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THEORETICAL FOUNDATIONS OF MUNICIPAL SPORT INFRASTRUCTURE DEVELOPMENT CONCEPTUAL PLANNING

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Submitted in August, 2008

It is not possible to create modern municipal sport infrastructure unless the newest scientific findings are used. Kinesiology and other closely related scientific disciplines (mostly biomedicine, sociology, economy and urbanism) offer an important insight into the problem. Next to the above mentioned the proposed theoretical basis of municipal sport infrastructure conceptual planning is also based on the findings published in the "Sport and sport education development conception" documents for selected regions and towns within the Czech Republic, on various conference papers and on other countries' case studies. The method proposed in this article represents a new perspective of the demand oriented sport infrastructure planning, differing from the traditionally recommended way of sport infrastructure planning on the basis of urbanistic norms.

Keywords: Conception, municipal conception, sport infrastructure, grant policy, communal recreation.

INTRODUCTION

Sport infrastructure and other kinds of municipal leisure infrastructure represent one of the basic conditions to be met in order to let the local residents satisfy their collective and individual needs related to sport and exercising (Hodaň, 1997; Dohnal, Hobza et al., 2007). During the last twenty years, developed west European countries have been systematically developing their sport infrastructure, being aware of the great impact it has on the life of the community, of the very complex set of functions it fulfills (Felderer et al., 2006; Weber et al., 1995; Howard & