three consecutive Games in 2000, 2004 and 2008. On other hand, because of the confined number of swimming pools the number of players could only be increased to a certain limit. In 2016, the highest proportion of business activity within the federation was 25.98%. The overall lowest proportion was 14.73% in 2013, and the highest was 37.14% in 2013. The received support that in its ratio is overtops other income sources comes from the corporate and dividend tax support (Figure 5). Other supports were given to the federation for the organization of the Sport XXI Program, the Heracles Program and the male water polo champions league.

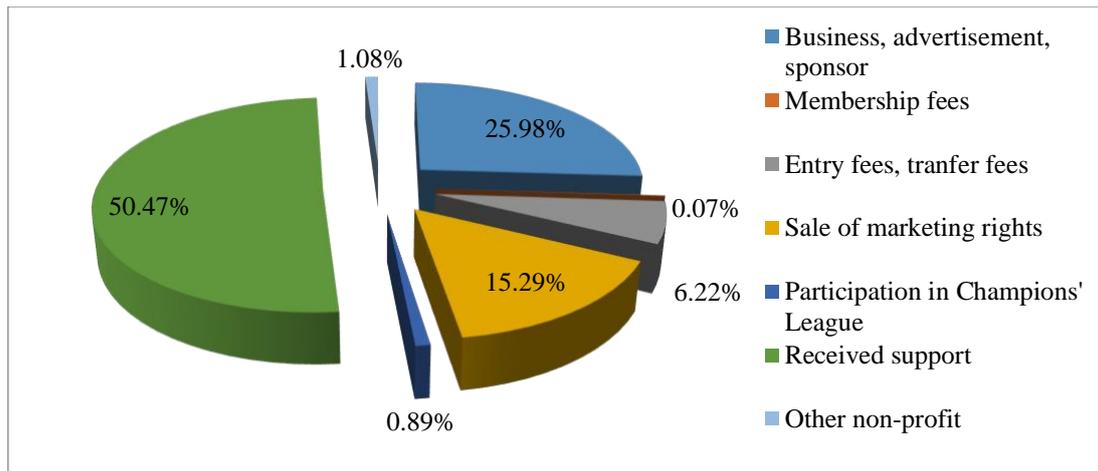


Figure 5. Distribution of the revenue of the Hungarian Water Polo Federation.

The asset of the federation has undergone a salient growth ever since December 31st 2015. The total has grown from 3.6 billion forints to 11 billion forints. The proportion of funds is 92.66% and its increase has exceeded 200%. This was made possible mostly by post-financing investments done by sport organizations in membership relations with the federation and the handling of corporate and dividend tax support offered by firms on deposit accounts. The proportion of passive delimitations in time is 14.93%. The index number of short-term liquidity is 1.14.

2.5 Hungarian Ice Hockey Federation

The number of certified ice hockey players grew from 2,305 in 2011 to 5,029 by 2016 (Fazekas, 2017). Compared to the starting year of 2010, the extent of differences made are obvious. The 330 million forint revenue of 2010 grew to 1,687 million forints by 2016. Income coming from business activity is continually present in the case of ice hockey as well, whose proportion was 18.66% in 2016 (Figure 6). In the first time period of corporate and dividend tax support, that is, between 2011 and 2013, the proportion of business activity was around 25 to 26%, and in the period from 2014 to 2016 around 15 to 20%. In the supplementary appendix it can be found that the ice hockey federation considers income from advertisements and sponsors business activity. Besides the corporate and dividend tax support, from among state aids, the federation is provided with support for the education of the replacement and organization of competitions and also support from the international federation. The ice hockey federation is the only one in whose case we can talk about income coming from the offerings of private people's personal income tax. In terms of expenditures, the proportion of material expenditure is 64.6% and the proportion of personal expenditure is 25.5%.

The total asset of the federation was 3.87 million forints in 2016, which is 171% more than that of the previous year, the reason for which is that all parts of the asset grew compared to the year 2015. Most of the growth happened because of the growth of the funds, which meant a 1.9 million forint increase to be precise. The liquidity value of the funds is 1.13. The funds cover the short-term liabilities despite the proportion of liabilities being especially high, 70.09%.

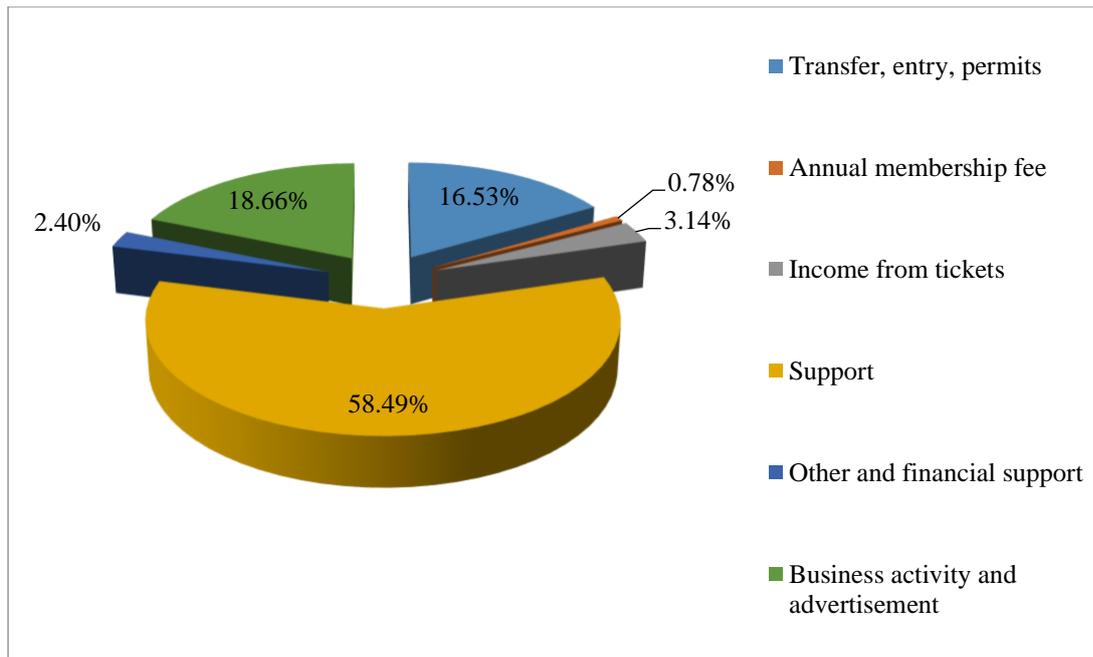


Figure 6. Division of the revenue of the Hungarian Ice Hockey Federation, 2016.

3 Conclusions

Summing up, the structure of the accounting reports of the five sports show significant similarities in terms of tendencies in growth, income sources, as well as asset structure. Thanks the support provided by the corporate and dividend tax, income structure indicates that even though the ratio of this support is notable, the increase in the number of athletes has brought with it the growth of other revenues, too. The biggest difference between federations is in the definition of non-profit and business activities.

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Stakeholders engagement in Slovak sport organizations.

Patrik Ferenc , Michal Varmus and Roman Adámik
Faculty of Management Science and Informatics, University of Zilina.
Univerzitna 8215/1, 010 26 Zilina, Slovakia
patrik.ferenc@fri.uniza.sk

Abstract

Stakeholder management is very complex. Stakeholders have different demands and expectations from organizations. In the field of sport, this is even more complicated because the sport product is very specific. The main problem is the failure to meet mutual expectations that organizations and stakeholders set. This often results in failure to achieve the desired business goals. The importance of addressing this issue is also confirmed by the growing trend of the sports sector and the growing number of stakeholders in relationship with sports organizations. This paper focuses on relationships and communication between sports organizations and their stakeholders through the Internet. The paper analyses the websites of the sports teams of the most popular Slovak sports. 13 parameters were determined for the evaluation. The sentiment analysis was used to evaluate. The results of this analysis show not only the various shortcomings, but also the common features and positive attitudes of different clubs regarding the approach to solving the problem. Results that have been identified by the analysis have helped set recommendations. These recommendations will help managers of Slovak sports organizations manage their relations with stakeholder properly.

Keywords: Stakeholder engagement, Stakeholders, Sport organizations, Sport, Sentiment analysis.

1 Introduction

Sport plays an important role in a wide level. There are a number of people working around the world in the sports industry. This business environment can be divided into a non-profit, public and professional sector. At a professional level, this form of physical activity has shifted from amateur entertainment to a major industry (Hoye, et al. 2008). In recent years, it is possible to see very strong commercialization in this sector. This has a direct impact on sports events, national teams or world clubs that connect people around the world, which also results in the interconnection of individual cultures. The continued development of sports in the area also has a significant impact on the increase in the number of stakeholders in relation to sports organizations. Who is all these stakeholders? How do they affect sports clubs?

Football, ice hockey or other match is played for whom? For the fans. Who give finance to clubs for their development? Sponsors. Who will replace the current generation of players? Juniors, children, etc. Managing relationships with stakeholders as fans, sponsors is a key factor for the club as well as training new players. An organization can not succeed in the long run if it does not properly manage relationships with its stakeholders (Freeman, 1984; Carroll, 1991; Clarkson, 1995; Donaldson a Preston 1995).

Who is stakeholder for sport club? Stakeholders are entities that are in any relationship with the organization (Thompson, Wartick a Smith, 1991). Stakeholders in the field of sport

can represent not only individuals, but also organizations that influence the success of a sports team, athlete, or entire sport by their activities (Linton, 2017). When managing an organization, it is important to know who represents the stakeholders, their opinions and expectations (Amstrong & Taylor, 2015). For the best understanding of their needs, it is necessary to examine their interests. Individual stakeholders may present different opportunities or threats for the enterprise. It can therefore be said that the importance of each stakeholder can vary from company to company (Mitchell, Agle & Wood, 1997).

This implies that it is important to know who the stakeholders are. How to manage these relationships today, when fans (supporters) and sponsors of the club are often hundreds of kilometers away? Dennis Adcock et al. (2001) said that marketing is providing the right product, in the right place, at the right price and at the right time. In the 21st century, right product is information's and is very important to give this information's to the sponsors and the fans in right time. How? According to Quester & Thompson (2001) getting the maximum of sponsorship is need to use supportive form of communication. In practice it means, that ordinary mode of communication is supportive webpages, which serve as more or less static sources for public information's (Harrer, et al. 2006). These webpages must be able to satisfy main requirements not only to graphic and technical parameters, but also to correctness of information's. NBC NEWS in paper How many people searched for a health-related topic online (2013) says: In all, 80 percent of Internet users, or about 93 million Americans, have searched for a health-related topic online. And people do not seek only this post. Today people are searching the internet for everything, and it is important know if we want to offer people something special. Next is important write about it on the Internet, advertise it, or show them it on the Internet. According Kotler (2003) marketing is not the art of finding clever ways to dispose of what you make. Marketing is the art of creating genuine customer value. If we expect that genuine customer value is the right information's at the right time in the right place, then we must see to it that we through communication channels to provide the right information's for our customers - fans, sponsors and the public. The main communication channel for sports clubs in online world is webpage and therefore is very important, to information offer by webpage will be managed. As confirmed Lendel and Kubina (2012) nowadays is transition from one-way communication to the customer relations management crucial strategy. Which is exactly what internet marketing offers. Another story is corporate social responsibility and as commented Uhrich et. al (2014) CSR-linked sponsorship (i.e., the linkage of sponsorship with CSR activities) enables sponsors to demonstrate corporate goodwill and enhance their brand image. Floter (2015) argued that to obtain positive brand effects, relevant stakeholders (e.g., customers) have to be aware of the company's CSR-linked sponsorship activities. Information about such activities can be passed on through a variety of channels Sponsors often use company-controlled channels such as corporate websites, annual reports, newsletters, or advertisements to communicate CSR-linked sponsorship. (Floter, 2015). Such channels are fully under the sponsor's control; that is, the sponsor is the message source and can directly influence the communication content (Du, Bhattacharya, & Sen, 2010). These facts just confirmed that website of sport club has key tasks in different spheres.

2 Main terms

This part of the paper contains an explanation of two main concepts of our study. These terms are stakeholders and sports organizations.

2.1 Stakeholders

The term stakeholders can be understood differently. In 1963, the Stanford Research Institute defined stakeholders as a group "on which the organization is dependent for its continued survival" (Freeman & Reed, 1983). This can be seen as a very breakthrough in this area. This created the term stakeholder. Since then, several definitions have emerged explaining the stakeholder's interest.

For example, Bowie (1988) defines stakeholders as entities without which the organization would not be able to exist. Morphy (2017), divide stakeholders to internal and external subjects, and also claim, that it be entities that can influence their organization's activity. This is confirmed by other authors, who also claim that relationships are mutually dependent between the organization and stakeholders (Rhenman, 1964, Ahlstedt & Jahnkainen, 1971, Freeman & Reed, 1983).

According to Grimsley (2017), any person, organization, social group, or company that has a stake in an organization is a stakeholder. It also states that stakeholders may be internal or external. What matters, however, is how they affect the organization and its activities. They may have ownership and ownership interests, personal rights or other interests in the organization's activities. Stakeholders may:

- affect business,
- be influenced by organizational activity,
- affect each other when doing business.

In general, it is possible to say that stakeholders are interested in organization - they can either affect it or can be affected by the organization's activities. The main stakeholders of a typical organization are its investors, employees and customers. However, stakeholders' modern ideas include other stakeholders, such as the community, government or trade associations (Staff, 2017).

2.2 Sports organizations

Sport organizations are one of type of organizations active in the field of sport. Organizations active in the field of sport can be understood as non-productive organizations active in the sport sector. They are organizations that participate directly or indirectly in the realization of a sports product. It is a set of instant-consumption items that have their own lives (Ferenc, Poláčková, 2017).

They can be specified as sport clubs. Sport clubs are sport subjects, that is dedicated to a single sport. Commonly, sports clubs are popular by one of the sports that are practiced there and not by the combination of all these. All sport clubs have different own signs that distinguish them very easily: clothing, colors, shields, and even some major feature own stadium (What is the Meaning & Definition of Sports Club, 2016).

3 Methodology

The three major sports in Slovakia are ice-hockey, football and tennis. This position is relative to the size of membership. For this analysis were used websites hockey clubs from the top two

Slovak leagues, the web site of football clubs from the top Slovak league and 59 tennis clubs of a regional subdivision. 13 established parameters: fan zone, online shop of souvenirs, section on the website for partners, promotion partners on the main page, partner promotion to page footer, promotion partners on site in the form of banners, foreign language version pages, section for youth, promotion of youth, promoting matches of youth, students list (roster), link to elementary school, elementary school promotion. On the basis of these parameters and characteristics of web site, a critical success factors utility was built. Different approaches were analyzed and the design of web pages because of the individual parameters, such as online store. It just did not care me whether the online store is only created, but mainly as well as to meet the expectations of fans, care me.

Steps of analysis:

1. defining factors of CSF,
2. categorization of clubs in categories,
3. search web pages of all clubs,
4. preview all clubs pages clubs of one category,
5. evaluating websites according to how fulfilled the criterion rated,
6. evaluation analyses in percent,
7. evaluation analyses in graphs.

3.1 Survey and analysis

This part of the paper contains an analysis of the websites of Slovak football, hockey and tennis clubs. These websites these clubs use as a communication tool between them and their stakeholders.

3.11 Evaluation of web pages clubs of TOP Slovak hockey league

The analysis shows that every club has the web fan zone and only one club does not have online souvenir shop. Each club also has a web section for sponsors and only 10% of clubs in addition to this part of the site reserved for sponsors, promotes their sponsors on the main page of their site. Also, only 10% of clubs promotes their sponsors in addition promotion to page footer and 10% promotes their sponsors using advertising banners. It is interesting that nowadays has only a 10% of clubs have foreign language version of their site. The following section analyses showed that 80% of clubs have on their web, web section for young people (recruitment, information for members, etc.). But each of them has published roster players (members of the teams – such assembly team U17, U19 team composition, etc.). From these clubs only 30% promoting youth teams in the form of videos, photos (of league matches, trainings, meetings, etc.). In addition, only 30% of clubs which promote their matches, in addition promote Youth-team league matches (U17, U19, etc.). For the education of youth it is important to collaborate with some elementary schools, where there is plenty of talented students, but only 20% of clubs have on your site to link school with which it cooperates and only 10% of clubs doing for their school advertising on your site.

The main findings of this analysis.

Within the evaluated areas, only few sports clubs communicated selected information via their website. The exception was information on the recruitment of new members. This information is communicated by 80% of selected sports clubs with its stakeholders.

3.12 Evaluation of web pages clubs of second highest Slovak hockey league

In continuing the analysis, it was found that clubs from lower leagues are not so perfect web site and there are significant shortcomings. To some degree that they have the funds but that is not the subject of this analysis. When we look at what this analysis shows we can see that compared to a teams of the top league there are the following changes. No every club has the web fan zone, but only 25% of club has the web fan zone and even 83% clubs does not have online souvenir shop. Here you can see lower interest and care about their fans.

No every club has a web section for sponsors (as in the TOP league), but only 67% of clubs has a web section for sponsors. Promote their sponsors by other ways:

- promotion partners on the main page - 63% of clubs,
- partner promotion to page footer - 0% of clubs,
- promotion partners on site in the form of banners - 20% of clubs,
- foreign language version pages - 8% of clubs.

Changes can also be seen in the next section on youth. No 80% of club have on their web a web section of young but only 50% of club have this section and no each of them has published roster players but only 67% of them clubs. It can be seen clearly less interested in the promotion of youth:

- promotion of youth - 50% of clubs,
- promoting matches of youth - 50% of clubs,
- link to elementary school - 8% of clubs,
- elementary school promotion. - 8% of clubs.

Compared to the highest league seen much lower rating. It is known that in the lower league is less money and therefore care about the fans, sponsors and promote juniors (talents) it is at a lower level.

3.13 Evaluation of web pages clubs of TOP Slovak football league

Unlike the previous analysis points at this point analyzes were evaluated websites of football clubs. When we compare clubs TOP Hockey League and Football League clubs TOP will be able to watch a surprisingly large difference. Such a difference we could see between Hockey League. 100% hockey club has a fan zone on the website of football clubs at no fan zone is only 67% of the clubs. We can see a decrease in the care of their own fans and even shop online section, where 67% of the clubs that have a fan zone and only 62% has the addition of online shop.

It is interesting to watch the fact that football clubs in addition to the section for sponsors (75% of all), promoted by its sponsors and the title of the web site (75% of all). Only one club promotes its sponsors in the page footer, or one of the clubs in the promotion does not use banners and foreign language version of the site only has 42% of the clubs. However, elementary school promotion is only 8% of the clubs.

Promoting youth is excellent level in all parameters:

- Section for Youth - 100% of clubs.
- Promotion of youth - 58% of clubs.
- Promoting matches of youth - 50% of clubs.
- Students list (roster) - 92% of clubs.

3.14 Evaluation of web pages of clubs of Slovak Tennis Association (STA)

Clubs of STA are categorized to 4 regional groups: Bratislava Region (BR), Western Slovakia (WS), Central Slovakia (CS), Eastern Slovakia (ES). Similarly to previous sports clubs the same analysis was carried out in tennis clubs. Websites were analyzed by 13 criteria. Web pages of tennis clubs are given criteria worst. A summary of the results of this analysis can be found in Table 1, which is on the next page.

Table 1. Evaluation of tennis clubs' web pages in Slovakia.

Group	BR	WS	CS	ES
1. Fan zone	0%	0%	0%	0%
2. Online shop of souvenirs	0%	0%	0%	0%
3. Section on the website for partners	29%	5%	14%	13%
4. Promotion partners on the main page	29%	25%	7%	13%
5. Partner promotion to page footer	0%	0%	0%	0%
6. Promotion partners on site in the form of banners	0%	0%	7%	0%
7. Foreign language version pages	18%	20%	0%	0%
8. Section for youth	41%	20%	7%	25%
9. Promotion of youth	35%	35%	50%	50%
10. Promoting matches of youth	18%	0%	0%	13%
11. Students list (roster)	12%	25%	7%	38%
12. Link to elementary school	6%	5%	7%	13%
13. Elementary school promotion	6%	0%	0%	0%

BR - Bratislava Region; WS - Western Slovakia; CS - Central Slovakia; ES - Eastern Slovakia

We can see that tennis clubs through the website only promote youth but not elementary schools. Neither of the clubs has no fan zone on the website, so there is the question: Tennis clubs have fans? If so, why not have your part, on their website? Why tennis clubs do not promote their sponsors? That is a question for tennis clubs.

The method CSF was used rating scale of 0-10. Below we can see that the maximum achieved by the hockey club was 2.0 points in the eighth factor. The graph shows the difference in the results of the bests clubs of results of CSF analysis for areas: hockey, football and tennis as a whole. These differences are described in Figure 1.

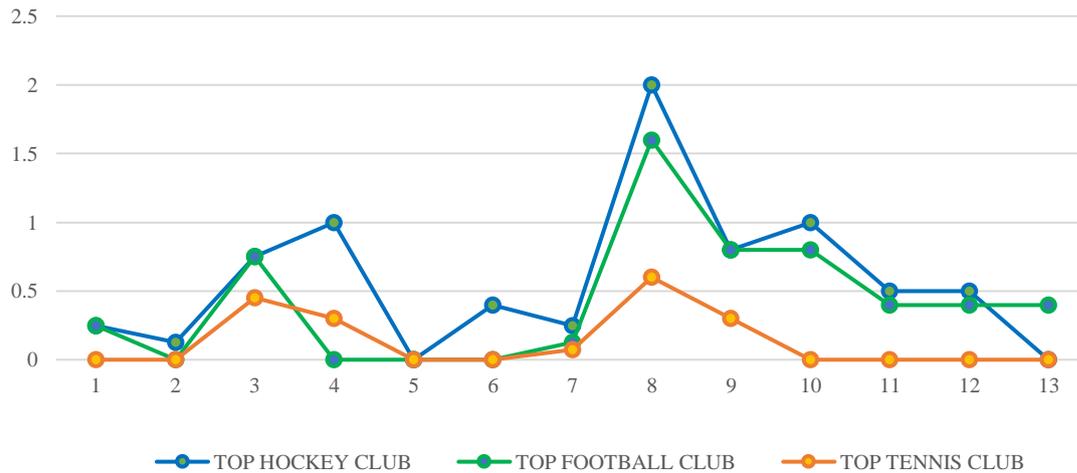


Figure 1. Compare best clubs – CSF Analysis.

As can be seen in Figure 1, in this analysis was hockey clubs the best of 12 of the 13 parameters. On the contrary, tennis clubs were the worst in 12 of the 13 parameters. The biggest differences can be seen in parameters 8 (Section for Youth) and 10 (Promoting matches of youth). In parameter 4 (Promotion partners on the main page), tennis clubs were better than football clubs. It is the only parameter in which tennis clubs were not the worst.

4 Conclusions

The biggest weaknesses for all sport clubs in the analysis were in parameters 1, 2, 5, 6, 10, 11, 12 and 13. For sports clubs from selected sports this means the following:

- Football clubs would be for their future profit good to focus online gift shop. They also would be tried to use other possibilities of promoting sponsors on the website (such as logos at the web background, logos of the main sponsors in the page footer, etc.).
- Tennis clubs should focus to all mentioned factors. Especially should focus on categories of sponsors and fans. They should create sections for fans and also to create an online store so that they are more fans. Create advertising background on a website for their main sponsors or advertise as links in the footer, and the like. Tennis is a very expensive sport and in except to advertising of young recruitment, and prices of lessons should also focus on the promotion of their young members, such as they have hockey clubs. Create part of members, players, their statistics and the like on their web site. To present videos and photos of trainings, meetings on social networks with links to web sites. Using YouTube, Instagram and the like take up more potential new members, such as referring looking for new talent.
- Hockey Clubs should improve especially promoting sports schools to more easily attract children to their sport schools. It should also be improved in other factors that are better than clubs in other sports, also it does not mean that they are perfect. We are still in this issue behind the world, and clubs must work very hard to cope foreign clubs, but it is already out of the issue.

Overall, it was possible to see in this analysis that sports clubs have shortcomings in basic online communication with stakeholders. Because web pages are one of the most widespread and

most used options for communicating with their stakeholders, it is very important that the site contains the correct content.

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PERFORMANCE ANALYSIS

Change of hand and direction skill in basketball: pilot study on teaching methods by verbal/visual stimulus versus verbal one.

Gaetano Altavilla¹, Pio Alfredo Di Tore², Tiziana D'Isanto² and Gaetano Raiola³

¹ University of Split, Faculty of Kinesiology, Split.

² MIUR Campania, Naples, Italy.

³ University of Salerno, Italy.

Abstract

The dribble with change of hand and direction is a crucial offensive basketball individual that is often used to overcome the opponent (take the lead) in 1v1 situations and actions of counter-attack. It is a fundamental that theoretically has the highest degree of efficiency, either because it is very effective or because it is difficult to hinder; so it is useful to know which training method (verbal and visual feedback or only verbal) allows the best possible learning and performance. The aim of the present study is to evaluate the difference in yields (in terms of improving) on the learning of dribble with changes of hand and of direction in basketball. The method is experimental and the study was conducted on a sample of 24 male athletes (12-14 years) divided into two experimental groups (A and B) of 12 young athletes each. Group A has performed training, in four weeks and for twice training at weekly, receiving verbal and visual feedback, while Group B has received only verbal feedback. They have been collected data of the times realized, individual and of group, utilizing the CODAT Test, at the beginning and at the end of the practice, to verify the improvement of motor learning in the two groups. The result for Group A (training with verbal and visual feedback) resulted in an increase the performance by 11,09%. The result for Group B (training only with verbal feedback) resulted in an increase the performance lower than Group A and was 5,65%. Group A had a steady increase in performance over the four weeks, while Group B have had a limited improvement in performance. The final percentage difference between the two groups has been 5.44%.

Keywords: training, motor learning, motor skills, feedback, performance.

1 Introduction

To watch an action performed by another person to learn a new movement is an everyday experience for children and adults, this is especially the case in sports activities. Observation of motor action induces a facilitation in the observer's motor system (Bassolino et al, 2014). This approach is supported by convergent evidence in monkeys and humans that indicates the motor cortex is activated when actions are merely observed 'mirror neurons mechanism' (Rizzolatti et al, 2001). Motor learning is usually driven by intensive training based on movement repetition and focused on alternative methods stimulating the motor system without an overt execution of the movement, such as through action observation (Bassolino et al, 2015). The number of repetitions of the new skill represents a basic element in reinforcing and creating

the motor model (Schmidt, 1975). The effectiveness and efficiency of overall practice, interpreted as the number of repetitions, has been long recognized as the foundation of learning and perfecting movements (Lee and Genovese 1988). The ability to observe is an essential prerequisite, if not the most important, for assessing both athletes and students. In the sports field, visual feedback belongs to the extrinsic type related to performance (Mantovani 2004). Instant visual feedback is very important in acquiring new skills. Zetou et al. (2008) state that the best results are obtained by providing subjects with immediate feedback about their movements along with observation of experienced athletes. The use of feedback is generally considered (Madella et al, 1994) fundamental to the success of teaching, though often between instructors and researchers there is no agreement on the concrete ways in which it should be proposed: for the instructor the feedback it is only the informative response to the motor behaviors used by the subjects. Visual feedback can be one of the best ways to implement corrections, and to provide useful information for improving performance. The modeling process is central to learning motor skills, but only when combined with practical activity (Hager et al, 2004). The experience and learning go hand in hand with the change in organic and evolutionary, being essential for the adaptation to the environment (Gaetano et al, 2014). According to the ecological approach "to learn" means being able to progressively find the best motor solution for a given task in a given context (Raiola & Di Tore, 2017). It is important to offer the pupils a visual model of optimal, to create a model of the correct motor-idea action to be executed (Altavilla & Raiola, 2015). Let him run the technical movement, suggest corrections after the execution, making it compare with the performance of others and viewing their own technical execution on the computer. In addition, you must perform several movements, first and foremost slowly and then at full speed control, always making sure to start with a simple proposal and then make it complex (Gaetano, 2012). Several studies have highlighted the importance of feedback in sports and school activities; in particular, in a Hanke and Schmitt's work, it has been detected as players constantly seek a high content feedback, such as, for example, video analysis (Hanke & Schmitt, 1999). Training with the use of both verbal and visual feedback allows improvements in motor skills, faster error correction and students will be more able to recognize their own mistake (Winfrey et al, 1993). In the field of education and physical and sports it is essential to identify methodologies that facilitate participation in adequate quantity and in terms of learning. Sports activities such as basketball include all the educational and training features required for the development of young students. It is a sport with technical characteristics where the precision and speed of execution of the fundamentals is a fundamental aspect for achieving a winning action (Raiola et al, 2016). In basketball, there is the obligation of having dribble for move on field, so a player who has not developed a good property of dribble can never take an advantage on the opponent (Altavilla et al, 2017). Was chosen basketball as a sport activity, in particular, the fundamental of the dribble with change of hand and direction. The aim of the study is to verify whether in a training period (4 weeks), learning hand and directional change, with the help of visual and auditory feedback, determines in improved technical performance in the players (experimental Group A), compared to traditional teaching, only with auditory feedback (Experimental Group B).

2 Methods and materials

The method is experimental and the study was conducted on a sample of 24 male athletes (12-14 years), divided into two groups (A and B) of 12 young athletes each. To them it was assigned the motor task to learn the change of hand and of direction. Group A (experimental) performed the exercises by receiving auditory and visual feedback, while group B (experimental) received

only auditory feedback. Individual and group time data were collected at the beginning and end of the exercise, using the CODAT Test, to verify initial and final learning improvements. The two groups conducted a program of 8 training sessions of one hour each. In the first training, after heating and a familiarization with the Codat test (fig.1), the same test was performed from all the players. Subsequent workouts predicted a brief initial warm-up, a second part developed on specific exercises to learn and improve the fundamental of change of hand and of direction (from still, walking and then running). The exercises were carried out in a progression from the simple to complex. After each action and every exercise, Group A students received verbal and visual feedback (individualized demonstrations and view of the motion recorded on the PC), while Group B students received only verbal feedback. In the last training, after a proper warm-up, the two groups again perform the test CODAT.

Test CODAT

The dimensions and movement direction for the CODAT is shown in Figure 1. This test was designed on the basis of sprint distances important for field sport athletes (Dawson et al., 2004; Sporis et al., 2009), direction changes and footwork that are demanded of field sport athletes during the game (Lockie et al., 2011). A timing gate was positioned at the start and at the finish of the test. Subjects were instructed to complete the test as quickly as possible.

Necessary tools: a personal computer, 4 photocells, 4 cones, a metric wheel and balls from minibasket.

Measurements: the time taken from the starting line to the arrival line is recorded.

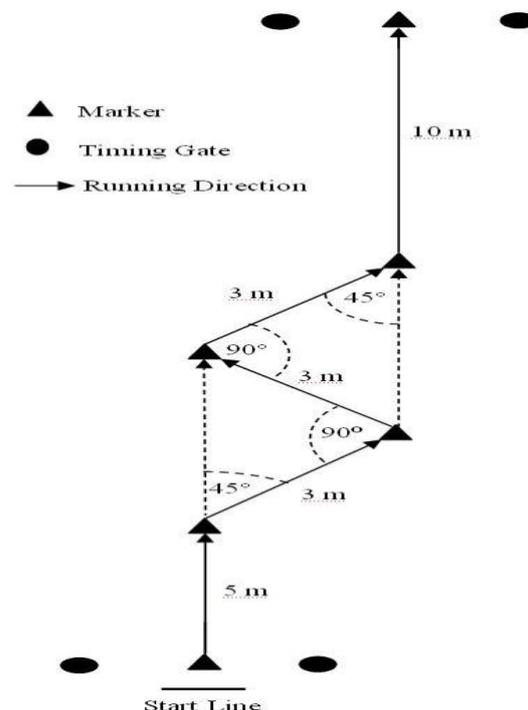


Fig.1 - Change-of-direction and acceleration test

2.1 Participants

The study was conducted on a sample of 24 young male athletes of ages of 12 and 14 years that had practice basketball at scholastic level. They have voluntarily participated in the study. The sample was divided into two groups of 12 boys, one experimental group (A) and one experimental group (B) and been assigned them a motor task from learn: change of hand and of direction in dribble. Participants were initiated to learn this motor task, but using different feedback. Group A received verbal and visual feedback, while Group B received only verbal feedback with the aim of assessing whether and to what extent a different methodological approach (auditory and visual feedback) was able to affect the motor learning. In the table 1 summarizes age, height and weight of the 24 boys, showing that the mean age, height and weight of the two groups was similar.

Table 1. Characteristics of the groups.

	Group A (n=12)		Group B (n=12)	
	M	SD	M	SD
Age (year)	13,35	0,49	13,19	0,46
Height (cm.)	161,13	2,85	160,36	2,64
Weight (Kg.)	55,41	2,09	54,06	1,95

2.2 Statistical analysis

Measures of central tendency and dispersion (mean \pm standard deviation) of age, height and weight of two groups: Group A; age: $13,35 \pm 0,49$; height: $161,13 \pm 2,85$; weight: $55,41 \pm 2,09$; Group B; age: $13,19 \pm 0,46$; height: $160,36 \pm 2,64$; weight: $54,06 \pm 1,95$).

The analysis covered basic statistics and percentages for the date considered. All statistical analyzes were conducted using Dell's statistical software 13.2.

Tables 1 and 2. Data from the 2 groups.

Group A				Group B			
Subject	Pre-Test	Post-Test	Differences	Subject	Pre-Test	Post-Test	Differences
1	10,28	9,12	1,16	1	10,41	9,92	0,49
2	9,52	8,54	0,98	2	9,65	9,14	0,51
3	10,05	9,01	1,04	3	10,05	9,51	0,54
4	9,52	8,41	1,11	4	10,12	9,48	0,64
5	10,25	9,01	1,24	5	9,85	9,28	0,57
6	9,55	8,51	1,04	6	9,74	9,15	0,59
7	9,58	8,61	0,97	7	9,68	9,21	0,47
8	9,66	8,53	1,13	8	10,02	9,33	0,69
9	10,16	8,93	1,23	9	9,76	9,35	0,41
10	10,09	9,18	0,91	10	9,88	9,23	0,65
11	9,83	8,74	1,09	11	10,11	9,54	0,57
12	9,49	8,35	1,14	12	9,81	9,19	0,62
Mean	9,83	8,75	1,09	Mean	9,92	9,36	0,56

3 Results

Tables 1-4 and Figure 1 summarize the results obtained in the present study. As you can see, Group A achieved better times (in seconds) significantly higher than Group B at the end of the fourth training week. Significant differences, in the times realized, from group A with respect to group B were detected at the end of formation (tables 2 and 3), and a difference between the pre-test and final test of 1.09 for the group A and 0.56% for group B. Finally, the estimation of the training effect due to the type of feedback used (verbal and visual for group A) and (verbal for group B only) gave a an increase of 11.09% for group A and 5.65% for group B (diag.1); while the percentage difference between the two groups was 5,44% (Table 4).

Table 4. Difference % between two groups.

Estimating of training effect	
Group A	Group B
MD = 9,83-8,75 = 1,09	MD = 9,92-9,36 = 0,56
% increas.=(MD/9,83)*100	% increas.=(MD/9,92)*100
% increas =(1,09/9,83)*100	% increas.=(0,56/9,92)*100
% increasement = 11,09 %	% increasement = 5,65%
Difference % between two groups=11,09-5,65= 5,44%	

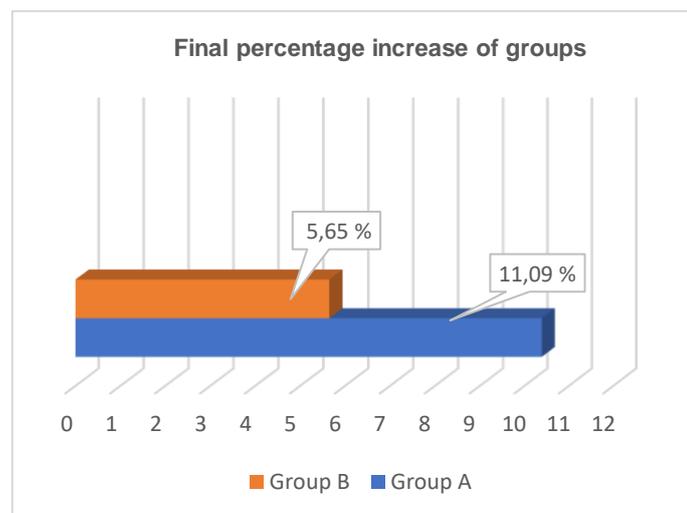


Figure 1. Final percentage increase of groups.

4 Discussion and conclusions

Basketball is a very technical sport in which good control is required in fundamentals and in particular in dribble. The verify of the learning of this type of gesture is important for the teacher and the student, so as to provide the appropriate information regarding the improving the gesture and motivating the student with a positive reinforcement. In this context, visual feedback is resulted a teaching method that has created a lot of interest by students, thanks to the continuous exchange of information between teacher and student regarding the use of the visual image. In the literature there are several proposals for the use of multimedia systems in the gym, too, in physical education lessons. Vernadakis and others (2006) propose the use of new technologies to provide preliminary information on the execution of correct technical gestures by athletes of good standard and observed by students in school lessons. The results of the studies of this author demonstrate how their use, supplemented by commonly used verbal instructions, results in better results than verbal instructions only, or at the use of visual technologies without verbal feedback. Inducing a motor facilitation to support motor learning through action observation is a common opportunity by children and adults. The results of the present study reveal less advantageous improvements for group B compared to those performed with verbal and visual feedback (group A). For each learning process, constant repetition is indispensable; in fact, only by repeating a motorized act learns it, but it is also true that there are other factors that affect the success of a learning process, such as feedback, motivation, coach / player ratio, initial skill level but above all methodology from to use. The results from Group A demonstrate that with full and accurate feedback there has been an improvement in performance in terms of motor control, speed and coordination. Improving and perfect a learning is the main purpose of any teaching, both for motor and cognitive learning. Finally, and in line with the data of the present study, the feedback and a high repetition number are recognized as a determining factor for the acquisition of a new motor skills. Coaches and anyone involved in training of young player should account for these methodological indications with the aim of program a technical training specific.

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Development and evaluation of a feedback system for endurance running (PerPot-live).

Martin Dobiasch¹, Stefan Endler² and Arnold Baca¹

¹ Institute of Sport Science, University of Vienna, Austria.

² Institute of Computer Science, Johannes Gutenberg University of Mainz, Germany.

martin.dobiasch@univie.ac.at

Abstract

Due to modern technology, mobile coaching systems are becoming more and more applicable for recreational athletes like endurance runners. They can help athletes with aiding them with a suitable pacing strategy. The meta model PerPot can be used for the computation of an individual pacing strategy. This paper presents the results of a pilot study aiming to validate PerPot-live. The developed feedback system uses data captured during a run in order to update the pacing strategy, i.e. perform live updates rather than following the same pacing strategy for a whole run. 22 moderately trained recreational athletes completed two trials on the same track in a randomised order. While one trial had to be completed using the pacing strategy given by PerPot, the other trial was completed using a strategy chosen by each participant. PerPot-live showed a significant improvement for runners needing more than 50 min for their trial, but a non-significant improvement for faster runners. However, data shows a possible problem in the implementation responsible for scheduling the updates. Nevertheless, the results show an indication that the live version of PerPot can help recreational runners achieve personal bests in paced runs.

Keywords: Pegasos, feedback systems, running, PerPot, pacing strategy

1 Introduction

The aim of this study was to investigate whether PerPot-live is able to guide runners to better performances in a 10 km trial in comparison to a self-paced 10 km trial. PerPot-live is the current implementation of PerPot for running embedded in a feedback system. The feedback system enables real-time adaptations to the athlete's pacing strategy. These adaptations are based on the daily form of the athlete, which can be recorded using actual speed and heart rate.

1.1 Pacing Strategies

The pacing strategy in endurance competitions is an important aspect. Starting too fast or running a section of a marathon too fast can result in an overload, which will eventually be followed by a breakdown in performance (Abbiss and Laursen, 2008). Two common strategies for avoiding such a scenario are even splitting and negative splitting (Hanley, 2015). Using an even splitting strategy means to complete the race with constant speed finishing the last kilometre with the same speed as at the start of the trial. Negative splitting - on the other hand - means starting the race slower than the average speed and increasing the speed for the second half of the race. PerPot, as will be described in the next section, adapts the pacing strategy regularly during the competition in order to help athletes with their pacing.

1.2 PerPot

Originally, the antagonistic meta-model PerPot was developed to qualitatively analyse phenomena such as the delayed reaction on load or collapse effecting overload (Perl, 2004). As is presented in (Perl, 2009), the meta-model PerPot describes physiological adaptation on an abstract level as an antagonistic process. The model uses physical demand, for example running speed, as input. This input is propagated to both strain and response potential with equal proportions. When applying the model to data from practice, however, it turned out that PerPot was able to provide quantitative results and to predict load-based performance development very precisely.

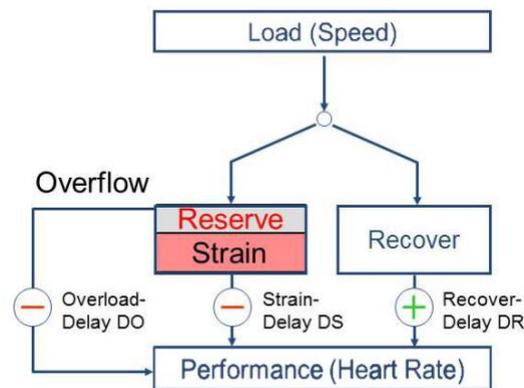


Figure 1. Basic PerPot structure.

Based on those results, extensions of PerPot have been developed. One of these extensions is the adaptation to running. By using PerPot-Run it is possible to determine the individual anaerobe threshold (IAT) and make predictions about competition finish times by simulation (Perl and Endler, 2006). Figure 1 depicts the structure of PerPot-Run. The load of the model is the running speed. From the recover potential the performance potential is increased by a positive flow, while the strain potential reduces it by a negative flow. In case of using PerPot for our running application, the Performance Potential is represented by the heart rate. All flows show specific delays modelling the time the components of the modelled system need to react. In particular in endurance sports delays play an important role for the process of tiring and recovering. All parameters, especially the delays, have to be calibrated for every athlete individually using data from a graded incremental test as input.

Reserve dynamics can be used for the optimisation of the running speed. Optimal finishing time can be achieved when the reserve is zero at the finish line. Therefore, the competition is simulated by iteratively increasing the speed up to the maximal running speed, where the reserve is still positive over the whole simulation. Previous studies have found a difference of 2% between simulated and actual finishing times of marathon and half-marathon competitions (Endler and Perl, 2012). However, different weather conditions and illness can lower the accuracy of the predictions.

Online-supervision and feedback promise even much better results regarding current load and performance data for optimisation. By using data (speed and corresponding heart rate) recorded during an event, the starting value and linear increase of the Strain Delay (DS) can be adapted. These adapted values can then be used for updating the simulation and optimisation of the remaining competition.

1.3 Feedback System

The feedback system for the present study was built using the Pegasos framework (Dobiasch and Baca, 2016). The framework is tailored for the generation of mobile feedback systems. In order to create a feedback system, the framework requires a configuration and the program code providing the additional functionality such as the case-specific generation of feedback. Using configuration files and additional code as input the framework generates a smartphone application and a server. The smartphone application is responsible for collecting sensor data and giving feedback to the athletes. All collected data is sent to the server using a mobile internet connection. Whenever the connection is lost, data is buffered on the device and sent to the server once the connection is re-established. The server stores all collected sensor data in a database for persistence and reproducibility. Additionally, live-feedback modules can generate feedback based on this data in real-time which is then sent back to the mobile unit. Furthermore, the server provides the possibility to display recorded activities as well as providing real-time tracking features.

For PerPot-live the application was configured to capture running speed, distance, positional data and heart rate. While speed and distance were estimated using a standard footpod (Garmin Footpod), heart rate was measured using a heart rate strap (Garmin Soft Strap Premium Heart Rate Monitor). Positional data was tracked using the GPS sensor built into the phone. The live-feedback for the PerPot trials was programmed to perform an update to the pacing strategy every five minutes. Furthermore, the system was programmed to communicate generated feedback messages to the athletes using the text-to-speech synthesiser which is available on smartphones.

2 Methods

2.1 Participants

The participants were 21 (15 male, 6 female) moderately trained recreational runners and one male semi-professional triathlete (Age: 29.05 ± 10.43 years, body mass 71.53 ± 10.51 kg) with reported personal bests for 10 km trials $47:38 \pm 8:17$ minutes, $n=11$. The study was approved by the ethics committee of the University of Vienna and all participants gave informed consent.

2.2 Protocol

Before the trials all participants had to perform a calibration run (see section

2.3 Calibration). After this run participants were randomly assigned to two groups. One group performed the runs in the order calibration, PerPot-Run and Free-Run (group PF) while the other group performed the runs in the order calibration, Free-Run and PerPot-Run (group FP). All participants were instructed to refrain from strenuous exercise two days before any of the trials. Breaks between the trails were selected by the participants. However, instructions were given to take at least two days rest and at most 21 days between the two runs. Participants not adhering to these requirements were excluded from the analysis.

2.3 Calibration

In order to obtain initial parameters for the PerPot model a graded exercise test, tailored for the needs of the model, was performed. The duration of each step was three minutes. Depending on their fitness level participants could choose from three levels: beginner, intermediate and expert. The parameters of the test were then as follows: initial speed was set to 6, 7 or 8 km.h⁻¹ and the increment to 1, 1.5 or 2 km.h⁻¹ for every step. The feedback systems guided the participants during the test. Initially, the system told the participants their starting speed. After reaching the assigned starting speed the system monitored the target speed. When deviating from this target speed by more than 0.3 km.h⁻¹ the system told the participants to go faster or slower. The test ended automatically when the participant was not able to match the target speed, i.e. the actual speed was more than 3 km.h⁻¹ lower than the target speed.

2.4 Free-Run

During this run participants received no verbal feedback concerning speed or heart rate. However, after every kilometre the feedback system told them their travelled distance. Runs were started automatically once the participant exceeded a speed of 6 km.h⁻¹. This start was signalled to the participants using a verbal message.

2.5 PerPot-Run

The feedback during this run contained two categories of messages: messages concerning the current performance and the estimated performance at the finish. Messages of the first category were used to inform the athletes when their actual speed was too slow (-0.3 km.h⁻¹) or high (+0.3 km.h⁻¹) compared to the simulated speed. The same was done for the heart rate: participants were told when their heart rate exceeded the simulated heart rate or when it was lower than 65% of the simulated target heart rate. Messages of the second category informed participants about their estimated finishing time and whether they should increase, decrease or hold their current running speed. Using the recorded data the simulation was updated every five minutes. Consequently, messages of the second category were sent every five minutes. For the messages of the first category a minimum delay of 15 s between two messages was set. Similar to the Free-Run the run started automatically once the participant exceeded a speed of 8 km.h⁻¹.

2.6 Statistics

Data were processed using R 3.3.1 (R Core Team, 2016). Differences were examined using standard (paired) T-Tests. Alpha-Level was set to 0.05.

3 Results

The average running time for the PerPot-Run was 53:14 ± 7:00 minutes and 54:28 ± 8:24 minutes for the Free-Run. Half of the participants (11) performed better in their PerPot-Run. Table 1 outlines the results. However, no significant difference was found, $t(21) = 1.4$, $p = .09$. The participants were further partitioned into two groups according to the time of their Free-Run. Participants needing less than 50 minutes for their Free-Run were assigned to group “fast” while participants needing 50 or more minutes for the Free-Run were assigned to group “slow”. While for participants of group “slow” a significant difference, $t(13) = 1.91$, $p = .04$, between the runs was found, no significant difference was found for participants in group “fast” $t(7) = -0.79$, $p = .77$. However, the effect size of the differences for “slow” runners is small (Cohen's

$d = .46$) (Cohen, 1988). Moreover, the power for the non-significant differences in running times for “fast” runners is low ($.09$). These results are outlined in Figure 2.

Table 1 Summary of Results. Group fast contains all participants needing less than 50 minutes for their Free-Run, while group "slow" contains all participants needing 50 or more minutes for the Free-Run. Column $F > R$ lists how many times the participants were slower in their Free-Run in comparison to the respective PerPot-Run.

Group	N	Free-Run	PerPotRun	$F > R$
all	22	54:28 ± 8:24	53:14 ± 7:00	11
fast	8	45:22 ± 2:31	46:04 ± 3:20	3
slow	14	59:42 ± 5:28	57:20 ± 4:52	8

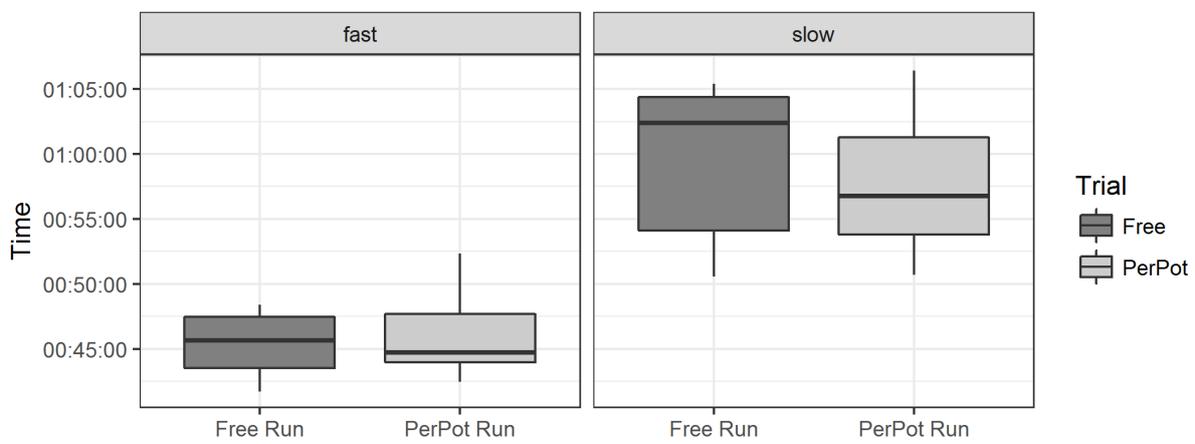


Figure 2. Comparison of running times.

Before the trials PerPot estimated a mean time of $52:01 \pm 7:24$ minutes for the PerPot trials. The difference between estimated and real time of the trials was $2:22 \pm 1:36$ minutes. Seven athletes completed their trial faster than the estimated time and 15 slower. The Bland-Altman plot in

Figure 3 shows no systematic bias.

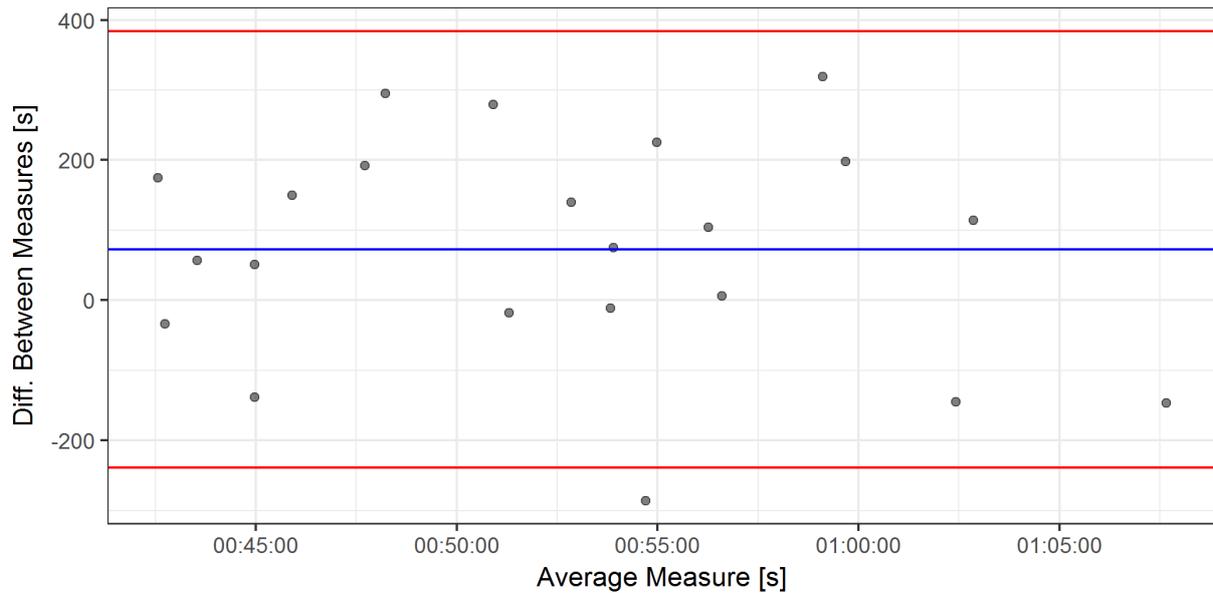


Figure 3. Bland-Altman of predicted vs real PerPot time.

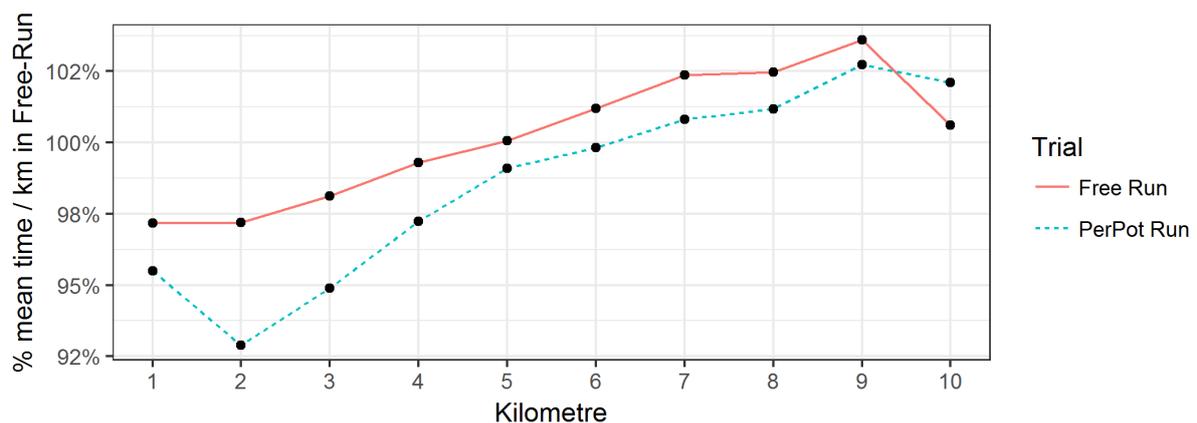


Figure 4. Mean splits per kilometre in relation to the mean running time for the Free-Run.

Figure 4 illustrates the mean splits of the two runs of all participants. The points on the line represent the time needed for the individual kilometre in relation to the mean time per kilometre for the Free-Run i.e. a percentage lower than 100% means that a kilometre was completed with a pace above the mean pace for the trial. This calculation was performed for every participant individually. Two aspects can be observed from the figure. First, neither an even nor a negative split can be observed in the two different trials. Second, the second kilometre was on average the fastest in all runs.

4 Discussion

Overall, the study gave an indication that PerPot-live might help runners of all levels to improve their times for a 10 km run. A significantly improved time in the PerPot run for runners needing more than 50 minutes showed that especially in- to medium-experienced runners can benefit from this system.

However, the study also showed potential for improvement and possible adaptations to the implementation. The analysis of the kilometre splits yielded that although the design goal

of PerPot is to not over-pace at the beginning, it scheduled the participants to run the second kilometre as the fastest kilometre (cf. Figure 4). From the third kilometre splits increased constantly, which is not the intended strategy.

One drawback of the presented study is that the system (PerPot-live) was only compared to self-paced runs. In the future, however, the system should be compared to other feedback systems implementing simple pacemakers such as a negative splitting strategy.

Furthermore, the implementation could benefit from a modification with regard to the feedback on the last kilometre. It can be observed in Figure 4 that participants increased their speed in the Free-Run more than they did in their respective PerPot-Run. Some of the participants claimed that they could have gone faster if the system had told them to do so on the last kilometre. Consequently, giving participants feedback about the distance to the finish for the last kilometre or 500 meters could further improve performances in the PerPot-Run.

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Performance Profiling in sport, using rugby union half-backs as an exemplar.

Gordon Smyth and Mike Hughes.

Centre for Performance Analysis, ITC, Carlow, Eire.

Abstract

An exploratory method of quantifying the impact of individual players, units of a team or whole teams, in sport was developed. To test its validity it was applied to rugby union and applied to both half-back positions in 2015 Rugby World Cup matches, with a view to firstly test the validity of these systems by profiling players, and secondly, if successful, to assess the impact of substitutions – to be published elsewhere. The match impact scoring system was devised using questionnaire responses of an expert group of professional rugby analysts and experienced international coaches. The scoring system weighted each game action in a positive or negative manner according to the impact on team performance. It was found that the proposed method produced valid and reliable data concerning player performance. As a validation exercise, it was applied to half-backs substituted with more than 20 mins playing time left, the two 20 min period, before and after substitution, were compared. A “non-substituted” control group were also analysed, in both the first and final 20 minutes of competition. It was found that for the scrum-half position, the starting players produced a higher median ‘efficacy’ score than replacement players 27.46, (std. dev. ± 10.06) and 20.42, (± 12.45). The best performing scrum-half group were the 60-80 minute non-replaced players 29 (± 9.0). For the out-half position, it was found that the highest median ‘efficacy’ was achieved by the replacement player group 18.80, (± 11.00), with the non-replaced 60-80 minute group performing worst 14.40, (± 7.09). Future research should develop the methods applied in this study to define player profiles for each position on the rugby field. It is suggested that these profiles should use score difference between the teams to take into account the strength of the teams involved. The concept of a weighted individual player efficacy system has been demonstrated in the sport of rugby union, but could be applied in any team sport where greater individual player performance data are required.

Keywords: player profiling, substitutions, rugby union

1 Introduction

1.1 Performance Indicators and Rugby

Since the inaugural tournament in 1987, rugby has developed into a major world professional sport. The narrow margin between winning and losing performances was identified by Vaz et al. (2010) who found that statistically significant differences in team performance indicators between winning and losing teams in professional rugby in the southern hemisphere were unlikely when the difference between the final score is 15 points or less. This is most likely due to the similarities in preparation and technical proficiency of the players at this level of competition. Indeed, there is little consensus in the available studies regarding which team

performance indicators discriminate between winning and losing performance, as can be seen in Table 1.

Such inconclusive evidence means that it is logical to examine performance on an individual rather than a team level in order to gain an insight into the key performance indicators in rugby.

Table 1. Team PI's discriminating between winning and losing performances.

Authors and Year of Study	Title	Number of games Analysed	Discriminating K.P.I. Between Winning and Losing Performances
Vaz et al. (2010)	Rugby game-related statistics that discriminate between winning and losing teams in I.R.B. and Super Twelve close games.	324	Kicked More Possession More Passes Completed More Mauls Won More Turnovers Won Fewer Errors Made
Jones et al. (2004)	Team performance indicators as a function of winning and losing in rugby union.	20	Lineouts Won On Opposition's Throw More Tries Scored
Bremner et al. (2013)	A retrospective evaluation of team performance indicators in rugby union.	65	More Territory inside the 22m line More Quick ruck ball
Prim et al. (2006)	A comparison of performance indicators between the four South African teams and the winners of the 2005 Super 12 Rugby competition. What separates top from bottom?	9	None
Hughes M.T. et al. (2012a)	Performance indicators in rugby union.	48	None

1.2 Player Profiling

Hughes et al. (2012a) analysed all games at the Rugby World Cup tournament in 2011 and found that using only frequency data of team performance indicators are insufficient to identify significant performance indicators. They recommended that more qualitative analysis of individual player skill sets for each position be undertaken to understand how performance indicators reflect performance. This paper seeks to apply this finding by presenting individual player data for the half-back positions to quantify how substitutions affect match performance in these positions.

After quantifying the game actions undertaken by the players, the data can be used to develop a positional profile of the key skills of the half-back positions. Hughes et al. (2012b) suggested that combining the identification of key positional skills in soccer with a weighting system for the effective use of these skills, presents an opportunity to develop an objective profile to assess how effective players are in their position. Such qualitative data could be used by coaches when deciding on the tactics to be employed on a game to game basis or, on a wider

scale, be used to identify individuals for scouting and recruitment criteria, as suggested by Hughes et al. (2012a).

Vaz et al. (2010) found that statistically significant differences in team performance indicators are unlikely in games where the points difference between the teams is 15 or less. This finding has not been extensively examined with reference to individual performance indicators. Thus, this study will examine quantifying the efficacy of individual players, exploring the inherent difficulties.

1.3 Substitutions in Rugby

In team sports, substitution (or interchange) is replacing one player with another during a match. Substitute players that are not in the starting lineup (also known as bench players, backups or reserves) ‘reside’ on the bench and are available to substitute for a starter. Later in the match, that substitute may be substituted for by another substitute or by a starter who is currently on the bench.

Some sports have restrictions on substituting or interchanging players whereas others do not. American football, ice hockey and basketball are examples of sports which practice "unlimited" substitution, albeit subject to certain rules. Substitution is unlimited during play in ice hockey. In basketball, substitution is permitted only during stoppages of play, but is otherwise unlimited. In baseball and association football, substitution is permitted only during stoppages of play, and once a player has been substituted out of a game he cannot re-enter it (Wikipedia, 2017)

Currently, World Rugby regulation 3.4(a) (World Rugby, 2016) permits teams to replace up to eight players in international competition, with three of the replacements being able to play in the three front-row positions, leaving the remaining five players to provide cover for the other 12 positions on the field as the coaching staff see fit. World rugby defined a “replacement” as a player who enters play in the place of an injured player and a “substitute” as a tactical change of personnel made by the coach. As this study does not have access to the information regarding the nature of the player change, whether a player is a “replacement” or a “substitute” is not taken into account. This information has implications for this study as a “replacement” is enforced by injury, and therefore not a tactical decision taken by the coach with a view to influencing match outcome.

There is a limited amount of research on the role of substitutes in sport, and in particular, rugby. However, there have been comparable studies undertaken in soccer. Pearce and Hughes (2001) conducted a study to analyse the effect of substitute players relative to the players that they replaced. A weighting system was devised for player actions and the cumulative score for 15 minutes of the replaced player compared with the first 15 minutes of the substitute player. This allowed for a “match impact” score for comparison of the two players. It was found that 37.5% of substitutes performed better than the player that they replaced, 25% of players performed worse than the player they replaced and 37.5% had no impact. The concept of comparing the impact of substitutes relative to the players that they replaced is the core component of the validation of the methods employed in this study.

Do certain players perform better in ‘partnership’ with other specific players (centre partnerships, second row, back row)? The general consensus is that this is the case, consequently to enable efficient and optimal substitutions, objective and accurate profiling needs to be developed – not just in rugby but in all team sports.

In order to place athlete performance levels in context, it is necessary to firstly identify what specific factors of performance indicate success and secondly, to compare single performances against previous performances. This will provide feedback, which, if successfully identified and applied, will lead to improved future performance. The process of

developing a method to objectively gather performance information and subsequently weight this information in relation to its importance to game outcome one that will increase our understanding of the most important, or key performance indicators. This will also help the coach(es) with their most difficult task of selecting the substitutes and combinations of substitutes.

1.4 Individual Player Analysis

In rugby, the half-back positions have a major influence over the match outcome due to the amount of possession that these players enjoy, as quantified by James et al. (2005). It is important to note that the ability of the half-backs to influence the game through their use of possession will be heavily influenced by the amount and quality of possession that the half-backs receive from their forwards.

Lim et al. (2009) constructed a player impact matrix for rugby and analysed individual player involvement of all rugby positions over three seasons. It was found that the scrum-half (13%), out-half (28%) and back-row forwards (16%) had the most net game involvement as a percentage of team total, confirming the findings of James et al. (2005). Therefore, examining these individual positions in greater detail gives a better understanding of how they affect team performance. A player match impact (or efficacy) weighting, similar to that devised by Lim et al. (2009) is a key aspect of this study.

Villarejo et al. (2015) used performance indicators to measure the characteristics of player performance by position in winning and losing teams. The data were gathered from all 48 matches of the Rugby World Cup in 2011. They found that the scrum-half on a winning team was responsible for significantly more kicks, metres gained per kick and try assists. This study grouped the out-half with the centre positions, as opposed to the study by Lim et al. (2009) who considered the positions individually, restricting the ability to compare data between them. The large number of games analysed by Villarejo et al. (2015), whilst providing greater data stability, may also obscure important data due to a number of mismatches during that tournament. The average points gap in matches between tier one and tier two nations was 20 points, and seven games had a winning margin of greater than 50 points (World Rugby, Formerly International Rugby Board, 2011), therefore the importance of specific performance indicators to match outcome may change, relative to the strength of the opponents. This finding was also identified by Carroll (2013) with reference to Gaelic football.

Whilst all players are required to perform a range of skills, some positions require a greater proficiency in specific areas. World Rugby (2015) defined the tactical requirements of the scrum-half and out-half positions. The scrum-half is required to:

- Link forwards and backs to maintain continuity of play.
- Communicate with team members, especially directing and organisation of attack.
- Create, identify, communicate, manipulate and exploit space in attack.

The out-half is required to:

- Link with the scrum-half to maintain continuity of play.
- Set and communicate attacking line width and depth.
- Select, implement and communicate correct decisions during attack.
- Create, identify, communicate, manipulate and exploit space in attack.
- Support team members in attack and defence.

From these positional requirements, it is clear that the major responsibilities of the half-back players are attack rather than defence orientated, however the defensive capability of these positions is also assessed in this study with a view to demonstrating the potential of the player efficacy to other positions.

The match-day tactics employed by the half-backs will vary depending on the skills of the available players, the perceived weaknesses in the opposition defence and other confounding variables, such as match location and weather conditions. Tactics may also change when substitutions are made, making a comparison of individual performance profiles problematic. Replacement players may bring different strengths to the team in relation to their ability to pass, kick or run with the ball. James et al. (2005), with reference to the out-half position, found that intra-positional differences may be due to an individual's style of play and the effects of confounding variables. They suggest that multiple profiles of the same position may be needed to take these factors into account.

1.5 Aims

This is an experimental study designed to test the validity and reliability of a qualitative system aiming to quantify individual player performance. As a means of validating these systems, the information gathered will be used to address the efficacy of replacement players relative to those players who started the game for both half-back playing positions. Knowledge gained in undertaking this study will help to better inform coaches and players as to the effectiveness of substitutions. **By** quantifying the game actions performed by the starting and replacement player it will be possible to observe tactical changes during the match. Such information is the first step towards developing a player profile that can be utilised to inform future tactical substitutions by the coaching staff.

1.5.1 Limitations and De-limitations

Limitations

1. This study examined a period of time of 20 minutes of play, according to the match clock. In instances after an infringement occurred, the referee would play advantage. If advantage is accrued any actions that the observed players performed was included in this study, however if no advantage accrued, play was re-started from the original infringement, however this "game time" was lost to the study as the match clock was not re-set to the time of the initial infringement.
2. This study used recordings of live broadcast matches. On occasions a short passage of play may have been missed due to a previous incident being replayed.
3. It was not possible to determine whether players were replaced for tactical or injury reasons, therefore it is unclear if the change was a voluntary act by the coach or enforced as the starting player was unable to continue.

De-limitations

1. The scrum-half and out-half positions were chosen in order to demonstrate the potential of this system to define the differences of the starting and substitute players. As previously identified by Lim et al. (2009), both these positions have a major game involvement. Other positions, for example the wings, would have less game involvement, and therefore be less effective in validating this method of assessing player efficacy.

2. The minimum period of analysis was 20 minutes, one quarter of a game. This was selected to allow sufficient time for the replacement players to have an opportunity to affect the match.
3. Each action had to be able to be performed by any player during a match. Actions that were not ‘in play’, such as re-start kicks or place kicks, while potentially important to match outcome, were not included. This will enable clearer inter-player comparison of game efficacy results. For example, a valid comparison can be made between a goal kicking out-half and a non-goal kicking out-half with a view to their player efficacy score in general play.

2. Methods

2.1 Subjects

Table 2. Substituted scrum-half players analysed. (n=24).

Match	Team	Player Off	Player On	Winning Margin
England V Fiji	England	9	21	24
Ireland V Canada	Canada	9	21	-43
South Africa V Japan	South Africa	9	21	-2
France V Italy	France	9	21	22
Australia V Fiji	Fiji	9	21	-15
New Zealand V Namibia	New Zealand	9	21	44
Argentina V Georgia	Georgia	9	21	-45
Argentina V Georgia	Argentina	9	21	45
Italy V Canada	Canada	9	21	-5
England V Wales	England	9	21	-3
Scotland V U.S.A.	U.S.A.	9	22	-23
Scotland V U.S.A.	Scotland	9	21	23
Tonga V Namibia	Tonga	9	21	14
France V Canada	France	9	21	23
New Zealand V Georgia	Georgia	9	21	-33
England V Australia	England	9	21	-20
Canada V Romania	Romania	9	21	2
Canada V Romania	Canada	9	21	-2
Argentina V Namibia	Argentina	9	21	45
Italy V Romania	Romania	9	21	-10
France V Ireland	France	9	21	-15
Ireland V Argentina	Argentina	9	21	23
Australia V Argentina	Argentina	9	21	-14
Argentina V South Africa	Argentina	9	21	-11

The subjects in this study were half-backs in Rugby World Cup 2015. All games in which a substitute played at least 20 minutes were analysed. The final 20 minutes of the starting player’s time on the field was measured against the first 20 minutes of the replacement player, using an agreed player efficacy scoring system. Data were gathered for the scrum-half and out-half positions to demonstrate the potential for the selected methods to assess

tactical changes in the use of possession by the replacement players relative to the starting players in these matches.

Selection using these criteria produced 39 eligible substitutions. These are presented in Tables 2 and 3. A minus sign in the winning margin column indicates that the analysed player's team lost the match:

Table 3. Substituted out-half players analysed. (n=15).

Match	Team	Player Off	Player On	Margin
Ireland V Canada	Ireland	10	22	43
South Africa V Japan	South Africa	10	22	-2
U.S.A. V Samoa	Samoa	10	22	9
Ireland V Romania	Ireland	10	22	34
Romania V France	Romania	10	12	-27
South Africa. V Samoa	Samoa	10	22	-40
Scotland V U.S.A.	Scotland	10	22	23
Tonga V Namibia	Tonga	10	22	14
England V Australia	England	10	22	-20
Canada V Romania	Romania	10	23	-2
South Africa V U.S.A.	South Africa	10	22	64
Argentina V Namibia	Argentina	10	22	45
#Italy V Romania	Romania	10	23	-10
France V Ireland	Ireland	10	22	15
France V Ireland	France	10	22	-15

Table 4. Non-Replaced players analysed (n=13).

Match	Team	Pos.	Round	Result	Margin
England V Wales	Wales	9	Pool A	28-25	3
Samoa V Scotland	Scotland	9	Pool B	33-36	3
Ireland V Italy	Ireland	9	Pool D	9-16	7
Italy V Canada	Italy	9	Pool D	23-18	5
Australia V Scotland	Scotland	9	Quarter-Fin.	34-35	-1
South Africa V Wales	South Africa	9	Quarter-Fin.	23-19	4
South Africa V New Zealand	South Africa	9	Semi-Fin.	20-18	2
South Africa V New Zealand	New Zealand	9	Semi-Fin.	20-18	2
England V Wales	Wales	10	Pool A	28-25	3
Samoa V Scotland	Scotland	10	Pool B	33-36	3
Ireland V Italy	Ireland	10	Pool D	9-16	7
Australia V Scotland	Australia	10	Quarter-Fin.	35-34	1
South Africa V New Zealand	New Zealand	10	Semi-Fin.	20-18	2

In addition to the quantification of starting and replacement player actions, analysis was conducted on a control group of 13 instances, (eight scrum-half and five out-half performances) in which the starting half-back was not substituted. The first 20 minutes and the last 20 minutes

of matches were analysed to provide a comparison with replaced players. The games analysed for this aspect of the study are identified in Table 4 above:

The cases selected involved matches with a score difference of seven points or less. The criteria are deliberately applied as in these matches the coaching staff had the option of replacing the starting player, but chose not to do so, removing the possibility of a potential player management substitution for future matches as a factor.

In total this provided 104 instances of 20 minutes of play to be analysed using the weighted player efficacy system, divided between starting, replacement, non-replaced players 0-20 minutes and non-replaced players 60-80 minutes.

2.2 Operational Definitions and Player Efficacy Ratings

The operational definitions used were adapted from the study conducted by Lim et al. (2009). Since the Lim et al. paper was published in 2009, changes were made to take into account the evolution of current tactics, for example a ‘contestable kick’ category was included to reflect the current importance of this action. The definitions of various player actions were presented to an expert group of nine players, coaches and analysts with experience of international rugby at senior and/or age grade level. This group individually considered the operational definition of each player action and applied a numerical weighting for each action relative to how important it was to the match outcome. The actions were grouped by category eg: “scoring actions”, “use of possession” to allow for greater depth analysis of game actions. The following player action weightings, presented in Table 5 were applied.

Table 5. Operational definitions and player efficacy ratings.

Game Action	Operational Definition	Player Efficacy Rating
Scoring Actions		
Try	5 points awarded to the scoring team when the ball is placed down in the try area	5
Drop Goal	3 points awarded when the ball is drop kicked between the posts from open play	3
Ball Carrying Actions		
Ball Carry	Carrying the ball into the opposition defensive line causing more than one opposition player to commit to a tackle situation	2
Ball Carry (No Fight)	Carrying the ball into the opposition defensive line requiring only one opposition player to commit to the tackle situation	1
Ball Carry (Leading to loss of possession)	Turn-over of possession due to poor technique in contact	-2
Breach	Carrying the ball through the opposition defensive line resulting in at least one opposition player having to turn around to make the tackle	3
Offload	Passing the ball on to a supporting player when being tackled, thus maintaining the forward flow of play	3
Offload (Leading to loss of possession)	Incomplete passing of the ball on to a supporting player when being tackled.	-3
Post Tackle Actions		
Ball Placement (Fast)	Quick placement (<3s) of ball when tackled, making the ball available for quick recycling	2
Ball Placement (Medium)	Medium speed (3-5s) placement of ball when tackled, allowing for average recycling of the ball	1

Ball Placement (Slow)	Slow placement (>5s) of ball when tackled, causing slow recycling of the ball	-1
Ball Support Actions (Post Contact)		
Attack Support Effective	First supporting player to arrive at a tackle situation to lend attacking support. (Tackle made but ruck not formed) positively affecting the speed or quality of possession	1
Attack Support Ineffective	First supporting player to arrive at a tackle situation to lend attacking support. (Tackle made but ruck not formed) not affecting the speed or quality of possession	-1
First Arrival (Ruck) Effective	First player to arrive in a tackle situation to clear out the ruck positively affecting the speed or quality of possession	2
First Arrival (Ruck) Ineffective	First player to arrive in a tackle situation to clear out the ruck not affecting the speed or quality of possession	-2
Second Arrival (Ruck) Effective	Second player to arrive and secure the ruck positively affecting the speed or quality of possession	2
Second Arrival (Ruck) Ineffective	Second player to arrive and secure the ruck not affecting the speed or quality of possession	-2
Third or Fourth Arrival Effective	Third or fourth player to arrive to the ruck positively affecting the speed or quality of possession	1
Third or Fourth Arrival Ineffective	Third or fourth player to arrive to a ruck not affecting the speed or quality of possession	-1
Defensive Actions		
Turnover Tackle	A tackle that results in the turnover of possession	3
Dominant Tackle	A tackle that drives the opposition player backwards	2
Jackal	To steal or slow down possession by >3 seconds in a tackle situation.	3
Passive Tackle	Tackling of opposition player with the ball carrier maintaining forward momentum	1
Tackle Assist	Assisting in a tackle situation	1
Missed tackle	Missing a tackle	-3
Use of Possession		
Pass/catch (Under Pressure)	Passing/catching the ball under opposition pressure (a defender advancing within 2 metres of the ball carrier)	2
Pass/catch (No Pressure)	Passing/catching the ball under no opposition pressure (no defender advancing within 2 metres of the ball carrier)	1
Error in play (No Pressure)	Errors made in play (e.g. handling, kicking errors etc.) (no defender advancing within 2 metres of the ball carrier)	-3
Error in play (Under Pressure)	Errors made in play (e.g. handling, kicking errors etc.) (a defender advancing within 2 metres of the ball carrier)	-2
Kick Receipt (Under Pressure)	Successfully kicking the ball under opposition pressure (a defender advancing within 2 metres of the ball carrier)	3
Kick Receipt (No Pressure)	Receiving a kick under no pressure (no defender within 2 metres of the ball carrier)	1
Return Kick	Successfully Kicking the ball through zones of the field	1 point per zone kicked
Tactical Kick - Contestable	A kick providing the opportunity to regain possession	3
Turnover Event	Error in play that directly results in turnover of possession to the opposition with no law infringement committed	-3
Law Infringements		
Free Kick	Infringement of the laws of the game resulting in free kick	-2
Penalty	Infringement of the laws of the game resulting in a penalty	-3
Yellow Card	Results in the carded player being sent off the field for 10 minutes, leaving their team one player down for that duration	-5
Red Card	Results in carded player being sent off, having no further participation in the game, leaving their team one player down for the rest of the game	-10

2.3 Ball in Play

“Ball in play” was measured from the time that the ball was available to either team. The exact criteria from each game scenario is shown in Table 6:

Table 6. Operational definitions applied to “Ball in Play”.

Game Scenario	Operational Definition
From a kick off/ 22 metre drop out	When the team receiving the kick gather the ball
Scrum	When the ball is available at the number 8’s feet
Line-out	When the receiver gathers the ball
Failed kick at goal	When the receiver gathers the ball
Kick in open play	When the receiver gathers the ball
Free kick/tap penalty	When the ball is tapped and play recommences

The impact score achieved by the starting and substitute player is influenced by the amount of possession that their team had during the period of the game being analysed. Accordingly, the time of ‘ball in play’ for both teams was recorded. The player “in possession” actions were categorised as “scoring”, “ball carrying”, “post tackle” and “use of possession”. The player efficacy score for attacking actions was divided by the number of seconds that the team was in possession to provide a figure of player attacking efficacy. For reasons of clarity, this figure was then multiplied by 100 to present the player efficacy score for attacking actions as a whole number. Player defensive actions were categorised as “defensive actions” and opposition time in possession to present a measure of defensive efficacy. There were two categories of player action – “ball support” and “law infringements” that could be performed regardless of which team had possession. These actions were of limited importance to half-back play and consequently not included. Future studies should re-categorise these two groups according to which team was in possession of the ball at the time of the “ball support” or “law infringement”.

2.4 Data Analysis Procedure and Equipment

Video recordings of the matches were obtained from live television broadcast coverage of the games. This was analysed using Sportscodel Pro software, Version 10.3.17 (Sportstec Inc. Warriewood, New South Wales, Australia) on a MacBook Pro laptop with 13” Pro retina Screen.

Each game was analysed on a separate day to prevent analyst fatigue compromising reliability. Matches were analysed in a silent, well-lit environment. This presented the optimum conditions for accurate analysis.

The Sportscodel tagging system produced data matrices for each player analysed in the study. The data were exported into Microsoft Excel and the efficacy rating applied to each player action. The results of each starting player and replacement player were summarised in a master spreadsheet using the ‘pivot table’ function and descriptive statistics applied. The study data were then imported into the SPSS package (IBM Corporation, Armonk, N.Y., Version 24) for further analysis and the application of statistical tests.

2.5 Reliability

The reliability of the process was tested by conducting intra and inter-operator reliability tests. The intra-operator test involved the coding of a starting and replacement player in the same match three times over the course of three weeks. This schedule of analysis was chosen to minimise memory effect. The recording was taken from a pre-tournament friendly between England and Ireland, providing four players for reliability assessment. Percentage error calculations (Hughes et al., 2002) were conducted between the first and second viewing of the footage and a third viewing was compared with the second. Percentage error was then calculated by individual player action according to the formula below to reveal the reliability of player actions:

S1 = Test 1;

$$\text{Reliability} = \frac{\sum \text{Mod}(S1 - S2)}{\sum (S1)} \times 100$$

S2 = Test 2;

Σ = Sum of the difference between S1 and S2

The “ball in play” reliability was assessed using the same process. Ball in play was measured in seconds and percentage error calculations were applied.

The inter-operator validity test involved an independent, experienced analyst coding player actions of the same performance as the intra-operator test. This analyst undertook a training session with the lead analyst, involving examining match footage and visual examples of the various operational definitions being applied.

2.6 Statistical Analysis

The first aspect of this study involved the demonstration of the reliability and validity of the developed method of assessing player performance, including the specific game actions performed by the players: The second aspect required using the system to quantify the performance of the substitute player relative to the starting player in each position. In order to test for significant differences between the actions performed by the four groups of players analysed: starting, replacement, the non-replaced players first and final 20 minutes on the field, a Kruskal–Wallis one-way analysis of variance was performed on the data. This was viewed as the validity study – did the system produce objective, realistic data that differentiated between positions, players and even different performances of the same player?

3 Results

3.1 Reliability Results

Table 7 shows the intra-observer reliability count of actions performed by the scrum-half position. There are difference between the “catch/pass no pressure” and “catch/pass under pressure” categories, however the total number of passes recorded on each of the three observations is the same for both the starting and replacement scrum-half position. Whilst some percentage error figures may appear large (several figures of 200.00 appear in the following tables), the actual number of instances are low – a difference of one action being observed.

The intra-observer reliability for the count of actions performed by the out-half position showed that the “catch/pass no pressure” and “catch/pass under pressure” categories were areas of difference for the replacement out-half. The starting out-half was credited with a “tackle

assist” in view one which was subsequently registered as a “passive tackle” on view two and three.

The rest of the results are presented as the validity study. We have analysed the gathered data and presented them in individual profiles, with which all our “experts” (N=9) were satisfied that they represented the performances involved. We present them to you in order for you to make your own assessment.

Table 7. Intra-observer reliability of performance - scrum-half.

Game Actions	Starting Scrum-Half					Replacement Scrum-Half				
	S 1	S 2	S 1-2	S 3	S 2-3	S 1	S 2	S 1-2	S 3	S 2-3
Cat/Pass No Press	20	19	5.13	18	5.41	21	22	4.65	22	0.00
Cat/Pass Und Press	2	3	40.00	3	0.00	3	2	40.00	2	0.00
Error Under Press.	1	1	0.00	1	0.00	1	1	0.00	1	0.00
Ret. Kick 2 Zones	1	1	0.00	1	0.00	0	0	0.00	0	0.00
Ret. Kick 3 Zones	0	0	0.00	0	0.00	0	0	0.00	1	200
2 nd Arr. Negative	1	1	0.00	1	0.00	0	0	0.00	0	0.00
Positive Carry	2	1	66.67	1	0.00	0	0	0.00	0	0.00
Missed Tackle	0	0	0.00	0	0.00	1	1	0.00	0	200
Passive Tackle	1	1	0.00	1	0.00	1	0	200	0	0.00
Tackle Assist	0	0	0.00	0	0.00	1	0	200	0	0.00
Sum of Actions	28	27		26		28	26		26	

The data showed that the “ball in play” totals varied by a maximum of six seconds for Ireland possession during the England replacement section. This demonstrated good reliability in this aspect of the study across all three observations.

The inter-observer reliability study showed that “catch/pass no pressure” and “catch/pass under pressure” are the major areas of difference between the analysts, particularly for the replacement scrum-half where observer one registered 24 passes in total and observer two registered 22 passes. A further area of difference was that observer one registered one play by the starting scrum-half as a “positive carry” and observer two registered as a “breach”.

3.2 Player Performance and Substitution Status

The following data are presented as the mean “game efficacy” score for each positional grouping:

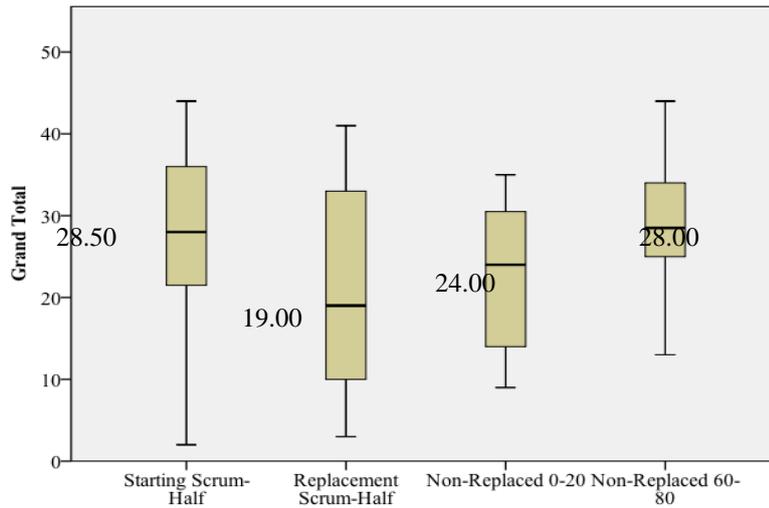


Figure 2. Mean game efficacy by group – scrum-half.

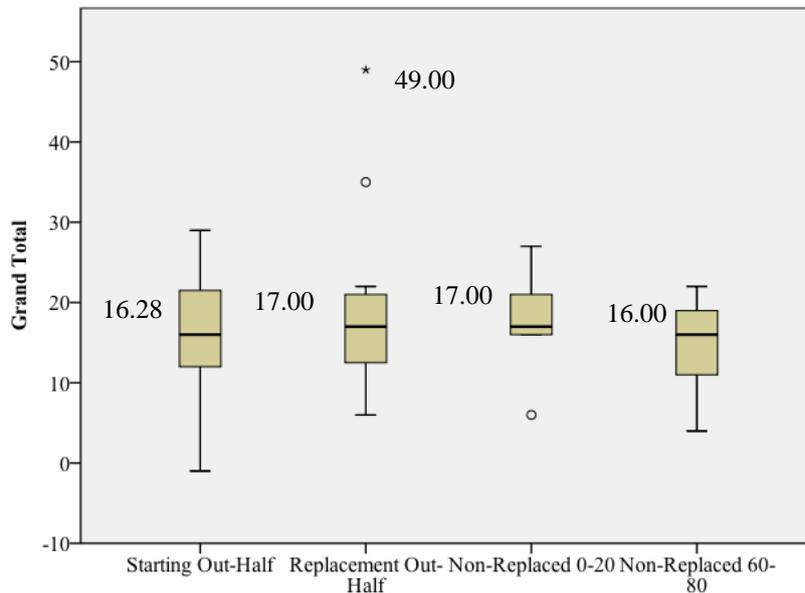


Figure 3. Mean game efficacy by group – out-half.

Figure 2 shows the highest median game efficacy score was achieved by the starting scrum-half group (28.). The replacement scrum-half group had the lowest median score (19). In the non-replaced categories, the second period of analysis, 60-80 minutes had a higher median impact score (28.50).

Efficacy scores for the out-half position show that the median impact score is similar across all groups. The non-replaced groups displayed the lowest range of scores (21 and 18 respectively) The replacement out-half displayed the largest range of scores of all the out-half groups (43). There are two outlier performances in the replacement out-half group, who achieved the highest game impact scores in the study (49).

Figures 4 and 5 present the “ball in play” adjusted player efficacy score for both half-back positions (calculated by dividing the impact score by the number of seconds in possession and multiplying by 100).

The best attacking and defensive performances were from the replacement scrum-half group (23.23 and 4.08 respectively). The worst attacking and defensive performances were also from the replacement scrum-half group (2.73 and -5.21 respectively).

Figure 5 presents each individual out-half performance score relative to the amount of possession that each team had during the period of analysis. The best attacking and defensive performances recorded both came from the starting out-half group (20 and 7.77 respectively). The worst attacking and defensive performances also came from the starting scrum-half group (1.56 and -2.71 respectively).

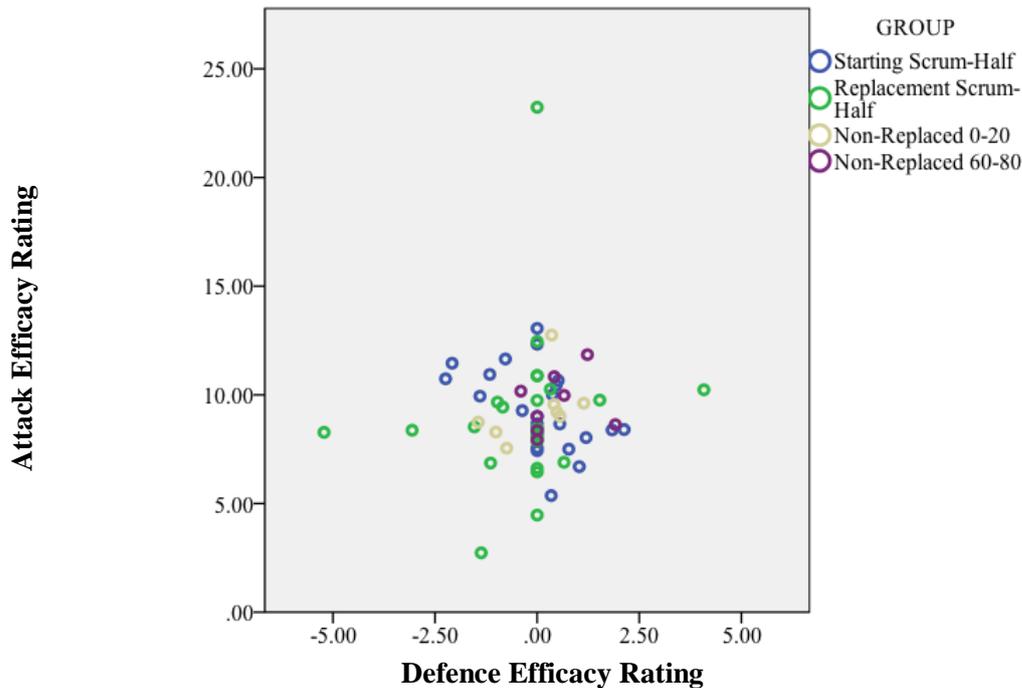


Figure 4. “Ball in play” adjusted attack and Defence efficacy – scrum-half.

A Kruskal-Wallis test was applied to starting, replacement, non-replaced 0-20 minutes and non-replaced 60-80 minute groups for both half-back positions. No statistically significant differences were identified between the four groups of players for either half-back position.

Figure 6 shows that the replacement scrum-half group performed less “use of possession” actions than the other three groups with a mean game efficacy score of 17, compared with the non-replaced 60-80 minute group who recorded the highest “use of possession” actions (24). Defensively, the non-replaced 60-80 group performed best (1.25), with the replacement scrum-half group scoring the lowest defensive score (-0.83). The replacement scrum-half group recorded the highest “ball carry” score of the four groups (4.57). Actions performed in the “other actions” group were tries scored and penalties conceded as no players received a red or yellow card during the games analysed. The data presented in Figure 3.6 represents the mean efficacy score achieved by each group of out-halves by game action type.

Figure 7 shows that the replacement out-half group achieved the highest “use of possession” score, (12.53) compared with the starting out-half group who scored lowest in this category (10.53). Non-replaced players in the 0-20 minute period of analysis scored highest in the “ball carry” category (5.6) and non-replaced players in the 60-80 minute category scored lowest of the groups for “ball carry” actions (3.4). The Non-replaced 60-80 minute group produced a negative score in the “defensive actions” category (-0.6). No “other actions” were performed by each of the non-replaced groups.

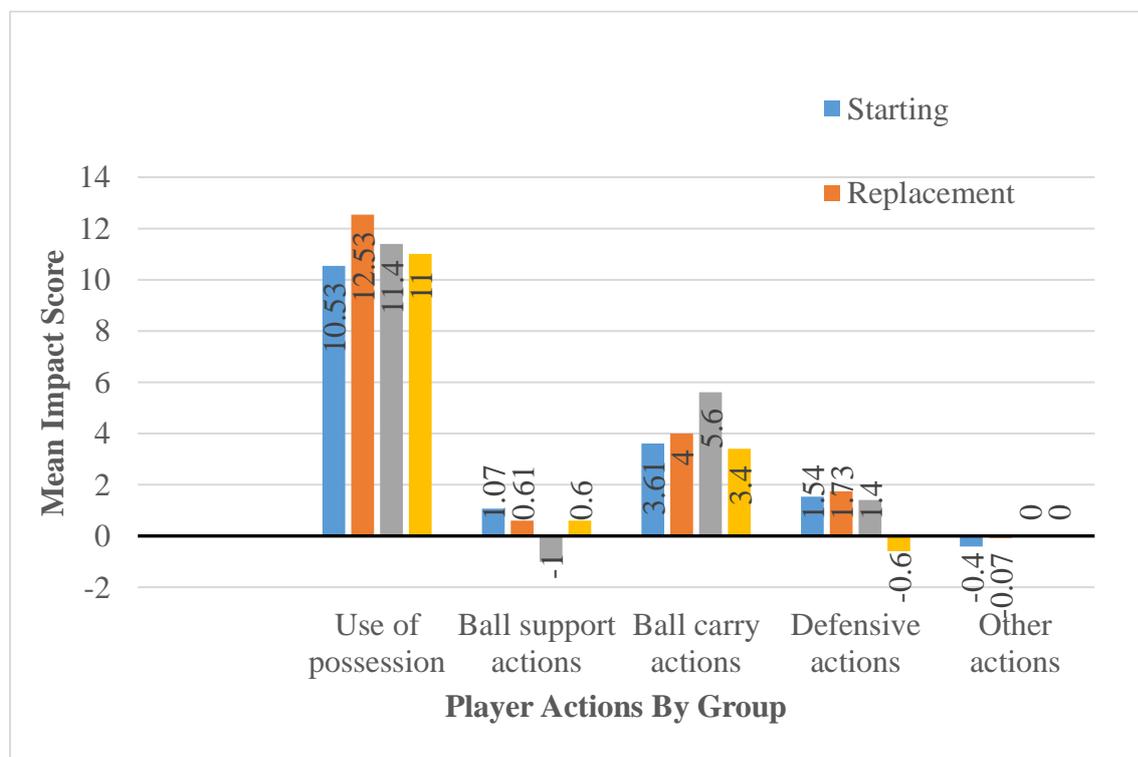


Figure 7. Mean efficacy score by player action – out-half.

Figures 8 and 9 present the net effect of replacing the scrum-half and out-half respectively. In each case, the player being replaced is from the first named team. Figure 7 shows that the replacement scrum-half produced a net positive effect on ten of 24 occasions. The highest net effect was achieved by the Argentina replacement against Ireland (+18). The worst net impact was achieved by the U.S.A. scrum-half against Scotland (-37). On one occasion, the impact score of the starting and replacement player were the same.

The highest net effect was achieved by the Ireland replacement out-half against France (+38). The worst net effect was achieved by the same player when coming on as a replacement against Canada (-19). In nine of the fifteen substitutions the replacement player had a positive effect on the out-half position.

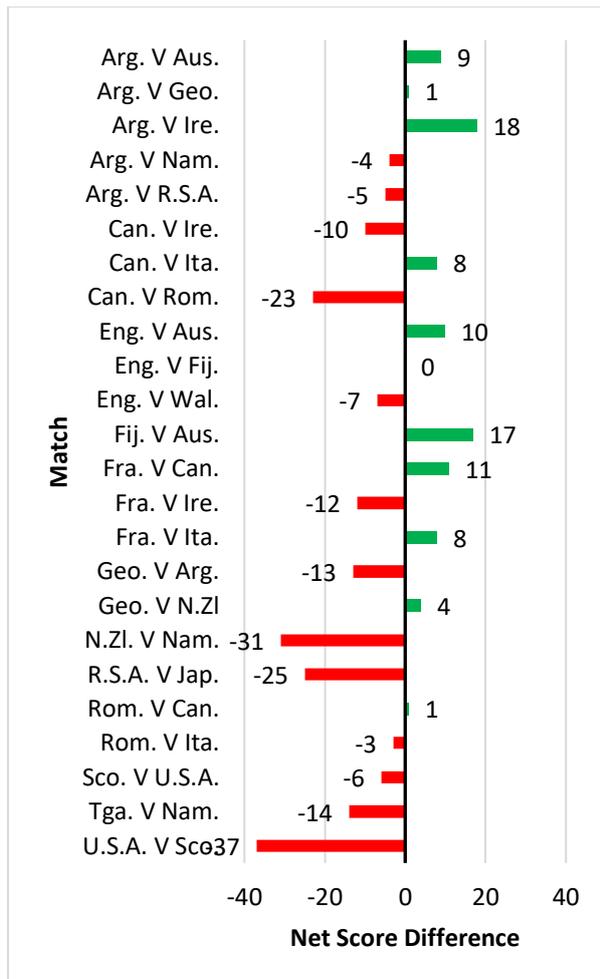


Figure 8. Net effect of substitution - scrum-half.

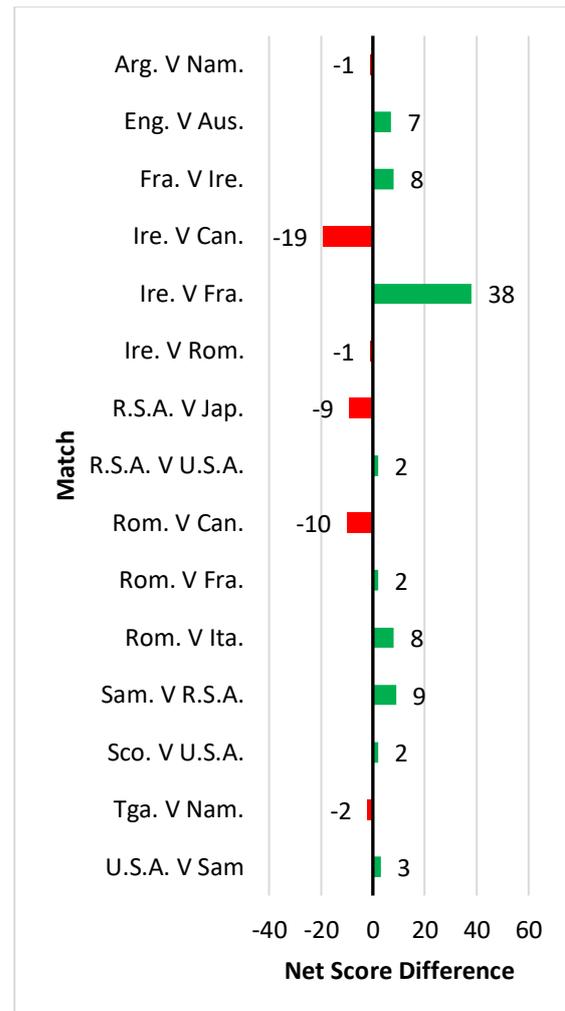
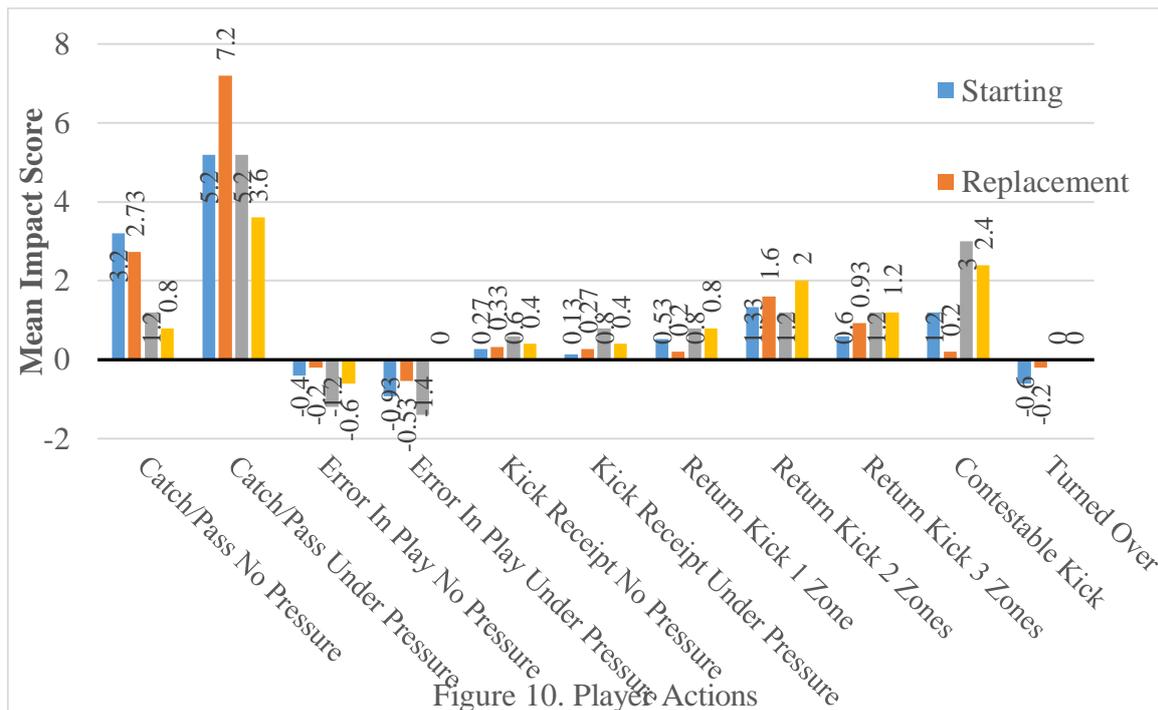


Figure 9. Net effect of substitution – out-half.

Examining the out-half “use of possession” actions in greater detail, Figure 10 shows that the replacement out-half group score highest for “passes under pressure” (7.2), compared to the starting out-half group (5.2). The non-replaced 0-20 minute out-half group make most “contestable” kicks (3). The next highest score is the non-replaced 60-80 minute group (2.4). This compares with the starting player (1.2) and the replacement (0.2) in the “contestable” kick category. The non-replaced out-half group also make most errors in play, both under pressure (-1.4) and no pressure (-1.2). The highest score for zones kicked by all groups of out-halves is two field zones, with non-replaced 0-20 players kicking three zones of the field, scoring the same points (1.2).



4. Discussion

4.1 Process, Reliability and Validity

Percentage error calculations were used to measure the reliability of the study, as advised by O'Donoghue (2010). The most significant area of difference was between “catch/pass no pressure” and “catch/pass under pressure”, however the total number of passes recorded was almost entirely consistent – 22 passes across the three performance observations for the starting scrum-half and 24,23,23 passes respectively for the replacement scrum-half. This reveals the issue in coding data is that it is difficult to quantify consistently. However, given the relatively large number of passes recorded, an error rate of 5.13 to 4.65 is acceptable, in the margins of tolerance. The same issue arises with regard to the inter-operator reliability. Whilst training was undertaken with the other analyst involved, in defining the player actions as used in this study, further work in this area would reduce the percentage error further.

The player profiles generated through applying this process were then presented to the expert group of coaches and analysts who agreed that the profiles were a valid measure of player performance.

The close agreement of the intra-operator results indicates that the operational definitions used in this study are clear and have been consistently applied, showing a high degree of reliability. The inter-operator reliability results are also consistent, but would benefit from further training to ensure consistent application of the operational definitions, particularly with regard to the “catch/pass under pressure” and “catch/pass no pressure” categories.

The data of the non-replaced players should be treated with caution due to the limited sample size of eight scrum-halves and five out-halves. However, it is included for comparative purposes. Of the replaced scrum-half group, ten of the 24 players analysed in this group were from tier two countries. This may be a further cause of the wide range of scores in the starting and replacement scrum-half groups as the clear majority of tier one players are full time athletes

competing in the major world competitions, many tier two players compete in semi-professional competitions, and are therefore not as well developed in terms of their skills or physical conditioning. This is reflected in the wide variation of the replaced scrum-half performances.

The data presented in Figures 6 and 7 represent a profile of all actions undertaken by the scrum-half and out-half positions respectively. Given that the “use of possession” category is particularly important for the half-backs, this is further profiled in Figure 10, for the out-half only. Were this system to be applied to data from other positions on a rugby team, it would enable greater analysis of how players perform according to the requirements of their position. For example, a back-row player’s contribution to team performance would be more accurately judged on “defensive actions” or “ball support actions” than on “use of possession”. The ability to focus on the area of play that is deemed important to the playing position is an important aspect of this study.

4.2 Player Performance and Substitution Status

The first hypothesis examined in this study was that replacement players would score more highly than the players they replaced. Based on the results obtained, for the scrum-half position, this hypothesis can be rejected. Figure 3.1 demonstrates that the starting scrum-half has a higher median efficacy score and that the upper and lower quartiles are higher than the replacement player. It can be speculated that the reason for this result is that the normal method of selecting a team requires that the best player starts in each position. It would seem that in the case of the players in this study, there was a gap in performance levels between the starting and replacement player. The large range of performance scores for the starting and replacement scrum-halves across all teams may be due to differences in the skill levels of the competing teams, a hypothesis which is given further weight by the narrower range of scores for the non-replaced scrum-half group. These players were all performing for teams ranked in tier one by World Rugby. The non-replaced players performed better in the second period of analysis later in the game. This would seem to confirm that these players were having the effect on the match that the team management required of them, and they were therefore not replaced.

The hypothesis for the out-half position, based on the results obtained, can be accepted. The replacement out-half group performed more “catch/pass under pressure” (7.2) than starting or non-replaced players. This would indicate that these players are presenting a different tactical challenge which involves playing the game closer to the opposition defence, rather than simply passing the ball. The fact that the replacement out-half group also produce more mean “ball carry actions” (4.0, compared with the starting group score of 3.61) would seem to confirm this. This would concur with a key aspect of the positional responsibilities as identified by World Rugby (2015) that the out-half was required to: Create, identify, communicate, manipulate and exploit space in attack. The out-half may choose to do this by kicking, running or passing the ball, and individual players will adopt different approaches to this task, as identified in Figure 3.10.

When considering the ball in play adjusted efficacy score in Figure 3.6, it can be seen that the scrum-half position frequently presented a negative figure for the defensive game actions. This would be in keeping with the low tackling priority given to the scrum-half role. Normally, the defensive responsibilities entrusted to the scrum-half consist of ‘sweeping’ behind the front defensive line to gather short kicks and organise the more physical members of the team, rather than as a first-choice tackler. This means that a scrum-half’s ability to tackle is only exposed when the first line of the defence is penetrated. Therefore, the large amount of zero defence efficacy for this group reflects the tackling excellence of the rest of the team resulting in little opportunity for the scrum-half to be exposed.

The starting and replacement out-half groups displayed a smaller efficacy range between the four groups. Given that of the 15 cases examined, nine were from tier one countries, it is possible that this skewed the performance data. As was the case with the scrum-half position, the defensive efficacy scores were lower than the attacking efficacy, reflecting the key responsibilities of the out-half position. These findings reflect the findings of Lim et al. (2009) who found that the scrum-half position was involved in more game actions than the out-half position, but that this difference was not statistically significant.

Player management, is an important factor in how and when substitutions are performed. When there is a large score difference between the teams, replacing a half-back will not normally affect the outcome of the game. This would confirm the findings of James et al. (2005) who advised that multiple profiles be developed to take account of factors such as relative strength of the opposition and weather conditions.

4.3 Potential Future Applications

This paper has sought to develop a player profiling system in rugby to quantify individual player efficacy. Hughes (2012) suggested that frequency data were insufficient to model performance in rugby and that a more qualitative approach was required. This study addresses elements of qualitative analysis, for example quantifying a pass performed under pressure or no pressure. The next step would be to apply this process to the other positions in a team. This may help to improve understanding of other key positions within the rugby team, for example Lim et al (2009) cited the “loose forwards” group as performing a similar number of game actions to the scrum-half and out-half positions (82 ± 37 , 84 ± 51 and 81 ± 36 respectively). A further application may lie in profiling combinations, for example the development of a combined profile of both half-back players. Such information could inform team recruitment, selection and substitution policy, ensuring that the selected combination have a complimentary skill set. It also raises the possibility of substituting the half-backs together to ensure that the most effective combinations play together.

Further applications of the process applied in this paper could be used to produce detailed player positional profiles. This could be performed using the process suggested by Hughes et al. (2001) who suggested that a percentage error plot showing mean variation across performances would be a suitable method of establishing that the performance profile had ‘stabilised’ sufficiently to be considered a reliable guide to performance.

Profiling the performance of a replacement player relative to the player that was replaced, is another aspect of this study that could be applied to any sport where substitutions are part of the game. Hughes and Pearce (2001) found that midfield players were most likely to be substituted in soccer. It was theorised that this may be due to the high physical demands of these positions. This would seem to reflect the situation in rugby, where the scrum half was replaced 24 times during the 2015 Rugby World Cup, compared to the replacement of the out-half on 15 occasions. The higher replacement rate of the scrum-half position could be due to the greater physical demands of the position. Quarrie et al., (2013) in a study of international rugby matches, found that the scrum-half position (starting and substitute players) travelled $6200\text{m} \pm 360$, when compared to the out-half position $5700\text{m} \pm 910$ per match. Furthermore, the scrum-half ran a higher number of metres than the out-half across all speed categories (0-2, 2-4, 4-6, 6-8 and >8 metres per second). The increased physical exertion of the scrum-half position would make replacing this player a logical proposition, particularly in a tournament such as the Rugby World Cup, when players must perform in a number of games to win the tournament, 7 matches in 44 days with uneven scheduling of matches. However, this option is only viable if there are two players available of comparable ability in the tournament squad.

The demonstrated method of profiling individual player efficacy would be transferable to other sports. It would be most effective in sports where there are a limited number of substitutions available to the coach, rather than a rotating player multi-substitution sport, such as basketball, ice-hockey or Australian Rules, due to the restricted ability to correct the situation should a replacement player drastically under-perform. The method also has the potential to be used as a tool to develop a profile of future opponents with a view to assessing the strategies and tactics likely to be employed in competition.

5. Conclusions

The purpose of this study was two-fold. Firstly, to develop a player efficacy weighting system to objectively quantify individual player performance, and secondly, as a validity study, to apply this system to performances from the 2015 Rugby World Cup to assess and compare the performance of starting, replacement and non-replaced half-back players.

The system developed was found to be a valid and reliable method of measuring player performance. With regard to the playing groups, it was found that the starting scrum-half group had a higher median efficacy score than their replacements. It was also found that the non-replaced scrum-half group performed better in the second period of analysis than the first 20 minutes of a game. For the out-half position, it was found that the replacement out-half group scored higher than the starting group. Overall, there was greater consistency of performance amongst the four out-half groups than the scrum-half groups, although it should be noted that the sample size for the non-replaced player groups was only one third of the substituted player groups. It is proposed that the greater variation of performance levels between the scrum-half groups is due to the higher number of performances from tier two countries in the matches analysed.

Future research should develop the methods applied in this study to develop player profiles for each position on the rugby field. It is suggested that these profiles should use score difference between the teams to consider the strength of the teams involved. The concept of a weighted individual player efficacy system has been demonstrated in the sport of rugby union, but could be applied in any team sport where greater individual player performance data is required.

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PEDAGOGY OF SPORT

Development of educational tourism in Pskov region.

Kobiakina O., Smirnova E.Yu., Shitova L.Sh., Ershova N.G. and Dytko E.V.
Foreign languages department.
Department of Humanitarian and Socio-Economic Disciplines.
Velikie Luki State Academy of Physical Education and Sport, Russia.

Abstract

The cultural and historical potential of Pskov region should necessary be used against the backdrop of negative trends in tourist services market development. There are special opportunities to create and promote a new tourist product in educational tourism, which is backed by many architectural monuments of antiquity, places associated with the life and work of famous people. One of the most interesting objects for a tourist product creation are old post stations.

A test excursion and tourist postal route were created and implemented with the participation of students and teachers of Velikie Luki Sports Academy. Then consumer properties of the tourist and excursion program were assessed.

It is planned to devise an information retrieval and educational system based on a special website by creating an interactive communication zone considering historical and cultural heritage of Pskov region. The system will offer access to collections of various categories of people who do not have the opportunity to visit real museums, people with disabilities and residents of remote regions. A postal tourist product is important for popularization of unique monuments of history and art of Pskov region and effective interaction with the media.

Keywords: *Pskov region, educational tourism, postal tourism, tourist product, interactive communication*

1 Introduction

Many of the things that are familiar to us are firmly embedded in our way of life, have their own history, and we get a wonderful opportunity to come into contact with this story. Mail has existed for many years - more precisely, for millennia, and is constantly improving, striving to keep pace with the times.

In the 21st century, the world entered the "museum boom", manifested in the "museumification" of historical and cultural monuments. Reflecting the ongoing cardinal changes in society and culture, museums in the modern world are also undergoing significant transformations. "A changing museum in a changing world" is a reflection of the existing reality. Modern museums "de facto" become centers of education, communication, cultural information and creative innovations.

Observing this issue of great importance, Regional Postal Communication Museum, a subdivision of the Federal Postal Communications Department of the Pskov Region, a branch of FSUE Russian Post, and the Department of Humanitarian and Economic Disciplines of the Velikie Luki State Academy of Physical Culture and Sports decided to create an educational postal project.

The purpose of the project: development and implementation of a new model (tourist postal product) by creating an interactive communication zone based on the historical and cultural heritage of Velikie Luki and Pskov Region.

Main tasks of the project:

- to study the history and evolution of the postal tracts of Pskov region;
- to identify potential opportunities for creating a new tourist product on the basis of cultural and historical heritage of Pskov region (post stations "A journey into the past");
- to evaluate the consumer properties of the tourist product of cultural and historical heritage of Pskov Region (post stations "A journey into the past");
- creation of the website "Virtual tours through the Kiev and Belorussian postal tracts".

2 Methods of research

- study of scientific-methodological and normative-legal literature;
- statistical analysis;
- experiment (trial excursion);
- evaluation of quality of the tourist product components based on a functional approach.

3 Results

Ranking and evaluation of consumer properties of our tourist product included a number of functions based on the needs of a tourist:

- a) F1 – to satisfy curiosity and raise one’s cultural level;
- b) F2 – to carry out transportation while traveling;
- c) F3 – to get current information;
- d) F4 – to implement nutritional needs;
- e) F5 – to get a good level of service;
- f) F6 – to receive reliable information about cultural and historical heritage of the visited site;
- g) F7 – to be/feel safe while traveling;
- h) F8 – to get satisfaction from travel;
- i) F9 – ensure communication needs.

The greatest preference for ranking the functions of the service was given to F1 – “satisfying curiosity and raising the cultural level”. The least preference was given to F7 – “to be protected during the trip”. Functional analysis made it possible to identify the problem of improving the tourist product and define specific consumer functions which were the cause of negative evaluation characteristics of tourists.

In various trends of functional approach, the final result of 0.935 shows that the effectiveness of developed tourist product is high enough. The maximum negative impact on the image of the product, taking into account the significance of the functions, was provided by the levels of implementation of functions F2, F4, F7. Thus, to improve the tourist product it is necessary to concentrate efforts on the technological processes that implement these functions.

Along with the standard use of the developed excursion route, it is possible to apply modern technologies to increase the educational, information and tourism potential of the

postal tracts. It is planned to create an information retrieval and educational system based on a website dedicated to postal stations of Pskov region, which includes:

- creation of an electronic information database on the history of Russian mail observing traditions of travel;
- development of electronic versions of:
 - a) exposition "Philately in Russia and Pskov Region" (collections of old postcards and postage stamps),
 - b) information directory "Museums of mail of Pskov region",
 - c) catalogue of literary, artistic and musical works dedicated to riding a Russian troika along postal routes,
- making a catalogue of virtual excursions along the Kiev and Belorussian postal tracts,
- enabling broad access to collections of various categories of the population, including people with disabilities, residents of remote regions, etc,
- wide popularization of unique monuments of history and art of Pskov region,
- effective interaction with the media in the process of preparation and implementation of the information retrieval and educational system on the web platform.

The evaluation and effectiveness of the project is based on questionnaires, book reviews, attendance records, use of virtual museum exhibits in real exhibition projects, feedback in the media, etc. The popularity of the website can be judged by the dynamics of visitors' amount based on the guest book and reviews.

Activities done during formation of the information retrieval website with approximate dates of implementation are as follows:

- a) preparation of a thematic-exposition plan for sections; drawing up of exhibit passports; textual, illustrative and reference material (1st - 10th month of the project);
- b) preparation of indices and dictionaries (3rd - 11th months of the project);
- c) preparation of hypertext (markup of text, scanning of illustrations) in the form of a site on the WWW-server of the Department of Humanitarian and Economic Disciplines of Velikie Luki State Academy of Physical Education and Sport (3rd – 11th months of the project);
- d) recording of musical works for the website (10th – 11th months);
- e) development and adjustment of the keyword search system (11th – 12th months of the project);
- f) final testing of the website, registration in the Russian systems of accounting for information resources (the 12th month of the project).

4 Discussion

In Pskov region there are many architectural monuments of antiquity, places associated with the life and work of remarkable and talented people. One of the most interesting objects of this kind are the old post stations built along all the roads of Russia.

The history of the postal tract Velikie Luki - Pskov dates back to the year of 1697. On the territory of the Pskov province there were 2 postal tracts - Belorussian and Kiev tracts.

Post stations are monuments of architecture, objects of cultural heritage of federal significance. In the Pskov province in the 19 century there were about 70 post stations. At

present, 8 stations of that historical period are preserved in the dilapidated state. There are 3 postal museums in Pskov region - in Porkhov, Velikie Luki and Pushkinskie Gory. Today, there exist potential opportunities for development of postal tourism in the Region and promotion of a new tourist product based on the study of post stations "A journey into the past".

Post stations are an inexhaustible source of knowledge in the field of art, literature, culture, history, geography of the native land and therefore serve as a means of educational tourism booster.

The tourist product includes a developed route which consists of 11 points, each of which has a unique architectural monument. The total length of the route is 400 km, the approximate duration of the excursion is 11 hours. The main target group of the tourist product are children over 13 years. Taking into account the specifics of the route, we focus on the preserved postal stations and cultural and historical objects located along the postal routes mentioned above.

The program of the tourist excursion is quite intense. The cost of the developed tourist route for a group of 20 people is about 30000 Roubles (with 1500 Roubles per person). On March 30, 2017, there was conducted a trial excursion in the frames of analysis of the tourist product effectiveness. On the base of the trial excursion results there were estimated the consumer properties of the tourist postal product.

5 Conclusions

Travel is a great opportunity to combine the present and the past. Nowadays travel activities are becoming more and more interactive with the use of modern information technologies which greatly contributes to development of such tourism sectors as educational and postal tourism. Design and implementation of tourist products based on the unique components of history and culture of a certain region, especially in the area of postal tourism, can help preserving these components – and the creation of an information website in this respect will definitely help increase the interest of various categories of society in educational tourism and make a lot of discoveries in this area.

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Dual career at the University of Zagreb.

Romana Caput-Jogunica¹, Sanja Ćurković² and Davor Pavlović²

¹University of Zagreb Faculty of Agriculture, Croatia.

²University of Zagreb Faculty of Agriculture and University office for Sport, Zagreb, Croatia.

Abstract

Entering university, most athletes have problem with being successful in study and sports career. The physical education professors at the University of Zagreb have an important role in shaping both careers for active athletes as well as to motivate former athletes to be active in university sport and guiding them towards study diploma. The aim of the article was to analyze the organizational system by SWOT analysis and athletes' interest in education and support system in education at the University of Zagreb. According to the analysis provided on the sample of 104 athletes - university student, 29,5% of them had a problem of harmonizing academic and sport obligations often or sometimes in secondary schools and 35.2% of them had a problem of harmonizing obligations in higher education. In conclusion, the results confirmed the university as a critical period of termination of a sports career due to lack of support system as well as the help for athletes to match obligations in sport and study. The results of supportive responses during sports career confirmed the present knowledge that the greatest support for athletes is provided by parents, friends, and coaches.

Keywords: *strategy, dual career, support system, university sport*

1 Introduction

“By recognizing the well-being of sport and physical exercise, taking into account the positive effects of physical exercise on health as well as having in mind the educational and moral potentials of sport, the University of Zagreb will promote the influence of sports and physical exercise on the academic community and on the wider social environment by developing awareness of balanced and quality lifestyle that contributing to a healthy and prosperous society. The University of Zagreb will retain the position of leading Croatian and one of the leading regional universities in the field of sports, with a high share of students and employees who are physically active and with appropriate sports infrastructure.” (Mission and vision from the Strategy of Sport at the University of Zagreb, 2014).

University of Zagreb has over of 80,000 students. Only 8% of student in the University of Zagreb are included in the sports competition system (Table 1). Among them are top level athletes; world champions and Olympic medallists. According to the long history of obligatory Physical Education (PE) at the University of Zagreb (since 1963) and student's sports competition, the data about the number of student participants in sports competition is unsatisfactory.

University of Zagreb has to seriously consider the role of PE and University sport and to improve the accessibility of sports infrastructures, equipment and appropriate funding with the aim to increase the number of students and academic staff in various types of sports activities as much as possible (Caput-Jogunica et al, 2013). The aim of the article was to analyze the impacts of obligatory Physical Education on the quality of university sport in

Zagreb by analysing the organizational system and documents as well as the study results related to student athletes at the University of Zagreb.

Table 1. Data related the number of participants of University sports competition per ac. Year.

AC. YEAR	NUMBER OF STUDENTS	MALE	FEMALE	TEAMS
2013/14	4119	2499	1620	314
2014/15	4188	2564	1624	338
2015/16	4015	2458	1557	320
2016/17	4071	2480	1591	314

University sport in Zagreb is considered as separate part of the upgrading the obligatory PE for the first year students as well as elective for the students of higher years of Bs and Ms studies. As we mentioned before, due to obligatory PE classes at the first year of study, all PE professors have information about the sports data related to the number of top level athletes who have entered the Faculty and the number of former athletes who want to be part of faculty sports teams. The students – athletes involved in university sport are not obliged to participate in regular PE classes, but they have obligation to train and participate on the university sports competitions (national and international level). To present the organisation of the university sport in Zagreb we have used the data by means of SWOT analysis from the Strategy of sport at the University of Zagreb (Baletić et al, 2014). It is important to emphasize that the Strategy of sport is the first strategic document related to sport in the history of the University of Zagreb. Table 2 shows the strengths, weaknesses, opportunities and threats related to university sport in Zagreb.

Table 2. Sum – up of SWOT analysis of sport at the University of Zagreb.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Longstanding tradition and experience in organizing and implementing Physical education and university sports competitions - Successful participation and winning prizes at numerous international university sports competitions - Employed PE lecturers who can inform and encourage the active and former athletes in university sport; - According to Sport Law: to establish support system at the University: Department for Sport, University Sport Association and Faculties Sport Association - Ensuring continued sports career for former active athletes; - Recognized perspective athletes in university legislation and special condition that they needed for dual career. 	<ul style="list-style-type: none"> - Insufficient financial resources for quality organization of the university sports competitions - Lack of sports infrastructure for university sport in Zagreb (training preparation, leagues, competitions, etc.); - Unsatisfactory sport treatment on University level – lack of branding by sports results and famous top level athletes who are studying at the University; - Lack of possibilities and financial support for EU projects. - Lack of organized academic support during dual career for university athletes.

OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - Secured and sufficient financing for university sports competitions; - Forming a system of sports competitions up to 30 sports with more than 10,000 students participants; - A system for evaluating the success of students, professors and / or team leaders at university sports competitions at all levels; - Performing sports competitions that involve students with disabilities; - Increasing the number of student - athletes who represent the University of Zagreb at international university sports championships; - Established student sports clubs for competing in top level leagues; - Completed IT for university sports competitions. 	<ul style="list-style-type: none"> - Willingness of Rector and vice rector responsible for sport to brand University through sport and top level athletes; - Position of Department for sport at the University, - Interest to provide the activities that have been defined by Strategy; - University budgets for developing the system of sports competition at the University as well as to develop sports competitions for students with special needs; - Implementation of the dual career policies; - Support for the cooperation with the European and international bodies of universities related to sport and sport for all.

2 Methods

Since 2004 a great number of studies on international basis have analyzed the role of educational institutions such as schools and sports schools as well as the universities with regard to ensure that young high-level athletes are offered a quality education in parallel to their sport training. In the frame of the Project "Athletes and education" that have been supported by the Croatian Olympic Committee and the Croatian academic sports federation we have provided pilot studies on the sample of 104 university student athletes who have participated at the Croatian University Sport final competition.

The participants of the pilot study have completed a questionnaire consisting of 27 questions: personal information: gender, age, educational level, type of sport, etc.), interest in education and career, environment support and special conditions in educational system.

3 Results

According to the analysis, the largest number of students was 20-21 old (19.04% in total) and majority of them (68) was on their first year (64,7%) and 26 students on second year (24.76%) of Bs study. A large number of students who have participated in this pilot study had a problem during the study: 28,6% had to change the study program and 24.76% had failed one year of study, 29.5% of them had a problem of harmonizing academic and sport obligations often or sometimes in secondary schools and 35.2% of them had a problem of harmonizing obligations in higher education.

Students who had participated in this study have been actively involved in sport when they were 6 to 13 old; the largest number of them (22.85%) participated in the training process around 10 years which can suggest that the majority of students have began to engage in sports at the age between 9 and 11. By analyzing response related to training frequency during the week, the great amount of athletes (33,33%) train 3-4 times per week, while 26.66% students attend daily. The analysis of responses have found that 24% of students who have participated in study have been engaged in recreational sports (less than 3x a week) or in student sports clubs as a member of university team sport at various levels.

By analyzing the answer to the question about absence from teaching during the academic year, students are mostly absent (50 students, 47.61%), while 25 students (25.38%) are absent several times a month from several hours of lectures and exercises. Only 8 students miss most of the academic year, which is in line with the number of categorized athletes who have participated in this study. The results of supportive responses during sports career confirm the present knowledge that the greatest support for athletes is provided by parents, friends, and coaches. The special conditions in higher education that students emphasize as those that would ensure the harmonization of the obligations in study and sport; are the following: 1. Flexibility of studying in the form of negotiation possibilities (58 students, 55,23%), 2. The higher number of absences from lectures and exercises (28 students, 27.61%) and 3. Mentors and/or coordinators for top level athletes 16 students (15,23%). These results have been used for creating policy documents related to dual career. This data confirmed the university as a critical period of termination of a sports career due to lack of support system as well as the help for athletes to match obligations in sports and study. These data are consistent with the results of previous studies in which one third of respondents meet these problems at different levels of education.

4 Discussion

With the aim to try to solve some mentioned problems in the study, the Croatian Olympic Committee and Croatian Academic Sports Federation have signed the agreement with the Rector Council of the Republic Croatia in 2014. The main result of this agreement was the document: “*The Regulation of studying student athletes in higher education in the Republic of Croatia*” (Regulations). According to the Regulations, the student athletes should sign a contract with the institution of higher education, which should include the following details with regard to the status of student athletes (top level athletes or student athletes a member of faculty sports team): Student top level athletes: can be absent from university with the obligation of notification of absence to professors; have the ability to have colloquium or exams outside of the exam period in agreement with the professors and vice dean for teaching, with the obligation to document the reason; may, exceptionally, gain less than 35 ECTS in two academic years; higher education institution should provide a mentor or student tutors who help top level athletes during study program; have the right to enroll decreased semester workload measured by ECTS; have the right for place at the University campus, university scholarship as well as the right to resign from the obligation to fulfill the sports requirements like sports preparation for longer duration, participation in Olympic Games, etc.

For the University sport it is also important active student athletes and former student athletes who want to be member of faculty team. The same document has proposed the regulations for these athletes. Some of the faculties of the University of Zagreb have a problem with sports infrastructure and possibilities to organize the training for the faculty teams in different sports on time when all students are able to come. Student athletes, the member of the national sports team or university sport clubs, his/her status and obligations should determine in agreement with the higher education institution according to students’ interest, schedule of competition and particularities of the study program.

5 Conclusion

According to the European Commission: “*dual career is a complicated policy domain, which links multi stakeholder policy domain such as education, youth, health and labour market.*” In this paper we have tackled only two domains: education and sport. The European countries and their universities in general have different positions as to policies towards, and legal/moral responsibility for supporting. Promotion of dual careers of athletes matches the several aims of the Europe 2020 Strategy (prevention of early school leaving, more graduates in higher education, higher employability) and makes sport policies more efficient by keeping more talented and high performance athletes in the sport system. With the aim to fulfil the mission in the Strategy (“to retain the position of one of the leading regional universities in the field of sports”) the University of Zagreb has to put into practice support model for student athletes.

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Documents

Pravilnik o studiranju studenata sportaša na visokim učilištima/The Regulation of studying student athletes in higher education in the Republic of Croatia

Study on the minimum quality requirements for dual career services (2015) European Commission.

PE project. Measuring impact and effectiveness

Judit H. Ekler
Eötvös Loránd University,
heszterane.ekler.judit@ppk.elte.hu

Abstract

Thirty teachers participated in the research, using the project approach in activities related to competence development and leisure sport in 30 classes. Adequate to the method the content of the project was negotiated by the learners and the PE teacher and they also shared the tasks and the responsibilities during the project. Besides the PE lessons they organized out-of-school programmes and used the project method in other classes. The efficiency of the project was measured by a pre-test and a post-test. We also used psychomotor skills tests and the PMCSQ-2 questionnaire. The data have been processed by the Paired Samples test.

In the field of psychomotor skills 85% of the learners performed significantly better at the post-test ($p=0,02$) than at the pre-test. The PMCSQ-2 analysis suggested that the Task-Involving climate increased and the Ego-Involving climate decreased during the PE project. The Cooperative Learning, the Effort/Improvement and the Important Role subscales of Task-Involving climate increased significantly ($p=0,00$). The rate of Intra-Team Member Rivalry and Unequal Recognition decreased significantly ($p=0,01$; $0,002$). Only the Punishment for Mistakes subscale of Ego-Involving climate remained unchanged ($p=0,691$). The results prove the efficiency of the PE project in achieving the aims of PE.

Keywords: PE project, perceived motivational climate in PE, 21st century skills

1 Introduction

The aim of Physical Education is to develop students' physical competence and knowledge and their ability to use these to perform in a wide range of activities associated with the development of an active and healthy lifestyle in their entire life. In addition to this, Quality Physical Education might be of crucial importance in the development of 21st century skills like creativity, critical thinking, collaboration, cooperation and communication.

The strategies and methods used in education are worthy to be adjusted to the educational purposes and to the participants. All educational strategies and methods can be adequate that create a motivating learning environment for active studying.

The Self-determination theory (SDT) of Ryan and Deci (2000) bases on three components of the perceptible learning environment of the motivational value scale the formation of a higher order pertaining to inner motivation. These three fundamental 'self-determination' needs are autonomy, competence and the feeling of social-relatedness.

Also a motivational factor that what kind of learning objectives we set, and according to what evaluation aspects we check them. Mastery is the goal, and task-oriented is the environment where the point is to obtain new knowledge, to learn new activities, to acquire new skills, to raise the level of abilities and skills. This task-oriented environment is the most appropriate to raise interest in PE (Physical Education) and also, in general, for physical activities, the formation of inner motivation. An important feature of the task-oriented learning

environment is the continuous feedback, evaluation, reflection, which is good if it is self-check and self-evaluation (Braithewaite et al, 2011).

According to the investigations of Bortoli et al (2015) and Solmon (2015) Physical Education classes are more efficient regarding their motivational level and learning results in a task-oriented, supportive learning environment than in an ego-oriented one, a methodology that generates competitiveness. In the result more factors were found of outstanding significance. The first is autonomy, that the students could set their goals individually and with continuous self-check they made decisions on their own, or changed them. The type of their goals is the second decisive factor. These were defined in the specified learning process advancement, and the development of their level of abilities. The third is the leading work form: in mixed composition of groups, they resolved cooperative tasks. In the groups they supported each other in order to attain individual (differentiated) successes. The feeling of a positive learning environment was also strengthened by the supportive attitude of teaching staff that acknowledged efforts and progress and ensuring individual progress pace.

Our current members represent the Z generation known by multitasking. They like the most those activities where they can experience actively, can create something, and are not passive recipients of the stimuli arriving from their environment. As for their performance immediate feedback supply is appreciated (Levy et al, 2005).

The practical learning content that can be well utilized in real life are preferred. Their active learning can be founded if they become interested in the process individually (Verok & Vincze, 2011).

For the purposes of Physical Education and Sports regarded as literacy fields, and for the students in our days, the teaching of projects can be one of the adequate methodological solutions, the regular processing of the curriculum also in the practical approach of PE. One of the features of the project is that the students take an active participation both in the choice and organisation of the activities. The other is that certain project programs are out of the PE classes (in other classes or out of school).

2 Methods

Our research was developed in the year 2016/17. Thirty PE teachers worked on curriculum related to the development of abilities and leisure sports with project method in their own classes. In the thirty classes the youngest were of 4th while the oldest 11th graders. The applied project titles: „What doesn't kill you makes you stronger" (7 projects); „Let's pull away the teacher's car" (8 projects); „Stand-by Hungarian" (7 projects); „Behave like Chuck Norris" (8 projects). The students were working on the projects for 4-6 weeks.

The phases of the project work: Brainstorming (1): after the title of the project was all set the students started to gather their ideas related to the topic freely. From these they picked the activities and programs ready to be realized on a mutual understanding which were displayed on a project map (2). They also defined the goal of the project (3): the study material that should be acquired during the project, abilities to be improved, or a concrete event they will prepare for during the project.

Out of the PE classes during the course of the project (16-20 PE classes) 1-2 programs were planned on other classes like physics etc. and as extra-curricular activities as well. The programs were organised in time and task tables (4) in which the creators responsible were indicated. During the realisation of the project (5) all ideas were utilised in all kinds of possibilities. In both the organisation and implementation of the PE classes and the extra-curricular activities was a leading element the self-motivated, active student work, the responsibility taken and measured by each individual. The projects, with the realisation of the

goal decided at the same time with the brainstorming session (6), and with the evaluation (7) had come to an end.

The effectiveness of the project teaching was decided upon qualitative and quantitative means. We applied pre and post-tests. The progress in the study material, the psychomotor skills tests, and the perceived motivational climate in PE by students were decided with PMCSQ-2 questionnaire. About the effects of the project activity for the students' attitude, activity, self-reliance and collaborative skills, we collected data by surveillance as well. The data were processed with the Paired Samples Test application, a software called SPSS Statistics 22.

We suggested that the task-oriented environment characteristic for the project education will be perceptible by the end of the project, and have a positive effect on the attitude of the students for PE. We also assumed that the effectiveness in the project processing will match with other conventional methods.

3 Results

3.1 The project activities

Most of the activities in the project happened during PE classes. The concrete programs of the ability development study material in focus – by the ideas of the students – adjusted to the theme of the project title. For example in „Let's pull away the teacher's car" project for gaining stamina in various pulling exercises (sandbag pulling, pulling of peers on gymnastics mats, in footstool etc.), while in „Behave like Chuck Norris" they used fighting games.



Figure 1. PE lesson in „Let's pull away the teacher's car" project. Notes: from teacher Pinter's project, 2017

In the project teaching the connection of different subjects is also important. In the framework of this the students dealt with the skeletal muscle in biology class, with power in physics. Extra-curricular activities added to the project theme. For instance in project „Stand-by Hungarian" they dealt with foot reflexology, danced, and with hand and foot print painted a huge Hungarian flag.



Figure 2. Extra-curricular activity in project „Stand-by Hungarian”. Notes: from teacher Ms Szummer Compo’s project, 2017

As an extra-curricular activity most of the projects included a fitness or gym visit. The project education strongly emphasizes individual interest and volunteering. It was present in the making and enforcement of more projects and personalized training plans. The students during the period of the project not only in PE classes but also in their free time did personalized trainings. A project feature is the creation of the product of the project too. This in project „What doesn’t kill you makes you stronger” meant the gaining of individual fitness results, in project „Behave like Chuck Norris” meant a Chuck Norris show (martial arts and fighting games demonstration). In project „Let’s pull away the teacher’s car” the students realized the project title: either the PE teacher’s car or the school bus they pulled away, improved their results made at the beginning of the project.



Figure 3. The post-test in project „Let’s pull away the teacher’s car”. Notes: from teacher Ms Polhammer Frend’s project, 2017

The products of the project „Stand-by Hungarian’’ related to the feet, or Hungarian identity, in programs like running races or folklore dancing.

3.2 The processing of study material

All of the projects dealt with the development of psycho motor skills, the improvement of the fitness results. Within the topic certain study groups set individual goals just as they formed the measurement exercises. They made both at the beginning and end of the project the measurement exercises related to age. 85% of the students had significantly better results in the post tests than in the pre tests.

3.3 Perceived motivational climate in PE

The PMCSQ-2 analysis suggested that the Task-Involving climate increased and the Ego-Involving climate was sinking during the PE projects. The Task-Involving climate in all three subscales values significantly increased: the Cooperative Learning ($p=0,00$), the Effort/Improvement ($p=0,00$) and the Important Role ($p=0,00$). Among the three subscales of Ego-Involving climate the value of the Intra-Team Member Rivalry and the Unequal Recognition subscales decreased significantly ($p= 0,01$; $0,002$). Out of the three subscales only the Ego-Involving climate Punishment for Mistakes value remained settled ($p= 0,691$).

Table 1. The results of Paired Samples Test of PMSCQ-2. *Significant differences at $p < 0.05$.

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Cooperative Learning 1 - Cooperative Learning 2	-,2247367	,2363583	,0431529	-,3129943	-,1364790	-5,208	29	,000*
Effort/Improvement 1 - Effort/Improvement 2	-,2314300	,2690873	,0491284	-,3319088	-,1309512	-4,711	29	,000*
Important Role 1 - Important Role 2	-,1492033	,2004159	,0365908	-,2240399	-,0743668	-4,078	29	,000*
Intra-Team Member Rivalry 1 - Intra-Team Member Rivalry 2	,1043433	,2081466	,0380022	,0266201	,1820666	2,746	29	,010*
Unequal Recognition 1 - Unequal Recognition 2	,1322900	,2075133	,0378866	,0548033	,2097767	3,492	29	,002*
Punishment for Mistakes 1 - Punishment for Mistakes 2	-,0246667	,3362867	,0613973	-,1502382	,1009049	-,402	29	,691

4 Discussion

In the PE subject, where the goal is to obtain the necessary knowledge for a health conscious and active adult life, it is outstandingly vital that our teaching methods are adjusted to individual inclinations, abilities and skills. The students who could make conscious, self-reliant (partially) goals undertook bigger challenges during the project (Ulstad et al, 2016). The project made possible for students the choice of different learning paths that reinforced their sense of competence (Braithwaite et al, 2011), increased their endeavors for advancement. By all these the success hierarchy of PE classes equaled, the versatile project work activities provided the feeling of success for more students (and the recognition of peers), what the Important Role subscale's increase and the students of Intra-Team Member Rivalry subscale decrease showed. Our teachers observed the rise in interactions and qualitative development among the students, the PE teacher and their students, and other project participants (H. Ekler, 2016). During the project the chance for Cooperative Learning was available and supported. Working in pairs and in collaboration with each other developed the students different set of

skills like tolerance, open-mindedness, argument and compromise skills which the students perceived as positive learning environment.

5 Conclusions

The objective of the PE project is the transfer of knowledge and motivating formation of attitude by laying emphasis on body-wise culture. For this reason the project connects the PE study material with certain topics and other subjects, also taking into consideration the outside world of the school. With student-oriented methods the project can establish a learning environment that affects the students' inner motivation. The PE project is of equal efficiency with other methods in transferring study material, however, in the formation of attitude is of way more efficient than other traditional educational strategies.

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Olympic Education at the Regional Level.

Karaulova, A., Ershova, N.G., Belyikov, D. A. and Smirnova, E.Yu
Foreign languages department,
Department of Humanitarian and \Socio-Economic Disciplines,
Velikie Luki State Academy of Physical Education and Sport, Russia.

Abstract

Mark out the features of Olympic education at the regional level.

In Russia the system of schoolchildren Olympic education began to be formed since 1992 and base on the interaction of different levels: the Federal level; the level of subjects of the Russian Federation; regional Olympic academies and educational authorities.

Annually since 2007, sports competitions “Young olympionics” among preschool educational institutions are held in Velikie Luki. The program of this competition includes: motor activity, complex zone of obstacles, and a theoretical quiz «Experts of Olympism». At the higher educational establishments of Velikie Luki the Olympic education got its development in Sports Academy. It is realized through teaching educational disciplines, creative contests during extracurricular time, the scientific work on studying the Olympic movement, and informative activity for the dissemination of Olympic knowledge among different population groups.

The peculiarity of Olympic education in Russia at the regional level is between regional Olympic academies, secondary schools and non-physical higher educational establishments.

Keywords: *Olympic education, regional level, Pskov region*

1 Introduction

In the system of Olympic education museums and sports tourism play a very important role. The Museum of sport and Olympic movement of Pskov region is among them. It has been working to spread the Olympic knowledge among different categories of the population. The system of Olympic education in Russia started to be formed by the initiative of the Russian Olympic Committee, which developed the concept of the state and public system of Olympic education in 1992. The system is based on the cooperation of the Ministry of education and the Olympic Committee at the Federal level, at the level of subjects of the Russian Federation on cooperation of sports bodies, regional Olympic academies and education authorities. In Russia there are 14 regional Olympic academies, which have a great influence on the development of the system of Olympic education in the regions of Russia. One of them is Velikie Luki Olympic Academy (VLOA). It exists as a public institution in Velikiye Luki State Academy of physical education and sports (VLGAFC).

The purpose of the research: popularization of sport and Olympic heritage of Pskov region; development and implementation of a new model of sports tourism.

Main tasks of the research:

- to study the activity of the Museum of sports and Olympic movement of Pskov region
- to spread the Olympic knowledge among different categories of the population
- to identify potential opportunities for developing a cultural-informative bicycle route in Velikie Luki under the name “Big history of a small city”.

2 Methods of research

- study of scientific-methodological and normative-legal literature
- statistical analysis
- experiment

3 Discussion

Every year since 2007, in the city of Velikie Luki sports competitions "Young olimponics" are held among preschool educational institutions. The program of the competition "Young olimponics" includes motor tasks, complex obstacle course, and a theoretical test "Experts of Olympism". The competitions "Young olimponics" are held in two rounds: the qualifying – in the neighborhoods of the city on the bases of secondary schools and the final – on the basis of sports academy because the greatest development the Olympic education has received in it. It is implemented through teaching, creative contests outside of class time, scientific work on the study of the Olympic movement, educational activity on the distribution of Olympic knowledge among different population groups.

Special place in the system of the Olympic education is given to sports museums. Among them there is the Museum of sport and Olympic movement in Pskov region, which was opened in Velikie Luki State Academy of Physical Education and Sports in February, 2015. There were some objective reasons for the creation of the Museum.

First, Pskov region is rich in sporting and Olympic traditions, proud of its famous athletes, coaches, organizers of sports-mass work. Athletes of Pskov region are famous for their sports victories at the international and Olympic arenas. Secondly, in Pskov region there is a specialized sports institution in the face of Sports Academy, which is recognized as a center of training and retraining of physical culture and sports specialists for the region and the country. 13 students and graduates of the Academy in different years became participants of the Olympic Games and two of them – the Olympic Champions (Valery Chaplygin and Mikhail Ivanov). Thirdly, the Academy has the necessary material base for the functioning of the Museum. Finally, the Academy has capacity to work effectively in the field of study, preservation and popularization of historical sports heritage of the region.

In the structure of the Museum there are 3 Funds: the main Fund, temporary storage and scientific support. The main Fund includes a variety of collections responding to the specifics of the existing Museum items. A collection of "Faleristics and numismatics items" includes medals, badges, coins, tokens with a sports theme; in the collection "Cups" you can find sport trophies from competitions of various levels – from local to international ones. A separate collection is dedicated to sports clothes and inventory, sports equipment. There is also an impressive collection of sports pennants (over 90 titles).

A special place in the Museum is given to the collection of "Attributes of the 2014 Olympic and Paralympic Winter Games in Sochi", including a large number of Museum objects related to the XXII Olympic and XI Paralympic Winter Games in Sochi. It is not casual

because 24 representatives of the Academy – students and teachers – have attended the Games as volunteers; and some of them, as the rector of the Academy V. N. Shljahtov – as the official guest of the Olympiad. Thanks to these people it was possible to assemble an extensive collection of Olympic Souvenirs, items of sport uniform and equipment, a large number of photographs and other documents. Therefore, among teachers, students, the University management there was an idea to create the exhibition devoted to the participation of the Academy representatives at the XXII Olympic and XI Paralympic Winter Games.

During the preparation of the exhibition there were collected more than 270 different items, over 120 of them were selected for exhibiting. Among these items are the torches of the torch relay of the Olympic and Paralympic flame, set of the torchbearer and volunteer uniform, accreditations and the work schedules of a volunteer, staff workbooks of the Games, commemorative certificates, diplomas, letters of thanks, tickets to sporting events and official ceremonies, souvenirs, posters, postcards, badges, magnets, pennants, plaques, photos, etc.

It is worth noting that some items are truly unique and are the pride of the exhibition and the Museum: the Russian flag with autographs of members of the Russian team in short track relay at the 5000 meters Olympic Champions Victor An, Simeon Elistratov, Ruslan Zakharov, Vladimir Grigoriev; a bouquet of flowers from the Awarding ceremony of the XI Paralympic Winter Games, donated to 4-time Paralympic champion Michalina Lysova; poster "Sochi 2014" with a donative inscription "Sincerely, the chief justice in cross-country skiing at the XXII Olympic Winter Games in Sochi, V. Vedenin"; the puck autographed by the Olympic champion, the captain of the men's Olympic hockey team of Canada Sidney Crosby; a stick of member of the men's Olympic hockey team of Norway Hansen; a gift set of badges with official forms of national hockey teams; souvenir medal "Participant of the closing ceremony of the XXII Olympic Winter Games" (February 23, 2014); a collection album for the Olympic 100 ruble banknotes and 25 ruble coins of the Bank of Russia, dedicated to the XXII Olympic and XI Paralympic Winter Games.

The Exhibition activity of the Museum of sport and the Olympic movement of Pskov region is one of the leading ones. June 4, 2015 the exhibition "Sports Academy: history and modernity" dedicated to the 45th anniversary of the Academy was opened. June 16, 2016 another exhibition took the floor – "Sports stars of Velikie Luki", dedicated to the 850th anniversary of the first mention of Velikie Luki in the chronicles.

The research activity of the Museum is closely connected with the preparation of new exhibitions, stock work and studying of Museum objects. Among the priority directions of the studies is the investigation of various stages of development of physical culture and sports of Pskov region; the study of the history of VLGAFK, a study of the lives and professional lives of the people of Pskov – Honored workers of physical culture, famous athletes of Pskov region and, first and foremost, the Olympic Champions, prize-winners and participants of the Olympic Games.

Cultural-educational work of the museum has a special importance. It is based on conducting the excursions which acquaint visitors with current expositions. Nowadays, more than 1300 people have already visited the museum. Among them are sports veterans, low-mobility groups, students of the Sports academy, athletes and participants of various sporting events, etc.

Tourist work is one of the new directions of the Museum activity. The first step was the idea of the creation of a bicycle tour in Velikie Luki. Before the appearance of this idea, on December 15, 2016, on the basis of country hotel "Volhynia" the round table «Tourism of Velikie Luki. Prospects, development» was organized. During the active dialogue the acute problems of tourist market of Velikie Luki had been revealed. It was established, that the main strategic direction for the tourism sector of Velikie Luki is advancement of internal tourism. The tourism sphere has a number of problems. To solve them a creative initiative group was

organized. The representatives of Sports Academy were included in that group. This working group offered a project of bicycle route which is a synthesis of a sports and cultural-informative elements, which makes it unique.

The bicycle cultural-informative route offered by Velikie Luki Sports Academy is a new theme in bicycle tourism. To implement the given project and to develop further this direction in Velikie Luki is very easy as bicycle sport is a well-developed one in our region. The main objective of the project «Bicycle tour - the big history of a small city» is a fascinating form to acquaint inhabitants of Velikie Luki and tourists with history and the present of the city of Velikie Luki. Besides, one more idea consists in the popularization of historical and cultural heritage with promoting of a healthy way of life.

There were some bicycle races organized in the city:

- in May 2014 with the motto “Let’s bike it!” (200 participants);
- in 2015 250 people took part in a bicycle race including some guests from Italy;
- in 2016 our city celebrated the 850th anniversary of the first mention of Velikie Luki in the chronicles and a bicycle race in honor of this date gathered more than 500 participants. The youngest participant was only 2 years old and the oldest one was 66. The winner of Deaflympic Games’ cycling events and the Sports Academy graduate Ivan Makarov took part in it as well;
- in 2017 youth public committee organized a traditional “Bicycle parade”.

It is possible to draw a conclusion that the direction under discussion is interesting not only for inhabitants but also for the guests of our city, as the number of participants of “the cycling parade” in 2017 was something about 1000 people.

4 Conclusions

Thus, it is possible to say that the Museum of sports and Olympic movement of Pskov region plays a very important role in the promoting of Olympic knowledge among different categories of the population, bringing the contribution to the system of Olympic education.

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PLuRALE project - Physical LiteRAcy in Lifelong Education.

Pio Alfredo Di Tore, Gaetano Altavilla and Gaetano Raiola
Università degli studi di Salerno, Italy.
alfredo.ditore@gmail.com

Abstract

The concept of physical literacy is rapidly gaining consensus across the globe. Currently, physical literacy is not only seen as the result of physical education but as a concept of health and well-being throughout life, and is therefore gaining importance in educational, medical, psychological and social field.

Physical literacy, in other words, seems to define a common denominator and a common sense horizon to a set of studies (and practices) that, in the international context, acquire a wide variety of denominations: sport science, exercise science, human performance, movement science, human kinetics, kinesiology, kinanthropology, athropomotrics, anthropokinetics, anthropokinesiology, health, physical education, physical culture, recreation, leisure studies, coaching, athletic training, adapted physical education, sport management (Čustonja, Milanović, & Sporiš, 2009).

The work intends to present a unitary approach to the concept of literacy, developing its various and complementary declinations.

The shift from skills to literacy implies further advancement towards a holistic conception of the human being and its interaction in the world as a key to a full and satisfying life (Whitehead, 2010).

From this perspective, the paper deals with "old" and new literacies, investigating how the current situation challenges the idea of different "literacies" as a different set of skills in various fields of knowledge in favor of a unitary, but more global and complex, meaning of literacy as the ability to "read" and "write" our own living environment. These are the premises of the PLuRALE project - Physical LiteRAcy project in Lifelong Education, starting at the University of Salerno, presented at the end of the paper.

1 Introduction

Physical Literacy is a fundamental human capacity that can be described as an acquired provision that includes motivation, confidence, physical competence, knowledge and understanding necessary for individuals to undertake intentional physical activity as an integral part of their lifestyle (Whitehead, 2013). Physical Literacy, in other words, concerns not only the physical development of a person (the ability to move), but also intellectual development (making the right decisions - when and how to move), emotional (trust and self esteem), and social ones (ability to work in groups). In this sense, the concept of literacy implies a continuum of learning that allows people to achieve their goals, to develop knowledge and potential, to fully participate in community life and society in the broader sense (UNESCO Education Sector, 2014). Literacy refers to a multiple scenario, which does not limit literacy to the outcome of education, limited to a certain period of life and training, but suggests a continuous evolutionary process, the constituent dimensions of which are both the acquisition and the the exercise of skills, and the interactions between these skills and environmental and social contexts.

The international scientific debate has declined the concept of Physical Literacy in the educational field (Whitehead, 2013), in performance (Corlett & Mandigo, 2013; Higgs, 2010), in the social sphere (Vickerman & DePauw, 2010), recognizing a common scientific and philosophical background in fields of knowledge not always contiguous. To the definition of this debate and of the cultural and educational process underlying it should contribute to the different scientific areas of Science applied to the study of the human movement and sport (neuroscience, medicine, psychology, pedagogy) oriented to a new definition of the relationship between movement, action, perception and knowledge. The physically literate individual is able to understand, communicate, apply and analyze different forms of movement, is capable of effectively responding to a wide variety of situations, has sufficient motivation and confidence to capitalize on its physical potential, is able to know and understand to make a significant contribution to the quality of life.

The aim of this proposal is to apply the key elements of the conceptual framework of Physical Literacy defined in the literature (Whitehead, 2010) to physical education and sport teaching practice realizing, through the definition of methodologies and tools applicable in everyday life, a conception of knowledge which recognized the role of the movement and body in cognitive processes.

It is evident that a field of study can exist and enjoy a specific identity even if it is defined in different ways. In 1992, however, Wade and Baker (cited in Mills, 1992) found that the absence of a clearly articulated and generally accepted definition of the field of study has obvious consequences in the articulation of higher education curricula. From its first formulation - attributed to Margaret Whitehead in 2001 (Whitehead, 2001) – to the current spread on a global scale, the idea of physical literacy has proved able not only to be a meeting ground between not always contiguous fields of study and research, but also to provide a solid ground for starting good practices in the field of education, rehabilitation and the promotion of healthy lifestyles, as evidenced by, for example, the Anglo-Saxon experience of the Primary School Physical Literacy Framework or the Canadian experience of Canadian Sport for Life (CS4L).

2 From Physical Education to Physical Literacy, from skills to literacy

The shift from the idea of Physical Education to the broader and more comprehensive one of Physical Literacy is attributed, according to Whitehead, to the functional dimension of the literacy concept: the ability to respond appropriately and to engage productively in a particular context.

While the term "competence" refers to different meanings in the various disciplinary fields and methodological implications, the concept of literacy, originally referred to the instrumental capacity of reading and writing, has rapidly developed over the last decade, even beyond the Anglo-Saxon world.

In the last decades, the idea of literacy as a reading and writing ability has undergone a rapid semantic extension (Digital literacy, Numeracy, Music literacy, Emotional Literacy, Physical Literacy) that has led it to become able to read and write the world (Corlett & Mandigo, 2013)

The meaning of literacy has gradually gained wider connotations, reaching a complex set of critical skills that allow people to express, explore, interrogate, communicate and understand a flow of ideas between individuals and groups.

The term literacy implies a continuum, refers to a plural scenario that does not restrict literacy to a limited period of life and training, but suggests a continuous evolutionary process, the constituent dimensions of which are both the acquisition and the exercise of skills, and the

interactions between these competences and the environmental and social contexts. Literacy has an effective acting power (dynamis) with respect to its object, together with a metacognitive part, a critical thinking ability and awareness of its effectiveness. Literate knowledge is a critical, informed and experienced know-how.

The hinges of the idea of Literacy become, following this perspective, the concept of interaction - understood as the ability to establish a 'fluent and productive interaction' with the world (Whitehead, 2014) - and the concept of embodiment – undein the meaning of understanding of the role ‘of an agent’s own body in its everyday, situated cognition’ (Gibbs, 2006).

In this sense, physical literacy represents a framework with a solid philosophical and scientific framework (Whitehead, 2008), an acknowledged identity in the international scientific debate (Evans, 2011), a strong pedagogical declinability in formal, informal and non-formal contexts (Mandigo, 2009) and presents itself as:

- as a reference framework to help educators in implementing quality programs related to curricular results designed to encourage the formation of physically literate students;
- as a tool able to bridge a historical gap that often separates educational-oriented learning environments from those related to the performance aspect;
- as a methodological and operational scenario that can accompany a person throughout life, from the early stages of school learning, to motor activities of the elderly.

3 PLuRALE - Physical LiteRAcy in Lifelong Education

The purpose of the project proposal is to support the development of horse training processes between the formal practices, non-formal and informal able to exploit the high operational effectiveness of the concept of Physical Literacy (evidenced by the rapid spread of programs based on Physical Literacy in the USA, UK and Canada) to promote and enhance - through the design, development and experimentation of dedicated methods and tools - an integral and integrated approach to the practice of lifelong motor sports and sports education, in order to foster greater prosperity and greater social sharing and participation, and thus a more cohesive, participative and inclusive society according to the Horizon 2020 guidelines.

In accordance with these guidelines, aimed at developing growth strategies in the field of education able to co-ordinate with research aimed at promoting innovation in a productive key, the proposal aims at developing an interdisciplinary framework that represents a theoretical and practical meeting place between all those who, for various reasons, are stakeholders in the motor activities and sports: athletes, families, schools, teachers, doctors, researchers, coaches, instructors, therapists, volunteers, leisure providers, young leaders.

The need for such an integrated approach is suggested by the already dramatic numbers that describe physical illiteracy: physical inactivity is the fourth leading worldwide mortality risk factor and causes 6% of all deaths. It is only overcome by blood hypertension (13%) and tobacco consumption (9%) and is at the same risk of hyperglycaemia (6%). About 3.2 million people die each year because they are not quite active (Oms, 2010). Proponent risk factors for inactivity should also be considered as a solution to the continuity between the different contexts of physical activity: according to age, in fact, the context for the practice of physical activity may be different: school, family, community, work or sport environment.

These different contexts should be articulated on a common architecture. The PLURALE Project - Physical LiteRAcy in Lifelong Education - aims to elaborate, on the basis

of good practices in the United States, Canada and UK, a common conceptual and operational framework that can embody such architecture.

In this sense, the project team includes the presence, among others, of experts coming from different contexts of the methods and the didactics of motor and sport activities: education, performance and rehabilitation.

The difficulty of developing a functional dialogue between different scientific, professional and operational sectors adds the difficulty of reflecting the lively internal debate of a scientific sector that has been questioning for years on both epistemological and methodological and operational levels.

In order to bring this complexity back to the project while avoiding the risk of paralysis that this involves, the methodological approach is based on communities of practice (Wenger, 1998).

4 Results

The ultimate goal of communities of practice is to reach the definition of a shared and effective teaching practice, oriented to Physical Literacy. A community of practice can be defined as a social group whose goal is to produce organized and qualitatively significant knowledge around a specific theme by making it available to the group and sharing with it their knowledge, research and experience with the aim of a collective improvement of the group from a strong awareness of the knowledge possessed.

Within the sciences of the human movement, scientific communities of practice are networks of university researchers, teachers of various school orders, instructors and coaches who carry out a self-analysis of sports and physical education teaching and of community empowerment (Vanassche e Kelchtermans, 2015). Communities of practice have two main objectives: efficacy and understanding of the investigative aspects, on the one hand, rigor and relevance of the results, on the other (Vanassche e Kelchtermans, 2015).

Wenger (1998) defines in detail the peculiarities of a Community of Practice:

- engagement in an activity - that is, the realization of a joint venture, understood as such by its members and negotiated in its various aspects;
- social cohesion - that is, the existence of a mutual commitment among the members, who feel bound by a common identity within a certain social identity;
- sharing a specific culture - that is, the presence of a shared repertoire of common resources developed over time, ie languages, styles of action, sensitivity, recurring modes of action and thought.

Physical Literacy is, in this context, shared culture, the common background from which community actors move, analyzing their teaching practice and the various multidisciplinary aspects that build the learning / teaching processes of physical and sports education.

In this sense, the various Communities will work on specific aspects of Physical Literacy and their concrete realization in teaching practice, sharing goals, methodologies (deductive and inductive) and teaching proposals. To ensure elasticity, the various communities will articulate their activities on a common canvas, organized around the three key questions:

1. *What is Physical Literacy in the context of reference?* - Communities may, for example, be articulated by the age of the subjects to whom they are addressed, or by an activity in particular. In any case, they will have the responsibility of declining the concept of Physical Literacy with respect to the subject around which the community

is established.

2. *What is the role of the different actors in contributing to the effectiveness of the community of practice?* - Communities will have to indicate which part they play teachers, instructors, coaches, families, schools and other training agencies in the establishment and maintenance of the Community.

3. *What resources of Physical Literacy have been particularly useful for the establishment and maintenance of the community?* - Communities will populate a database of resources related to Physical Literacy which are useful in community life.

The effectiveness of the programs implemented must be assessed on the basis of effects on motor learning variables, psychological, social and biomedical variables. The monitoring will aim to control, in a structured manner and with recurrent and fixed step, the activities of communities of practice in order to:

- highlight the trend, starting with the elementary variables of the common action around which they coagulated;
- record deviations between what is being achieved and what was designed;
- Inform the actors about the criticalities they face from each other to look for the most appropriate solutions.

In this sense, the ubi consistam of the conceptual and methodological framework which is the goal of the project consists of a semantic portal dedicated to Physical Literacy, an open and upgradeable text able to respond, with different levels of detail, to single users, students, parents, instructors, athletes, therapists, schools and institutions.

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Role of hippotherapy in rehabilitation of children with a spastic form of cerebral palsy.

Ivanova V., Lanskaya, O.V., Dytko, E.V. and Ershova, N.G.
Physiology and Sport Medicine Department,
Foreign Languages Department,
Velikie Luki State Academy of Physical Education and Sport, Russia.

Abstract

Recently, there has been a significant growth of the amount of children with cerebral palsy in the world. This fact makes the problem of their complex motor rehabilitation very important. We consider hippotherapy to lead in this process.

Our hippotherapy rehabilitation study is based on the analysis of Pskov equestrian club "Rodina" infrastructure and selected literature on the topic to obtain the necessary knowledge and further embody the data in question in Velikie Luki rehabilitation center for children and adolescents with disabilities and the stables "Balandino" in Velikie Luki area.

At first a sample of a hippotherapy rehabilitation program for children with a spastic form of cerebral palsy of preschool and primary school age was created. Then the obtained knowledge and information helped successfully implement the program in Velikie Luki rehabilitation center. The sample program and implementation data increased the probability of further successful development of the rehabilitation center and made it easier for disabled children and their parents.

Key words: cerebral palsy, rehabilitation, hippotherapy, sample program, Pskov Region

1 Introduction

According to a number of researchers in the general mass of Russian children with disabilities, cerebral palsy among all nosologies is presented in more than 50% of cases. The term "cerebral palsy" brings together a number of syndromes arising from lesions of the brain and spinal cord. There are various causes of cerebral palsy. The reasons for this violation mostly lie in the defeat of the fetus in the stages of fetal development during the influence of toxic and harmful substances such as alcohol, drugs, radiation, potent medicinal substances, and in the transferred infectious diseases of mother during pregnancy (meningitis, encephalitis, etc.), birth trauma, and genetic predisposition. The increasing number of children with spastic form of cerebral palsy makes very actual the problem of their complex locomotor rehabilitation. Among the means and methods of motor rehabilitation in recent years hippotherapy plays the leading role.

One of the most common forms of cerebral palsy is spastic diplegia, also known as "Little's disease". This disease is characterized by dysfunction of muscles, and to a greater extent hands, contractures, deformities of the spine and joints.

Hippotherapy as therapeutic gymnastics on a horse ("hippos" means "a horse" in Greek) is a long-known effective therapeutic aid for patients with various diseases. The first attempts to apply dosed horseback riding and physical exercises on horses for the treatment and rehabilitation of some categories of disabled persons were adopted in the early 1950s in Germany, Scandinavia, and then in the UK, Canada, Switzerland, Poland and France. Horse riding in Russia for the first time for the treatment of children was applied in the hippotherapy

center "Zhivaya nit", which was opened in 1991 in Moscow. In recent years in various countries hippotherapy has been used in the system of complex rehabilitation of persons with disorders of the musculoskeletal system. On the territory of Pskov Region on the basis of the equestrian club "Rodina" for more than 10 years the treatment and rehabilitation of disabled children has been carried out.

The goal of the rehabilitation process is to move to a higher level of the patient's abilities. Hippotherapy as one of the forms of therapeutic physical training allows to solve the following main tasks:

- to counteract the negative influence of hypokinesia caused by the disease;
- to develop physical activity of a patient;
- to contribute to the restoration of impaired functions;
- to improve or restore lost skills;
- to provide professional rehabilitation, form new or restore lost skills.

Hippotherapy as one of the technologies for working with people with disabilities is a complex multifunctional method of rehabilitation. In essence, hippotherapy is nothing more than a form of physiotherapy exercise where the horse, the riding process and the physical exercises performed by the person during riding are used as an instrument of rehabilitation. The positive effect is achieved through familiarity with the horse (a positive emotional background is created), the heat and movement of the musculature of the horse (it warms up and massages the muscles of the child), the inclusion of all muscle groups in the work. Thus, hippotherapy as a means of rehabilitation provides not only motor rehabilitation, but also social adaptation of the patient.

Aim. To experimentally validate the proposed model program of rehabilitation in Velikie Luki area.

2 Methods

Analysis of literature sources on the problem under study, questionnaire poll, survey of infrastructure facilities in Pskov Region and adjacent regions (racecourses, private stables), analysis of topical Russian rehabilitation programs with application of hippotherapy, evaluation of motor skills on Chailey scale, mathematical statistics methods.

3 Results and Discussion

To create a specialized program of classes with children with a spastic form of cerebral palsy, in the first place, the possibilities of the infrastructure of Pskov Region were assessed. In the immediate vicinity of the city of Velikie Luki and the Academy of Physical Education and Sports there is a stable in the village of Balandino (Velikie Luki district), in which it is theoretically possible to organize horse-riding classes for children suffering from cerebral palsy, but this stable currently has only entertaining and teaching potential of work with a horse, offering, for example, riding small children around in a circle on horses and training everyone who wants to ride from scratch. From our point of view, with the presence of specially trained animals and qualified specialists, the stable in Balandino can in future become a center offering rehabilitation services for different age groups of people diagnosed with cerebral palsy.

The site for development of an exemplary rehabilitation program was the equestrian club, located in the village of Rodina, Pskov district. This club has a wide range of opportunities for implementing medical support programs using hippotherapy, as well as employees who have the appropriate education and training to conduct classes with horses in special conditions.

According to personal estimates of the staff of the racecourse in the equestrian club "Rodina" the classes are being held with children with disabilities under a special program for more than 10 years already, on the basis of the club there are two horses possessing an iron mind, a good disposition, a suitable physique and a good amplitude step for classes with children.

Based on the materials and programs of the equestrian club Rodina and the analysis of programs for the rehabilitation of children of pre-school age group with cerebral palsy traditionally used in practice, initially a curriculum was developed, designed for a period of six months (the optimal term of the test period of the program in real conditions) and consisting of 3 parts - the adaptation stage, the main stage and the final stage. The curriculum design includes a total amount of only 24 hours, classes should be held 2 times a week and last for 30 minutes.

Selection of the complex of exercises of the program is strictly individual for each patient. Depending on the form of the disease, the tasks of treatment and rehabilitation and functional capabilities, which are determined by special tests, there are various contraindications.

An exemplary program of rehabilitation of persons with spastic form of cerebral palsy initially being only a theoretically designed project, found its application in practice and has been successfully implemented on the basis of the rehabilitation center in Velikiye Luki district.

To assess the spastic cerebral palsy patients' motor abilities dynamics was used the method of motor skills assessment with the use of Chailey scale. This scale is a visual method of crude motor activity evaluation. To define validity of acquired experimental results and obtaining the opportunity to compare these results on the intragroup and intergroup levels mathematical statistic methods were applied.

We investigated five different postures of the 10 rehabilitants participating in the experimental procedures, which allowed to evaluate the impact of static reflexes in postural control of body posture. When conducting indices' analysis on Chailey scale attention was drawn to the static position of the head, shoulder girdle, pelvis, and also to the setup reaction from the head to the shoulder girdle, the shoulder girdle to the pelvis, the free movement of the limbs. The evaluation was performed before and after training sessions.

Table 1. Control measurements before a training session (n=10).

Exercise type	Average assessment sum (based on Chailey scale)									
	Lying on the back		Lying on the belly		Sitting on flat surface		Sitting on a chair		Standing	
	Xavg	a	Xavg	a	Xavg	a	Xavg	a	Xavg	a
Control group	4,40	0,52	4,60	0,84	3,90	0,73	4,50	0,53	3,90	0,88
Experimental group	4,00	0,47	4,50	1,08	3,60	1,20	3,90	1,10	4,00	0,94

Table 2. Control measurements after a training session (n=10).

Average assessment sum (based on Chailey scale)	
Sitting on	
Exercise type	Lying on the back Xavg a
	Lying on the belly Xavg a
	flat surface Xavg a
	Sitting on a chair Xavg a
	Standing Xavg a
Control group	105,10 0,73 5,30 0,48 4,80 0,91 5,00 0,47 4,70 0,82
Experimental group	105,40 0,70 5,60 0,70 5,20 0,92 5,20 0,79 5,00 0,67

4 Conclusion

Our proposed model program for the rehabilitation of children and persons of younger school age by means of hippotherapy has been successfully introduced and implemented in the rehabilitation center for children with disability on the territory in Velikie Luki district. The sample program and implementation data increased the probability of further successful development of the rehabilitation center and made it easier for disabled children and their parents.

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“What comes next? Life after the degree”

Némethné Tóth Orsolya,
ELTE PPK., Sporttudományi Intézet, Szombathely, Hungary.

Abstract

The aim of this research is to investigate the success ratio in job finding of the students who have taken part in teaching courses at our university. Also, the research includes examinations whether students have a language certificate which is compulsory for getting a diploma. Moreover, we were interested in their diplomas' labelling. Further attention was paid to the pupils' career possibilities, their position in their jobs, and their ambition for further studies after receiving their diploma. I presumed that students nowadays find jobs easier which is true. I also assumed that from 2012 we have an increased rate in receiving diplomas among students but, that turned out to be incorrect.

Keywords: *graduating, work, language, occupation*

1 Introduction

Before 2006 when the introduction of the Bologna system occurred, about 70-80 students started their study each year on average at the University of West-Hungary, Savaria University Centrum. This number greatly decreased to a yearly number of 15 to 20. Thankfully, in the recent two years we had at least a modest increase which resulted in the possibility of starting evening courses.

What arose my interest is that the pupils who had completed their studies here have been able to find a job in large proportion in the public education area. Therefore, I choose to continue our previous research (started with Noémi Zsilinszki) from 2012.)

1.1 The antecedents of the research

I have received some information from the directorate of local education of KLIK. They informed me that the average age of teachers with legitimate teaching diploma is somewhere between 46 and 49 in county Vas, which includes 4 education quarters of the county. Not to mention, that the expected retirements in the upcoming 5 years counts 85 out of 463 members. This leads me to the conclusion that there will be a serious shortage of teachers in county Vas due to the 12-15 membered classes per year.

All of this has been ensured by a tender of the local government in Szombathely which is called "Szombathely welcomes you back". It tries to encourage local students to start a course at the university that is considered to be a future blank profession. These areas are: instructor, kindergarten nurse, ethnic kindergarten nurse, adult and infant general practitioner, engineer, electrical engineer. <http://www.szombathely.hu/ugyintezes/e-ugyintezes/ugytipusok/szombathely-visszavar-felsooktatasi-tanulmanyi-osztondij.2422/>

The legislation background of the research is given by the Act [CXXXIX] of 2005 on Higher Education Data Management in Higher Education Institutions, according to Article 34, paragraph 6 of the Higher Education Information System which says: "The higher educational institutions on the basis of volunteering data management:

- support the tasks of career tracking in which they investigate on those job market situation, who has received their certificate in our institution. Previously before joining ELTE, there was a Career Tracking System for those who received a diploma, which was also the part of the examination process at the University of West-Hungary of the graduated pupils in the frame of the Operative Program of New Hungary Developmental Plan. The research still goes on, the partial results can be read on the website of the university. The Career Research System gives us a whole picture, divided into faculties, even though the results do not show the differences between the departments. Given the fact that only 25% of the pupils have completed their studies from pedagogy, we decided to conduct a research on the teaching pupils only. (http://tamop411.nyme.hu/fileadmin/dokumentumok/projektek/tamop411/DPR_modul/letoltesek/NyME_dpr2011tavasz_vegzettek.pdf .)

The research of the Educatio Nonprofit Ltd has reached a conclusion that the job market treats Bachelor degrees like the old college certificates. Their salary and their job satisfaction are lower than the average - according to the researchers this is caused by the fact, that "the employers do not know the possibilities of the new educational system." The ones with Bachelor diploma are more likely to finish their Master degrees, than the ones with a college diploma. In the previous higher education system 26-27% of the pupils start new studies at universities, out of these 44% have a Bachelor diploma and 29% do not work during their studies.

(http://eduline.hu/felsooktatas/2011/2/27/20110227_frisssdiplomas_munkakereses_allas)

In 2001 The Educatio Nonprofit Ltd made a substantial research in which they collected data from 31 higher educational institutions in 2008 and 2010, focusing on the recently graduated students. The connection between their jobs and qualifications were also highlighted. 21% of the ones who had completed their studies left his field of career. 62% of the pupils could get a job corresponding to their qualifications, and 17% work in their field of study. In the spring of 2012 in the frame of the Hungarian Diploma and Career Following System (DPR) that tracks people who have diploma, the Educatio Nonprofit Ltd collected data about the graduated students. This data collecting included students with 5-year degrees. The institutions targeted pupils who finished in 2007, 2009, 2011 via online questionnaire. They highlighted the question about whether they received their diploma right after graduating. This information was further divided by the areas of the qualifications. In the pedagogical education there were 31,5% of those who did not receive their diploma after having had absolutorium which is caused by the lack of language exam at 89,8% of them. 36% of the subjects without diploma after having an absolutorium could find a job, and 45% had already been employed. The field of pedagogy suffered significantly more from the losses of diplomas on the job market. 22.9% of the surveyed said that the lack of diploma was not a disadvantage for them. It turned out that the job market's "welcome ability" had been decreasing by the years for those who did not have diploma. It means that it is becoming a genuine problem not having the diploma after the absolutorium. In the case of absolutorium the career-leaving phenomena is 23%, where their job is not connected to their earlier studies. 26% of them could find a job that was equivalent to their qualifications, 51% works in a field of their speciality. These rates are typical for the workplaces they were having during the period of the research too. The rates of the career leavers are 22%. The ones who only work in their speciality is 17% which is 9% less, and the ones whose jobs are connected to their speciality is 61%, which is 10% more.

All in all, we can say that the career leavers' and the ones whose job/work is fully or partly connected to their specification's rates did not change during the research. The government made a Diploma Rescue Program, that allows people to prepare for the language exam free of charge, that is indispensable for receiving a diploma. If the exam is unsuccessful, they have to refund half of the tuition fee.

(http://eduline.hu/nyelvtanulas/2015/3/2/Igy_jelentkezhettek_a_marciusban_indulo_ing_A4Y_IL0)

1.2 Hypotheses of the research

H1: We assume that our graduates can find a higher proportion than in previous years.

H2: We assume that students who are graduated will receive a higher degree after completing their degree than graduates of the 2012 survey. (Examination of Language)

2 Material and Method

Applied research methods:

The method taken from social sciences, the written form of the query, the questionnaire method, online form. (Open and closed questions or application of the Likert scale). The questions and conclusions of our questionnaire can be grouped around the following topics: general questions, study requests (graduation, other education, college studies), any foreign plans, location, work (main, side), relationship with the mother institution, measurement of satisfaction, the prestige of the profession.

2.1 Sample

NymE SEK graduates from 2013-16, 57 graduates completed 4 academic years, 38 of them online surveyed our questionnaire. Our students had previously been able to reach our students in the Neptun study system at their enrollment (e-mail address).

3 Results

Of the respondents 89% were women, 11% men, all of which reflect the specificity of the teaching profession, and we have one male student per group.

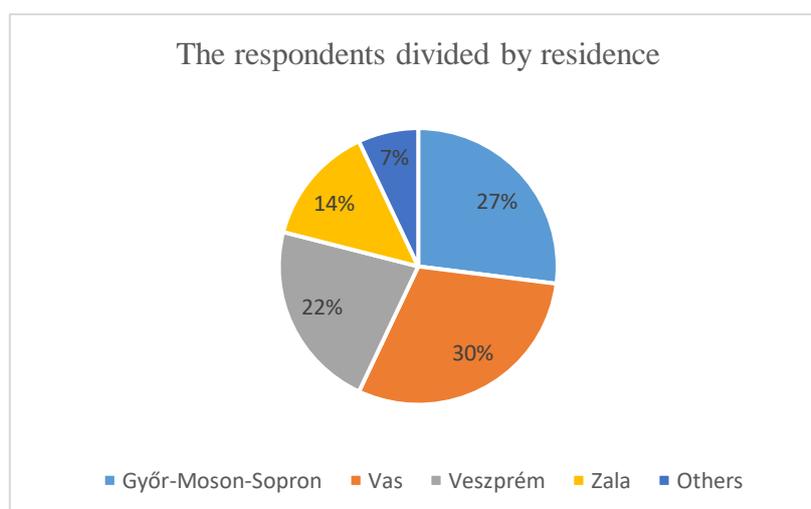


Figure 1. The respondents divided by residence.

In the first diagram we can see the respondents divided by residence. Our university's main schooling areas are, Győr-Moson-Sopron county, Vas county, Zala county and Veszprém county. The classification of diploma was answered with grade 5 by 65% of the respondents, 35% grade 4. It is a usual experience that those teachers who come to the university for the usual teaching course and have not got enough motivation, will be career-leavers.

- Yes, because I had language exam
- No, because I did not have language exam
- No, for other reasons

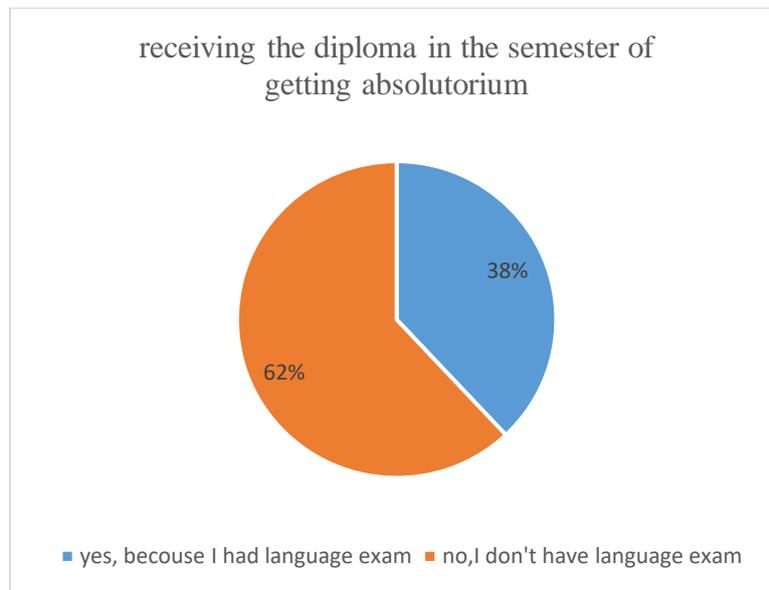


Figure 2. Receiving the diploma in the semester of getting absolutorium.

As we can see on the diagram, almost 62% of the respondents had language exam so that they could receive their diploma after the successful final exam.

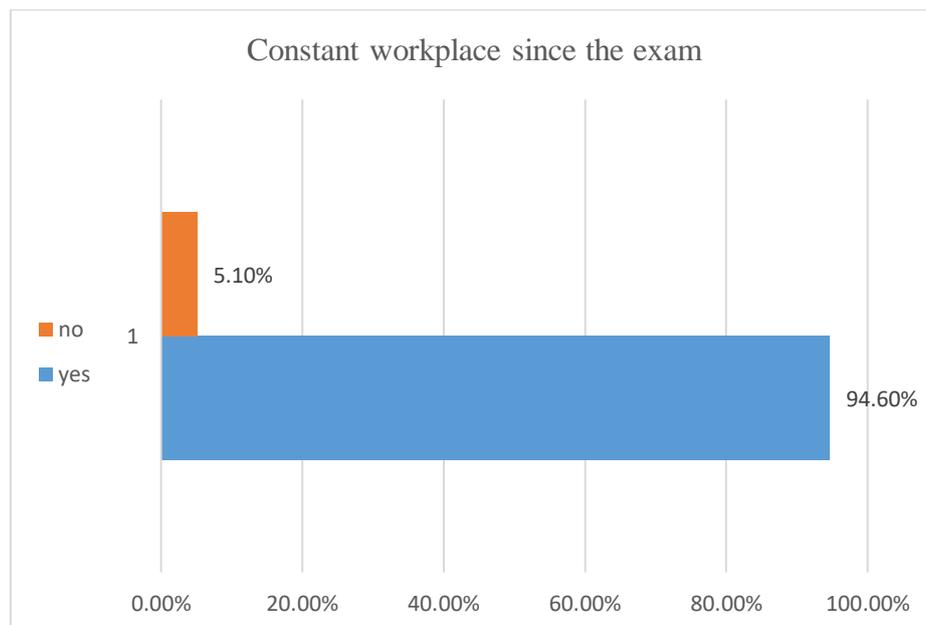


Figure 3. Constant workplace since the exam.

The 3rd diagram shows our research's main point, the success of disposition of the job market. 95% of the respondents found a job after receiving the diploma, (36 persons), out of them 29 persons (80%) could get a teaching job according to the 4th diagram.

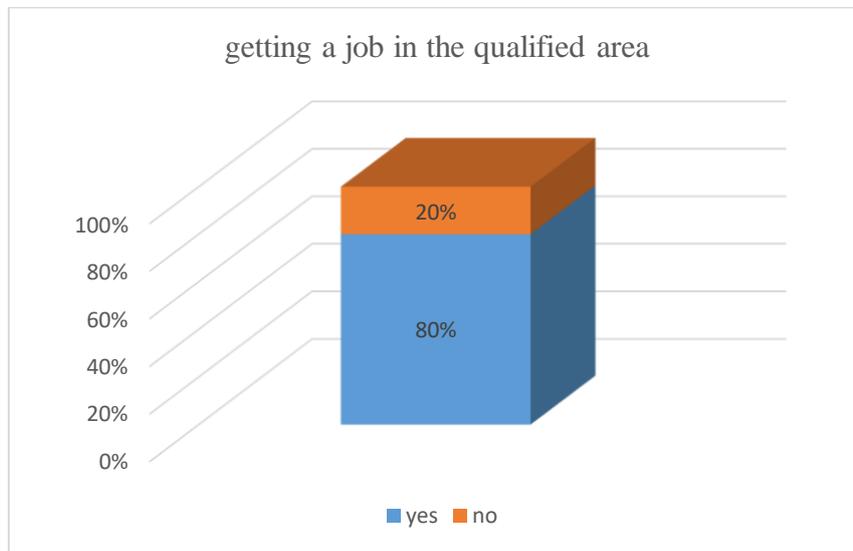


Figure 4. getting a job in the qualified area.

Those who newly received their diploma could find a job as a head teacher, 45% could get a job as an afternoon section teacher, 2 persons only gives lessons.

- After school teacher
- Head teacher
- part-time teacher.

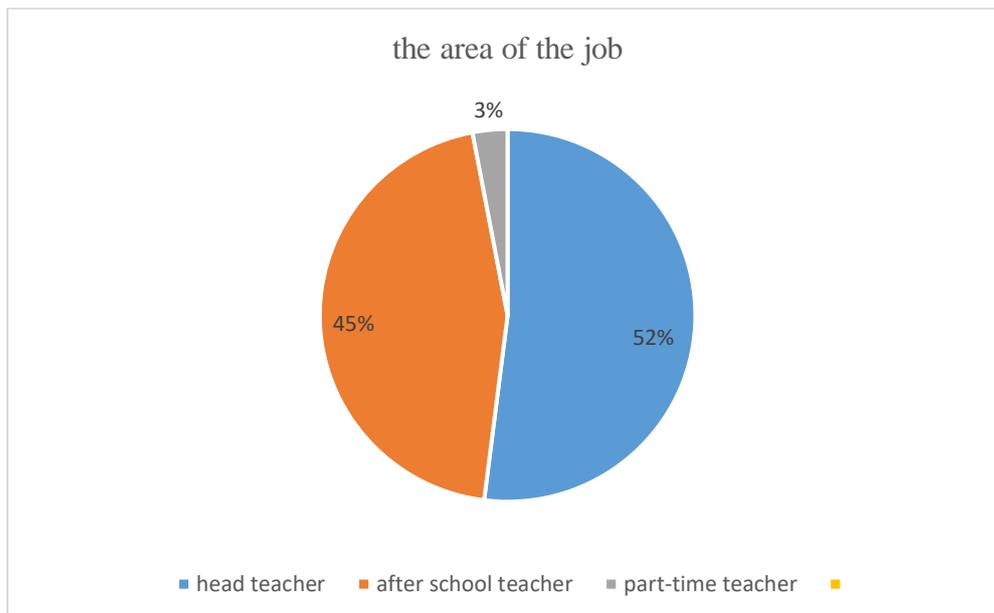


Figure 5. the area of the job.

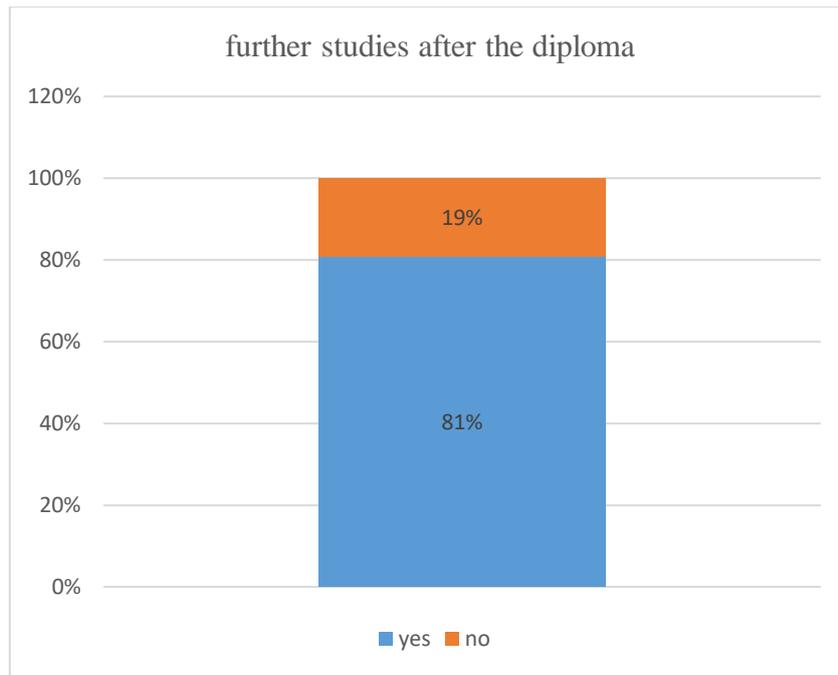


Figure 6. Further studies after the diploma.

Our present days' main motto, the life-long-learning, did not avoid the teaching specification either. In the early years after receiving the diploma 4/5 part of the pupils continued their studies. This is shown by the 6th diagram. The research showed that almost 60% of them continued with the Master course (pedagogy and free time activity coordinator) because pedagogy life model requires highly qualified individuals.

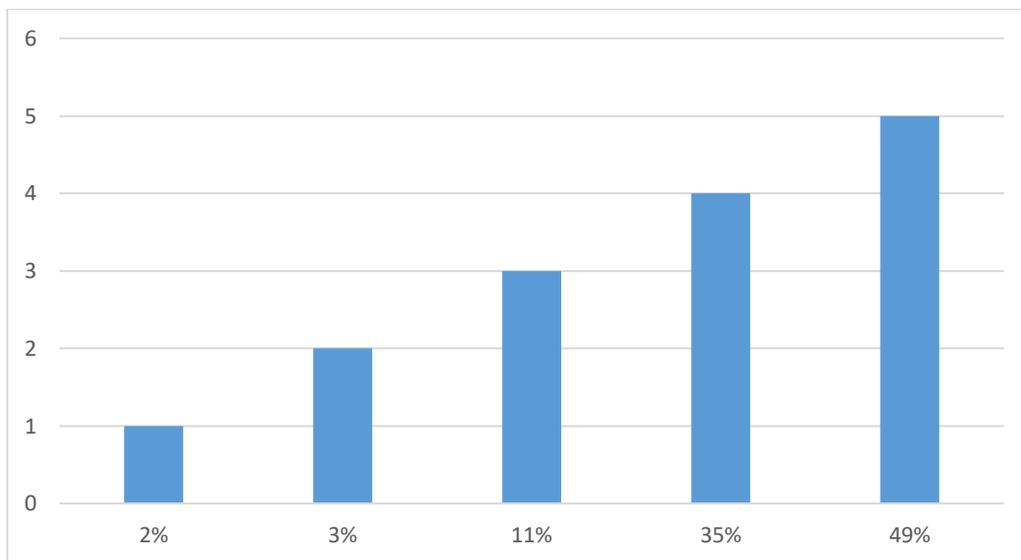


Figure 7. The satisfaction rate of the usefulness of previously learned material in mother tongue.

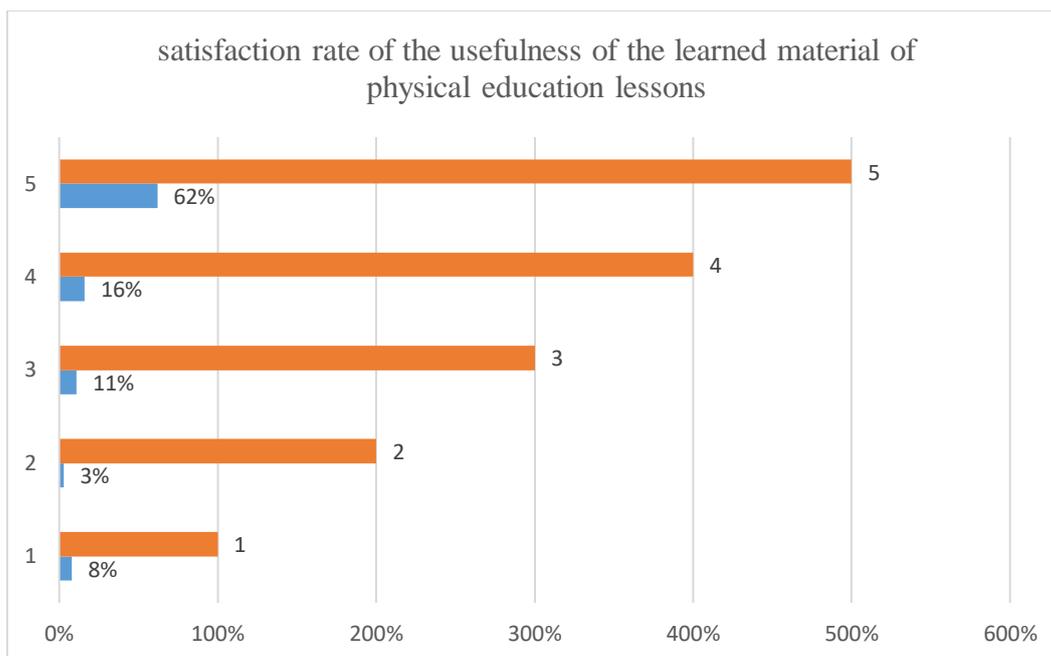


Figure 8. Satisfaction rate of the usefulness of the learned material of physical education lessons.

On the 7th and 8th diagram it is clearly shown that the two partial results of the satisfaction research. Most of our students gave a grade 5 for the practical usefulness of the physical education training and the Hungarian literature and grammar training. I highly appreciate this attitude, the reason behind this phenomenon might be the fact that both lecturer of said subjects are rather close to the public education and they are able to transfer their practical first-hand experience. (Many years ago, in the curriculum of pedagogy included the subject called School practice, when teachers had to visit the pupils' lessons, but nowadays it is not needed anymore unfortunately).

4 Discussion

1 In our first hypothesis we assumed that our pupils find a job much easily, then before. This hypothesis turned out to be true due to the answers of our pupils who has completed their studies that is proved in the research done in 2012, in which 55% answered positively about finding a job. They could find a job as an after-school teacher and as a head teacher. In the present research this rate is 80% that can be titled as a highly positive change.

2 In our second hypothesis we assumed that our pupils receive their diploma in a higher rate after the courses at the university, than the ones who had taken part in the research of 2012. (having a language exam and certificate) This hypothesis failed, 76% of the respondent of an earlier research answered with receiving their diploma after the final exam, but at present this rate is only 62%.

5 Conclusions

To sum up, we can say that in the examined period (completion of studies between 2013-2016) graduates could get a job on a higher rate that is equivalent to their qualification. It is gratifying, that more than half of them could get a job as a head teacher immediately. The limited number of language exams among students is still an existing problem, and the number of those who got the diploma in the semester of the final exams has increased since the last research. This leads to further questions. The effectiveness of the "Diploma Saving Program" is highly questionable. Also, the problem of the education of foreign languages should have a priority. The results of the research supported our experiences, namely the fact that the teaching field is mostly chosen by women. Our university's education district is the Middle and West Transdanubia Region. As practicing teachers, they can judge the usefulness of their earlier studies, unfortunately we have not received such welcoming result from the areas that were not in the scope of the study. I highly recommend these types of researches to be conducted in other institutions as well, moreover in other trainings/educational areas, because this is a proper way of giving trustworthy information to the pupils who are willing to study in the chosen faculties. The favourable job market opportunities can be impulsive for the future pupils. They will be much more drawn towards "life-long-learning" and will be more prepared for the progress of the pedagogical career model.

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PHYSIOLOGY OF SPORT

Fitness level of junior ice hockey players – differences between league and national team.

Brúnn David, Sýkora Jozef, Pupiš Martin,

Department of Physical Education and Sports, Faculty of Arts, Matej Bel University in Banská Bystrica, Slovakia

Jozef.Sykora@umb.sk

Abstract

Every single sport game has a specific scouting system, which is crucial for choosing best possible players with the highest potential for future success. The main purpose of this study was to compare fitness level of Slovak national U18 ice hockey team with Slovak league youth team and to determine whether there are any differences in maximal and explosive strength between them or not. Two samples (19 players each) were intentionally chosen according age criterion and participated in pre season testing in Squat jump test, Counter-movement jump test, Back squat and Benchpress 1 repetition maximum. Myotest Pro and Fitrodyné devices had been used. National U18 team players achieved significant better score in Squat jump ($p = 0.0001$, $\eta^2 = 0.55$), Counter-movement jump ($p = 0.001$, $\eta^2 = 0.3$) and Benchpress 1RM ($p = 0.004$, $\eta^2 = 0.23$). There were no significant differences in Back squat 1RM test, however large effect size was achieved ($p = 0.17$, $r = 0.52$). National U18 team players did better than same age Slovak league team players in maximal strength and explosive strength tests. Results might serve as a prerequisites for joining the national team supported by high level of performance during ice hockey game.

Key words: ice hockey, physical condition level, league team, national team, junior players

1 Introduction

Nowadays, the professional sport is becoming too much competitive and every single detail creates a huge difference in final performance. Sport is every day more challenging and it demands enormous stress on physical aspect of athletes performance, therefore we must really organize wisely strength and conditioning training since early years of players careers. Brúnn (2017) is adding, that these details are determining winners and losers in every sport discipline.

William (2004) is also writing about importance of conditioning, which is the key element for success in any hockey league. Not surprisingly, several articles have described the components of ice hockey conditioning programs supported by scientific clarification. However, if we want to know what direction of conditioning we should follow, we need to test our athletes or players. All NHL strength & conditioning coaches recommend testing athletes. It is useful because it identifies team and individual strengths and weaknesses. We also find out areas that need to be improved, or we see the efficiency of the program (Harmann, 2000).

As Albert (1998) and Cox (1992), we tested only anaerobic system based skills because of primarily anaerobic character of ice hockey. Pupiš et al. (2016) supported the importance of testing, when they successfully monitored olympic winner in race walk from early stages to the very top level.

Potteiger et. al. (2010) examined in his study relationships between laboratory tests and on-ice skating performance in men's ice hockey athletes. He found out, that laboratory testing of selected variables can predict skating performance in ice hockey athletes. That means, that there is some relationship between general conditioning test and on-ice performance. Eventhough this correlation is linked to skating only, this component is essential in ice-hockey and makes the difference. This case was also objective of the Behm (2005) study, where he determined the relationship between specific performance measurements and hockey skating speed.

Thirty competitive secondary school and junior hockey players were timed for skating speed. Off-ice measurements included a 36.9 m sprint, squat jump, drop jump, 1 repetition maximum leg press, flexibility and balance ratio.

This author found significant correlation between skating performance and balance test. These authors were finding relationship of physical fitness test results and ice hockey playing potential in elite-level ice hockey players. They concluded, that physical fitness measurements and anthropometric data are definitely valuable for helping to predict ice hockey playing potential.

The main purpose of this study was to figure out, if there are any differences in physical condition level between national team junior ice hockey players and slovak league youth team ice hockey players, therefore to identify, if there are physical prerequisites for joining national team.

2 Methods

Our intentionally chosen sample consisted of 38 same age professional ice hockey players from whose 19 players are part of Slovak national ice hockey team U18 (Age 16.32 ± 0.82) and 19 players are part of slovak youth league ice hockey team HC '05 Banská Bystrica (Age 16.74 ± 0.45). Both groups participated on preseason testing of fitness abilities (May 2017) and this research was targeted mostly on strength parameters such as explosive strength tests and maximal strength tests. Both groups participated on Myotest squat jump test where height parameter was monitored and same it was in counter movement jump test. These two tests were indicators of explosive strength. For maximal strength of upper body benchpress test diagnostic series was used monitored via Fitrodyne device and for maximal strength of lower body weighted parallel squat test was used monitored via Fitrodyne device as well. Myotest is 2D accelerometer with a 500 Hz frequency sensing ability. Fitrodyne is device working on a principle of registration location, speed of movement and known weight of the barbell.

For data evaluation we used Tables and Figures due to better interpretation. Statistical methods such as Mann-Whitney U-test or F-test for 2 independent samples and effect size were calculated for comparing 2 samples. For data interpretation causal and relation analysis were used, synthesis, induction and deduction, where our effort was targeted to create practical conclusions for sport and ice-hockey. During data evaluating we used quantitative methods such as percentage, central tendency variables (arithmetic mean, standard deviation), For statistical significance and effect size calculation Microsoft Excel 2016 and IBM SPSS v19 software had been used. This research is part of VEGA 1/0414/15.

3 Results and discussion

Table 1. BB youth team score sheet

	BB youth team			
	SJ (cm)	CMJ (cm)	Squat max (kg)	Bench max (kg)
P1	39,5	38,5	80	70
P2	32,5	36,4	80	80
P3	38,1	46	80	80
P4	36,8	39,5	80	100
P5	42,3	44,9	70	90
P6	33,5	38,5	120	50
P7	39,1	43	110	80
P8	36,4	37,8	100	70
P9	33,2	40,2	110	100
P10	33,2	39,9	130	80
P11	31,6	36,8	130	70
P12	34,1	38,5	80	80
P13	31,6	35,4	130	80
P14	41,6	49,4	80	90
P15	32,2	40,5	110	110
P16	35,8	41,3	100	70
P17	34,8	39,5	110	80
P18	31,6	35,8	110	80
P19	38,1	39,5	90	70
Mean	35,58	40,07	100,00	80,53
SD	3,42	3,60	19,72	13,53

Table 2. U18 slovak team score sheet.

	U18 slovak team			
	SJ (cm)	CMJ (cm)	Squat max (kg)	Bench max (kg)
P1	44,8	45,6	90	50
P2	44,6	47,8	120	40
P3	48,1	47,7	110	50
P4	46	40,1	120	40
P5	40,1	39,8	120	50
P6	48,1	48,6	110	70
P7	45,1	58,5	120	80
P8	39,1	41,5	80	70
P9	38,8	42,3	120	70
P10	47	51,2	100	70
P11	38,6	44,2	90	80
P12	39,9	47,1	90	40
P13	44,1	42,7	80	80
P14	46,4	43,4	100	70
P15	45,9	51	120	70
P16	37,7	37,6	110	70
P17	50,2	45,9	120	90
P18	42	43,5	80	80
P19	38,9	39,6	90	70
Mean	43,44	45,16	103,68	65,26
SD	3,89	5,03	15,71	15,41

For results calculation we used IBM SPSS v19 software and Microsoft Excel 2016 software. First of all, we calculated if our data has normal distribution. Only in maximal squat test, both groups had normal distributed data so we could use F-test for 2 independent samples for calculating, whether there is significant difference in maximal squat score between youth team of Banská Bystrica and U18 Slovak team players or not. We also calculated effect size for practical relevance. Results are presented in Figure 1.

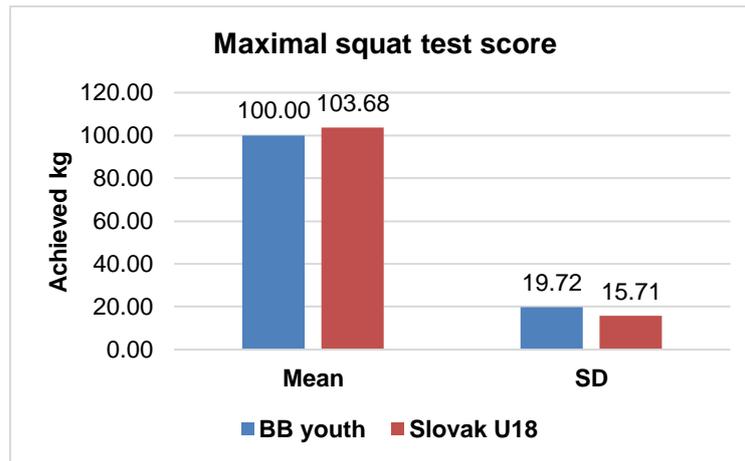


Figure 1. Maximal squat score of teams.

In Figure 1 you can see, that Slovak U18 players did not achieve significantly better score with high effect size ($p = 0.17$, $r = 0.52$) in maximal squat test.

Another compared variables were explosive strength parameters. Since there were not normal distribution of data in these tests, Mann-Whitney U-test non-parametric method was used supported by effect size calculation.

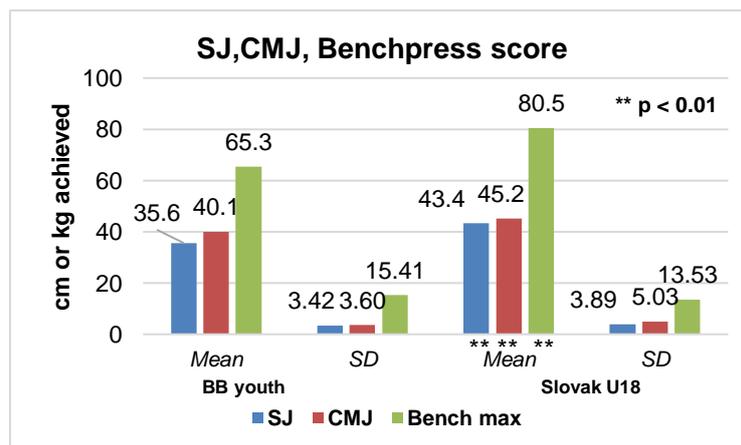


Figure 2. SJ, CMJ and Benchpress team comparison.

In Figure 2 there are presented results of others tests. In SJ test, Slovak U18 team achieved significantly better score than BB youth team with high effect size ($p = 0.0001$, $\eta^2 = 0.55$). In CMJ test, results were very similar but medium effect size was achieved. Still Slovak U18 was significantly better ($p = 0.001$, $\eta^2 = 0.3$). Finally in maximal Benchpress test Slovak U18 team achieved significantly better score as well ($p = 0.004$, $\eta^2 = 0.23$). It seems, that Slovak U18 team is better physicaly prepared and it might be the factor why players are members of the national team.

4 Conclusions

In every sport it seems, that athletes in best teams are a little bit higher level than others in lower leagues. Our research showed, that Slovak national U18 team players are significantly stronger, when it comes about maximal and explosive strength comparison, than same age

players from Slovak league team. This finding is confirming basic idea, that more prepared players are performing better and this difference is often deciding about winner or loser during ice hockey match.

Although it is not a condition, in most of the top leagues like NHL etc. players are intentionally chosen by scouts according specific tests scores, which are indicative for correct prediction of future player's potential. In agreement with Hedlund (2017), who examined player's fitness level and performance, compared them with teams by which they were chosen, he found a correlation between NFL Scouting and later team's success in the NFL. Burr et. al. (2008) determined predictors of potentially successful NHL players. We have now clearer perception about what is current level of Slovak league young players and what might be prerequisites for becoming successful member of Slovak national U18 team.

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Pre season preparation of u18 Slovak national ice hockey players.

Brúnn David, Sýkora Jozef, Pupiš Martin, Švantner Roman and Moravčík Juraj
Department of Physical Education and Sports, Faculty of Arts, Matej Bel University in
Banská Bystrica, Slovakia.
david.brunn@umb.sk

Abstract

Pre season period is one of the most important part of the macrocycle in ice hockey. Therefore main purpose of this study was to apply innovative training protocol during pre season period. Eight national team ice hockey players from under 18 hockey project of slovak ice hockey federation participated in 10 weeks training program divided into 3 microcycles per 3 weeks with 1 deload microcycle. First three weeks were targeted on improving eccentric strength (10 training sessions per week), Second 3 weeks were targeted on maximal strength with energy system development and last microcycle was targeted on improving explosive strength and high intensity working capacity. During the program, had been used innovative training tools like Vert, Vertimax and isokinetic ergobike. For complex diagnostics were used FMS, isokinetic ergobike, Bench press, Back squat, Squat jump, Counter-movement jump, grip strength and sprints on 5 and 10 meters. Results showed, that players significantly improved in all tests with low to moderate effect sizes ($p < 0.05$, $r = 0.17 - 0.49$) and in Bench press we achieved higher statistical significance ($p < 0.01$, $r = 0.23$). Used training program periodization seems to be efficient way for pre season preparation.

Key words: ice hockey, periodization, eccentric strength, power

1 Introduction

Ice hockey, according Nightingale (2014), is a highly complex sport requiring multiple fitness components. It is a high intensity, intermittent full-contact sport of anaerobic endurance (Spiering, 2003). According to Behm (2005), Bracko (2001) and Burr (2008), the key components for successful play in Ice Hockey are strength, speed, power, acceleration, aerobic endurance, balance, and agility. As it is in others sports, also in Ice Hockey can divide season macrocycle into particular cycles. From the strength and conditioning view, Nightingale (2014) divided Ice Hockey macrocycle into three main phases. These are preparatory (aerobic, strength, maximal strength, power), maintenance (maintain strength, aerobic and power) and recovery phase (off-season). Next, author also divided preparatory phase into general strength (Jun), maximum strength and unload (july), maximum power and again unload (august). Although Nighthingale (2014) collected information from researchers and coaches, he was still just demonstrating periodized training program for Ice Hockey and he did not do any physical tests. Therefore we decided to test his findings. As in our study, Nightingale (2014) was also focused to athletes, who have reached the adolescence phase of physical maturation. According to Lloyd and Oliver (2012) is this phase the “window of opportunity” for training the significant

components of ice hockey. It is also well known fact, that it doesn't matter if adolescents or adults, individual athletes will respond differently to any given training program (Stone, 2007). While Sýkora (2017) is adding that the specificity of conditions in ice-hockey brought a lot of polemizing about validity and reliability on off ice testing, from our scientific experiences we know, that there is a big correlation between off ice tests and performance on ice.

With this theoretical background behind, the aim of our study was to find out if our chosen periodization model will improve overall fitness after pre season preparation period in elite ice hockey players.

2 Methods

Eight national team ice hockey players from under 18 hockey project of slovak ice hockey federation participated on special innovative pre season training program. Training program consisted of 10 weeks long cycle divided into 3 microcycles per 3 weeks with one deload recovery cycle after 6 weeks. Each microcycle was oriented for developing different fitness abilities which are determining and highly affecting ice hockey sport performance. First three weeks were targeted on improving eccentric strength by eccentric hypertrophy trainings when players completed 10 trainings per week (2x upper body pull, 2x push, 2x lower body pull, 2x push, 1 core training, 1 recovery training). Primary distinction was in performed tempo of exercises which was 4:0:1 seconds (eccentric phase, explosive, concentric phase). Second three weeks were targeted on maximal strength training with tempo 2:1:1 seconds with added ESD (energy system development) to the end of each workout where players performed several maximum intensity intervals of complex exercises such as sprints, bicycle ergometer etc. (work to rest ratio 1:2). During these weeks players completed 10 trainings units per week (same as first 3 weeks but inverse relation when it comes about sets and reps). After 6 weeks followed 1 recovery deload week with minimum training units and light intensity activities. Last 3 weeks of training program were targeted on improving explosive strength with combination of HIIT (High intensity interval training) due to their similar energetic demands on players body. Players completed 6 training units per week (Contrast explosive strength 2x, Tabata 2x, Core 2x) with additional trainings of ice hockey skills (Less number due to higher demands on CNS and energy recovery). During whole program traditional tools had been used like Barbells, Dumbbells, Prowler, sledge, parachute etc. Additionally some progressive tools had been used for individualizing training for each player. These tools were Vert, Vertimax and isokinetic ergobike. VERT is a wearable miniature inertial measurement unit (IMU), with a very high precision 3X gyroscope and high precision high rate 3X accelerometer. Vertimax is leading vertical jump and speed training system designed for multi-point leg and arm loading on platform.

For complex diagnostic of initial and post-program state of players FMS diagnostic was used for evaluation of functional movement ranges of motion. For laterality test isokinetic ergobike was used. Based on the initial state each player received his own correcting guide for eliminating dysbalances, weaknesses etc. incorporated into their warm up routines. For maximal strength and relative strength the Bench press (diagnostic series), Parallel squat (diagnostic series) tests were used measured via Fitrodyne device. Fitrodyne is device working on a principle of registration location, speed of movement and known weight of the barbell. Thanks to above mentioned parameters device can successfully measure peak force and power. Grip strength was tested by dynamometer. Explosive strength was measured via Myotest device by Squat-jump test and counter movement jump test. Myotest is 2D accelerometer with

a 500Hz frequency sensing ability. Finally starting speed ability was measured by Microgate Polifemo photocells during 5 metres and 10 metres running tests. Microgate Polifemo photocells work as a coaxial optical system. For data evaluation we used Figures and Tables due to better interpretation. The main method used was case study method when we evaluate every player individually. Statistical methods such as Wilcoxon signed rank test and effect size were calculated for comparing sample results. For data interpretation causal and relation analysis were used, synthesis, induction and deduction. Conclusions were created in order to improve practical strength training in ice hockey. During data evaluating quantitative methods such as percentage, central tendency variables (arithmetic mean, standard deviation) were used. For statistical significance and effect size calculation Microsoft Excel and SPSS software were used. This research is part of VEGA 1/0414/15.

3 Results and Discussion

For results interpretation we are using Tables and Figures. Evaluation was made on every single test independent showed by % improvement followed by overall evaluation supported by statistical tests and effect size calculation, when we compared initial state and post program state of players.

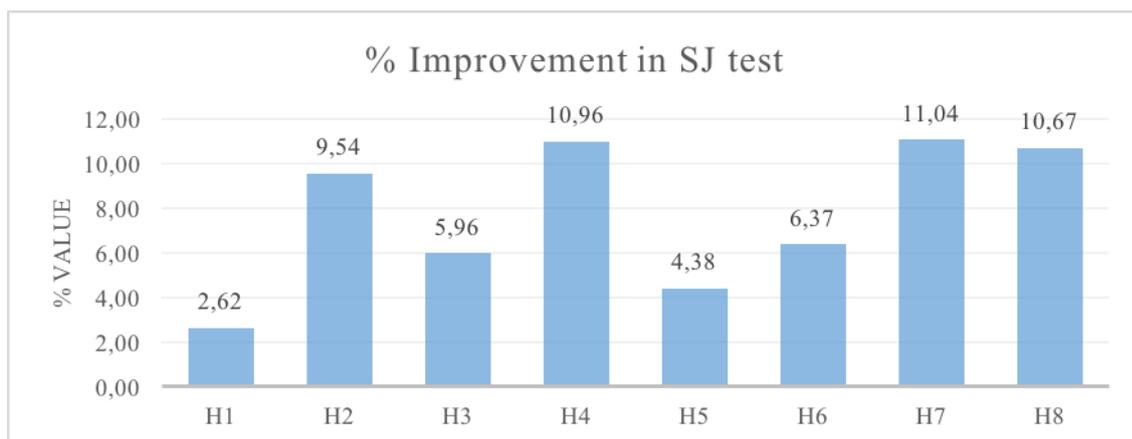


Figure 1. Squat jump test improvement of players

In squat jump test all players achieved significant improvement when the lowest improvement was 2.62 % and highest achieved was 11.04 %. As a sample, players improved average about 7.69 ± 3.29 % which is satisfying result.

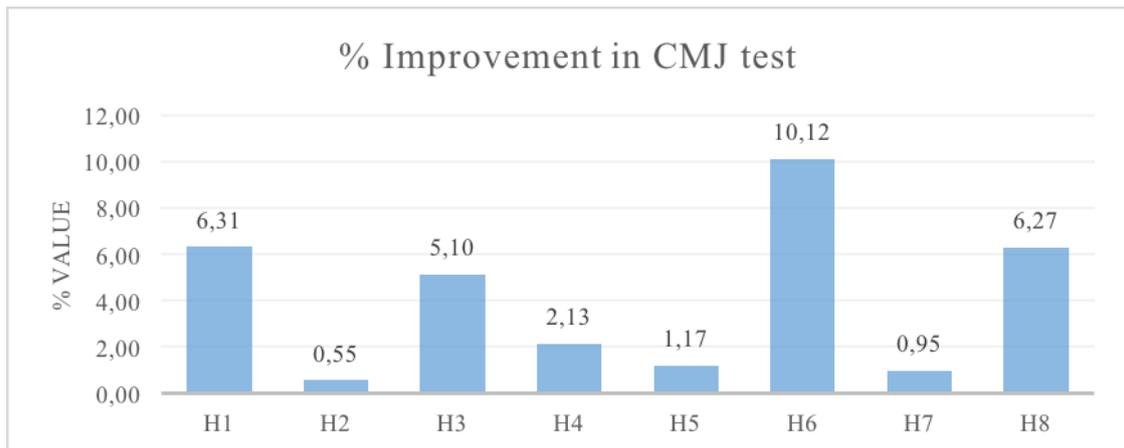


Figure 2. Counter movement jump improvement of players.

In counter movement jump test we tracked average improvement about 4.08 ± 3.42 % in sample, minimal improvement was 0.55 % and highest was 10.12 %.

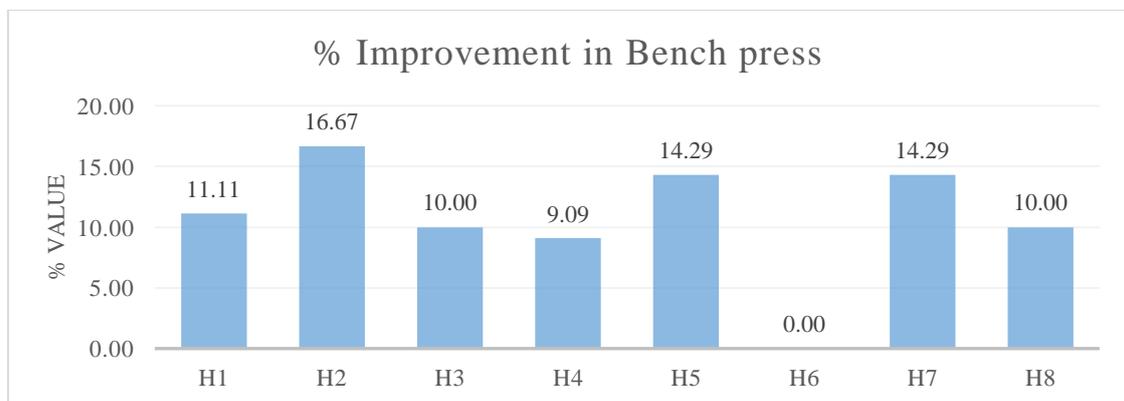


Figure 3. Bench press improvement of players.

Bench press results brought improvement in 7 from 8 players, mostly about 16.67 % and one player didn't improved at all. Average sample values moved average about 10.68 ± 5.06 %.

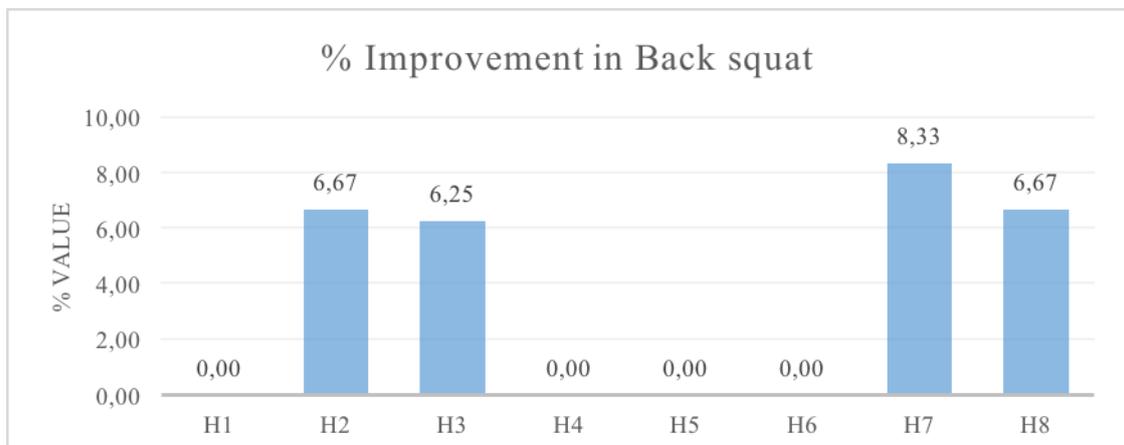


Figure 4. Back squat improvement of players.

Figure 4 represents difference between initial and final results in heavy paralel back squat test, when only 4 players improved from 6.25 to 8.33 %. Average value moved about 3.49 ± 3.78 %.

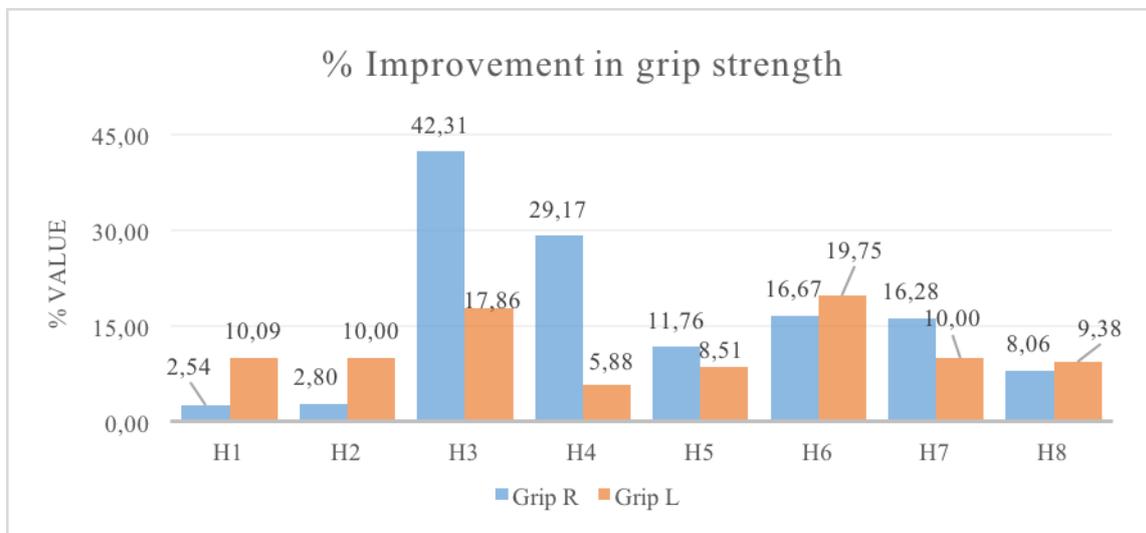


Figure 5. Right and left hand grip strength improvement of players.

Figure 5 is showing results of grip dynamometer test, when in right hand players improved in average about 16.20 ± 13.64 % and in left hand it was 11.43 ± 4.78 %. Biggest improvement in right hand was 42.31 % and lowest was 2.54 %. In left hand biggest was 19.75 % and lowest was 5.88 %.

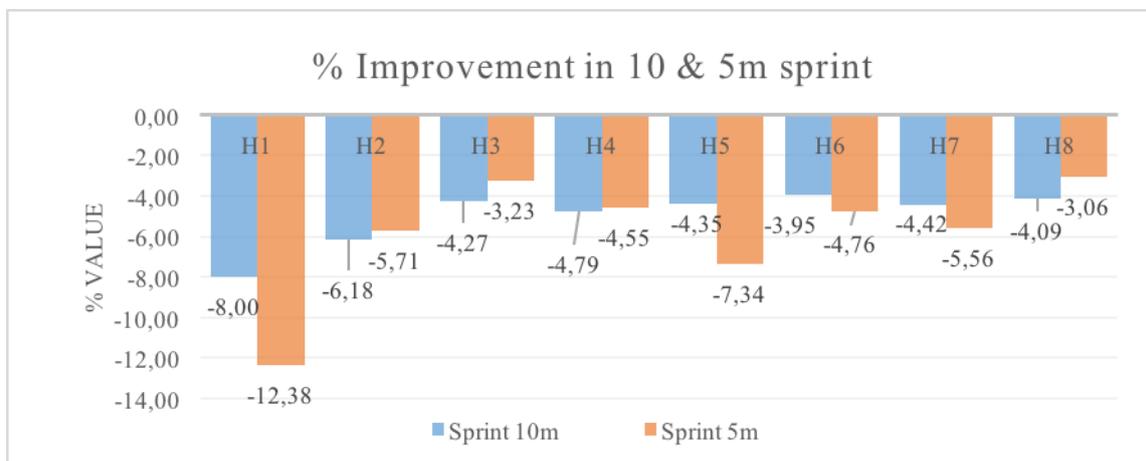


Figure 6. Starting speed tests results of players.

Figure 6 represents results of 5 & 10 metres agility test, when players improved (decreased time) in 5m sprint average about 5.82 ± 2.99 % and in 10 metres test average about 5.01 ± 1.40 %. In 5 metres test biggest improvement achieved 8 % value and lowest 3.95 %. In 10 metres test biggest improvement was 12.38% and lowest 3.06 %.

Including all above mentioned results and after calculating normality of sample, we calculated also statistical significance and effect size values. Since in all of our tests there was not completed condition of normality, for statistical significance test we used Wilcoxon signed ranked test for determining significant differences of average values and simultaneously with that we calculated effect size (r) for Wilcoxon signed rank test. Our findings are presented in Figure 7.

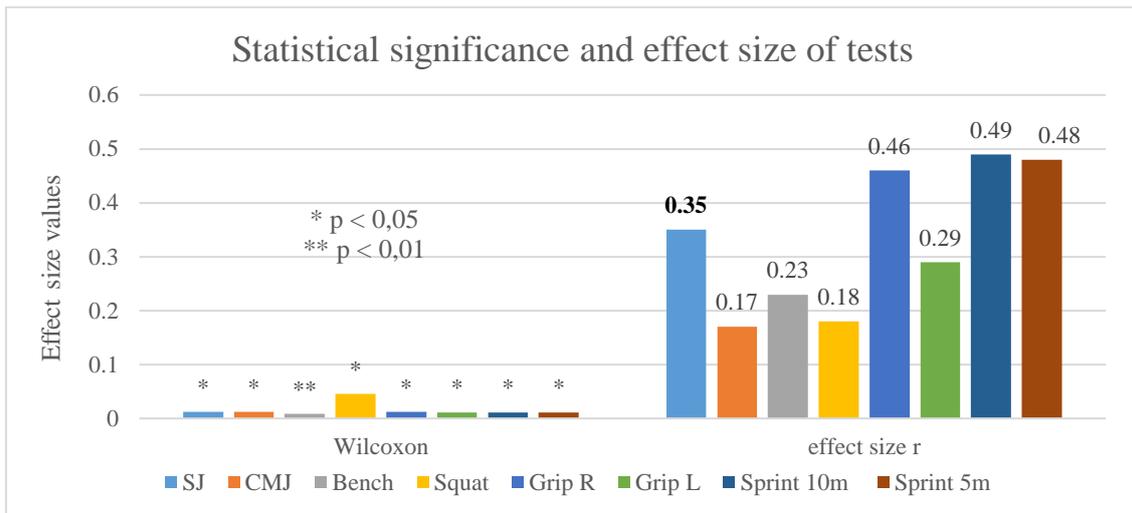


Figure 7. Statistical and effect size results.

Figure 7 is showing that all of our test brought significant improvement with low effect size effect in CMJ test, Bench press and Back squat tests which might be caused by low number of respondents.

4 Discussion

According to improving explosive ability results from CMJ tests are matching with initial predictions of coaches. From the Back squat test, since max. rep squat was not the main purpose for improvement coaches found stagnation in some players as trivial. Grip strength of players rapidly increased also thanks to many unorthodox tools used in training process (Fat grips). From 5 and 10 m sprint, we are finding these results as crucial because starting speed ability is one of the key ability in elite ice hockey sport performance.

Because of low number of respondents, these test can not be surely evaluated as reliable although our training program showed improvement. On the other hand we recorded significant improvement with moderate effect size effect in all other tests (SJ test, grip strength test and starting speed ability tests)

and so these results we can consider as reliable and not affected by statistical or other factors.

Our program caused significant changes in grip strength, explosive strength followed by starting speed ability and so we can recommend this preseason program to other ice hockey coaches, who are working with elite ice hockey players. Training process targeted on eccentric hypertrophy, maximal strength and finishing specific task training such as explosive strength training and metabolic conditioning seems to be good way how to prepare high level ice hockey player for season. We recommend explore and apply our research on bigger sample for conclusions confirmation.

5 Conclusion

When it comes about periodization, Baker (1994) examined the effect of manipulating volume and intensity on strength and power in experienced male athletes. In his article it says, that there is considerable debate about most effective way to structure strength training in terms of manipulation of volume and intensity. He divided his research sample into three groups, which differed in strength training periodization. First was nonperiodized, they trained in traditional way by Berger and O'Shea. Second included linear periodization, suggested by many authors

like (Voroboyev, 1978, Mateyev, 1972, Stone, 1981). Third one was based on undulating periodized training method advocated by Poliquin (1988). Baker's (1994) results indicate that during short-term training with previously trained athletes, no differences in maximal strength were seen when training volume and relative intensity were equated. As a comparison of these findings, our research showed, that 10 weeks pre season training program (3 weeks eccentric strength, 3 weeks maximal strength, 1 deload week and 3 weeks explosive strength) brought significant improvements with low to moderate effect sizes in elite slovak players of national team project U18. Although authors are still in disagreement when it comes about pre season training periodization, our research brought different perspective and succesful model of training program. Eccentric strength, Maximal strength and explosive strength training microcycles respectively seem to be efficient way how to organize pre season period in elite ice hockey. (Supported by Energy System Development, HIIT, coordination and individual mobility work). Despite the success of our research we recommend to apply this program to wider sample for its later validation.

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The placebo phenomenon in sports and exercise.

Ferenc Köteles

Institute of Health Promotion and Sport Sciences, ELTE Eötvös Loránd University, Hungary.

koteles.ferenc@ppk.elte.hu

Abstract

This paper aims to provide the reader with a comprehensive summary of the importance and possible role of the placebo phenomenon in sports. The placebo response is a learned reaction to certain symbolic characteristics of an intervention or environment, which can stem from personal experience or social transmission. Although certain elements of the response may reach consciousness, a considerable proportion of the entire process is involuntary, automatic, and often non-conscious. Responsivity to placebos shows considerable individual differences due to inherited attributes (gene polymorphism) and personality characteristics, which makes placebo related research particularly difficult. Moreover, subjective (perceived) body responses are often not in accordance with objective (measured) changes; thus, these aspects of sport-related placebo responses should be considered independently. Practical and theoretical challenges to finding an ethical standpoint on the involvement of deception and the possibility of placebo-based doping are also summarized. It is concluded that placebo-related responses may play a role in performance enhancement in competitive sports and may also contribute to the long-term maintenance of recreational physical activity.

Keywords: *expectations, placebo, nocebo, sport, recreation*

1 Introduction

A placebo is a substance or procedure that is administered with suggestions that it will modify a symptom or sensation but which, unknown to its recipient, has no specific pharmacological impact on the response in question (Ross & Olson, 1981, p. 408). The individual reaction to the administration of a placebo is called “placebo response”, while the term “placebo effect” refers to a group-level change (Fields & Price, 1997; Hoffman, Harrington, & Fields, 2005). From a broader perspective, the placebo phenomenon is a sub-category of the so-called “meaning response”: the totality of the psychophysiological changes initialized by the symbolic aspects (meaning) of the actual environment (Moerman, 2002). The meaning response demonstrates the predictive nature of the human brain, which continuously attempts to predict future changes using an implicit model based on past experiences (Friston, 2009; Friston, Kilner, & Harrison, 2006). It is worth noting that this broader approach to the placebo phenomenon also encompasses responses evoked within and by means of non-medical contexts. Such non-medical placebo effects are also called placebo related effects (Benedetti, 2009). Sport-related changes (e.g., elevated blood pressure and heart rate in the changing room well before the onset of actual physical activity, or performance enhancement evoked by a pharmacologically inactive substance) clearly belong to this category (Bérdi, Köteles, Szabó, & Bárdos, 2011).

Although inherited characteristics might also play a role (see below), the placebo response is essentially a product of learning (Benedetti, 2009). Learning can rely on personal

experience (e.g. classical and instrumental conditioning), social transmission (e.g. observational learning or persuasion), or logical reasoning (Humphrey, 1992). Through the learning process, expectations of future events develop (Stewart-Williams, 2004; Stewart-Williams & Podd, 2004). For example, conscious expectations concerning uncontrollable body functions are called response expectancies (Kirsch, 1997). However, an expectation can also be non-conscious (Hahn, 1997), and an imperceptible (i.e. subliminal) stimulus can evoke a placebo response (K. B. Jensen et al., 2012, 2014).

In summary, the placebo response is initialized by specific *symbolic* features of an intervention or environment (Brody & Brody, 2000; Miller & Colloca, 2010; Moerman, 2002; Walach, 2011). Although certain aspects of the response might reach consciousness, a considerable proportion of the entire process is involuntary, automatic, and often non-conscious. Sport related placebo responses represent a sub-category of the placebo phenomenon, and can be explained by elementary and complex mechanisms of learning.

2 Impact on actual and perceived performance

It is well-known that there is a marked dissociation between actual and perceived performance for both cognitive and body related changes (Pennebaker, 1982; Schwarz & Büchel, 2015). When a change in cognitive or physical performance or state (e.g. blood pressure, heart rate) is not directly accessible to conscious awareness, then expectations, selective attention, and other factors shaped by situation and disposition can substantially bias perception. For example, expectations evoked by essential oils (Babulka, Berkes, Szemerszky, & Köteles, 2017; Howard & Hughes, 2008; Köteles & Babulka, 2014) or placebo interventions administered with performance enhancing information (Szabo, Szemerszky, Dömötör, De la Vega, & Köteles, 2017; Szabo, Szemerszky, Dömötör, Gresits, & Köteles, 2017) often generate only subjective changes. Therefore, objective (actual) and subjective (perceived) placebo effects should be discussed independently.

The enhancement of actual performance is obviously the most important goal in competitive sports. A meta-analysis based on the results of fourteen empirical studies, found a medium overall effect size (0.4, 95% CI ranged from 0.24 to 0.56) (Bérdi et al., 2011). The authors concluded that the placebo response might play a role in competition and is thus worthy of further investigation. Subsequent research has also reported positive placebo effects in a variety of sport-related performances, such as peak minute power (Bottoms, Buscombe, & Nicholettos, 2013), recovery of muscle strength (Broatch, Petersen, & Bishop, 2014), duration of high-intensity cycling (Higgins & Shabir, 2016), endurance performance (R. Ross, Gray, & Gill, 2015; Sabino-Carvalho et al., 2017), repeated sprint performance (Tolusso, Laurent, Fullenkamp, & Tobar, 2015), tennis serve accuracy (Guillot, Genevois, Desliens, Saieb, & Rogowski, 2012), 100-m swimming performance (Marocolo, da Mota, Pelegriani, & Appell Coriolano, 2015), and 200-m sprint performance (de la Vega, Alberti, Ruíz-Barquín, Soós, & Szabo, 2017). In other studies, however, no objective changes in aerobic (Desharnais, Jobin, Côté, Lévesque, & Godin, 1993; Szabo, Szemerszky, Dömötör, Gresits, et al., 2017) or anaerobic performance (Szabo, Szemerszky, Dömötör, De la Vega, et al., 2017), 30-min cycling performance (B. Saunders et al., 2016), maximal voluntary force of knee flexors and extensors (Tallis, Muhammad, Islam, & Duncan, 2016), repeated sprint performance (Hurst, Foad, Coleman, & Beedie, 2017), muscle performance (Poon et al., 2015), sprint swimming (Ferreira et al., 2016), maximal grip strength (Cai, Au, An, & Cheung, 2016), vertical jump (Cheung et al., 2016), various aspects of athletic performance (Brazier, Sinclair, & Bottoms, 2014), maximum oxygen uptake (Sabino-Carvalho et al., 2017), and ankle instability (Sawkins, Refshauge, Kilbreath, & Raymond, 2007) were reported. Beyond methodological and

statistical factors, these differences can be explained by the diverse psycho-physiological background of various physical performance domains (strength, endurance, etc.) and individual variations in the reactivity or responsiveness to placebo interventions (Beedie, Abigail, & Damian, 2008; Bérdis et al., 2011).

Placebo reactivity is partly determined by genetic factors, such as the polymorphisms of various alleles involved in monoamine-metabolism (Furmark et al., 2008; Hall et al., 2012; Hall, Loscalzo, & Kaptchuk, 2015; Leuchter, McCracken, Hunter, Cook, & Alpert, 2009). However, situational factors, personal history and individual beliefs also appear to play a role (Brody & Brody, 2000; Moerman, 2002). For example, a placebo given with a spiritual explanation may initiate a marked reaction for an individual with a spiritual worldview, while physiological information may be more congruent with the belief system of another person (Hyland, 2011; Hyland, Geraghty, Joy, & Turner, 2006; Hyland, Whalley, & Geraghty, 2007; Hyland & Whalley, 2008). Athletes' intentions to use supplements might also impact their effects (Hurst et al., 2017). Also, the look and feel (size, shape, color, application form, etc.) of the placebo plays a role in the magnitude of evoked expectations in both medical (de Craen, Roos, de Vries, & Kleijnen, 1996; Moerman, 2002) and sports (Szabo, Bérdis, Köteles, & Bárdos, 2013) contexts. In conclusion, the considerable inherited and acquired inter-individual diversity in the factors that determine a placebo response deter any conclusion concerning the impact of placebo response on objective sports performance.

Beyond physical abilities, the actual psychological state (most importantly: anxiety and pain) of the athlete also has a substantial impact on overall performance. Interestingly, placebo interventions have proven to be particularly effective in the reduction of both pain and anxiety in medical (Benedetti, 2009, 2011; Brody & Brody, 2000) and sport-related contexts (Benedetti, Pollo, & Colloca, 2007). It is also established that the central mechanisms of placebo analgesia and anxiety reduction are identical to those associated with pharmacotherapy (Benedetti, 2011; Faria, 2012; Faria et al., 2012). Thus, it is reasonable to assume that the placebo reaction can influence (i.e., mediate and/or moderate) sports performance through the aforementioned psychological variables, indicating that interventions with or even without a genuine (true) placebo effect under laboratory circumstances can contribute to overall performance in competitive situations for some athletes. These psychological mechanisms might underlie the positive effects of water immersion (Broatch et al., 2014), β -alanine (Bellinger & Minahan, 2016), ankle taping (Sawkins et al., 2007), altitude training camp (P. U. Saunders et al., 2010), hologram wristband (Brazier et al., 2014), ischemic preconditioning (Ferreira et al., 2016; Marocolo et al., 2015), kinesiotaping (Cai et al., 2016; Cheung et al., 2016; Poon et al., 2015), and acupuncture (Urroz, Colagiuri, Smith, Yeung, & Cheema, 2016).

Similarly, subjective (perceived) effects, including the enhancement of performance and mood, might improve the overall performance of an athlete in competitive situations. These effects can also substantially shape the physical activity related behavior of amateurs. Although regular physical activity has both physical and psychological benefits, its maintenance over extended periods of time is often problematic (Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001; Lox, Martin Ginis, & Petruzello, 2010; Markland & Ingledew, 1997). Reduction of perceived stress, revitalization, and enjoyment are among the most essential motives behind routine recreational exercise (Lox et al., 2010; Markland & Ingledew, 1997). Therefore, any factor that can increase the affective benefits of exercise may contribute to long term maintenance of physical activity. Beyond technical interventions, such as choosing the optimal intensity (Ekkekakis, Hall, & Petruzzello, 2008; Ekkekakis, Parfitt, & Petruzzello, 2011; Szabo, 2003) and applying an appropriate attentional strategy (Lind, Welch, & Ekkekakis, 2011; Razon et al., 2010), affect can successfully be influenced via placebo interventions and instructions (Helfer, Elhai, & Geers, 2015; Szabo, 2003; Szabo & Kocsis, 2017). From this practical point of view, the widespread (and often professionally unwarranted)

use of electronic and magnetic gadgets, food additives and sports drinks declaring performance enhancing effects, or mobile applications with various indicators of fitness might also be helpful (Köteles, Dömötör, Berkes, & Szemerszky, 2015).

Finally, negative or harmful responses which lead to decreased sports performance, such as pain or loss of concentration, can arise. This is the so-called nocebo response, which can be triggered by conscious or non-conscious expectations and evoked by specific aspects of the environment (Hahn, 1997). Empirical evidence shows that the nocebo (or negative placebo) effect can indeed influence sports performance (Andani, Tinazzi, Corsi, & Fiorio, 2015; Beedie, Coleman, & Foad, 2007; Bottoms, Buscombe, & Nicholettos, 2014; Ferreira et al., 2016). This also implies that decreased performance can be only partially explained by traditional physiological variables (e.g. mistaken training schedule, overtraining). Coaches and sport psychologists should be aware of the nocebo phenomenon and pay attention to potential nocebogenic factors.

3 Ethical issues

The placebo phenomenon cannot be discussed without considering its ethical implications. First, in therapeutic and research contexts, deception is a crucial feature of placebo use and should be avoided (Bok, 2002). Therefore, the therapeutic use of placebos is acceptable only if the patient receives detailed information on the therapy (i.e., the patient is aware of the fact that placebo therapy will be applied) (American Medical Association Council on Ethical and Judicial Affairs, 2006). Interestingly, placebo therapy was effective in several pilot studies, even when patients had been informed about it (Aulas & Rosner, 2003; Kaptchuk et al., 2010; Kelley, Kaptchuk, Cusin, Lipkin, & Fava, 2012; Park et al., 2014; Sandler & Bodfish, 2008). Second, whether placebos have a greater benefit for the patient or the physician is debated (Bok, 1974; Miller, Wendler, & Swartzman, 2005; Spiro, 1998; Thomas, 1978). Many professionals feel that placebo therapy can benefit patients under certain conditions, and this benefit might be greater than the costs associated with deception. Thus, placebo use could be an ethical option for certain patients (Fassler, Meissner, Schneider, & Linde, 2010; Ferentzi, Köteles, & Bárdos, 2011; Placebo Arbeitskreis der Bundesärztekammer, 2011). Furthermore, a number of empirical studies demonstrate the widespread therapeutic use of placebos (Fässler, Gnädinger, Rosemann, & Biller-Andorno, 2009; Fent, Rosemann, Fassler, Senn, & Huber, 2011; Ferentzi, Köteles, & Bárdos, 2010; Ferentzi et al., 2011; Howick et al., 2013; Meissner, Höfner, Fässler, & Linde, 2012; Tilburt, Emanuel, Kaptchuk, Curlin, & Miller, 2008), indicating that clinicians consider it both effective and useful. Additionally, patients do not object to placebo therapy if the results are favorable (Köteles & Ferentzi, 2012).

When considering the context of sports, the use of deception appears to be equally problematic because it undermines the coach-athlete relationship. However, empirical findings demonstrate that the majority of professional athletes and coaches do not consider the use of placebos unethical if they are effective, and there is widespread use of placebos in sports (Bérdi, Köteles, Hevesi, Bárdos, & Szabo, 2015; Szabo & Müller, 2016). The use of deception is particularly difficult to evaluate because of the inherent self-fulfilling nature of placebo interventions. In other words, can we speak openly about deception when the declaration (or promise) of effectiveness is the factor that creates the desired effect? Beyond information from a coach, a well-established brand-name placebo, given on its own or in combination with active substances, may be more effective in reducing pain or stimulating the central nervous system than the same placebo or active drug administered without a label (marketing placebo) (Branthwaite & Cooper, 1981; Faasse, Martin, Grey, Gamble, & Petrie, 2015; Garvey, Germann, & Bolton, 2015; Shiv, Carmon, & Ariely, 2005). The placebo response is a typical

top-down psychophysiological reaction (Brody & Brody, 2000; Moerman, 2002); however, it has some distinct qualities. Although the physiological change is initiated in the mind, its transmission through the hierarchy of the central nervous system is decidedly measurable and often does not differ from the pharmacological effects of the respective medication (Benedetti, 2009). This fact makes passing judgment on the use of deception even more difficult.

Beyond deception, enhancement of performance is yet another ethical deliberation concerning placebo use in competitive sports. In an experiment, after repeated administrations of morphine during a simulated pre-competition training phase, its replacement with a placebo on the day of competition induced an opioid-mediated increase of pain endurance and physical performance (Benedetti et al., 2007). As morphine is regarded by WADA as illegal only during competition but not during preparation, it is unclear whether the procedure should be considered doping or not. Furthermore, if we consider this unethical, the position of other (sport)psychological interventions that aim to enhance performance (e.g. relaxation and imagination techniques) are brought under scrutiny (Bérdi et al., 2011). The ethical standpoint concerning the use of such practices requires further elaborations.

4 Research agenda

Research on the placebo and nocebo phenomena in sports is still in an early phase. The amount of empirical evidence presented here is clearly sufficient to demonstrate that this area is worthy of further research; however, several pitfalls should be avoided. First, simply adopting the research methods and theoretical models of other placebo related fields has its limitations. Most importantly, classic placebo research was conducted on voluntarily uncontrollable conditions (e.g. pain), while the motor system is partly under voluntary control. This fact underscores the potential importance of motivational states. The role of motivations is poorly investigated, even in medical placebo research (Aletky & Carlin, 1975; Geers, Weiland, Kosbab, Landry, & Helfer, 2005; M. P. Jensen & Karoly, 1991; Price & Fields, 1997). Additionally, medical placebo response, also referred to as “remembered wellness” (Benson & Friedman, 1996), represents a shift from a pathological condition toward a healthy state and might rely on different physiological and psychological mechanisms, than the enhancement of performance in sports. Second, ethical concerns should be discussed and elaborated in great detail. Third, considering the existence of marked individual differences in placebo response, the traditional group-level research methods are not necessarily appropriate when evaluating the effectiveness of a placebo intervention. Finally, sample sizes used in this area of research are generally low, and attempts should be made to replicate positive findings.

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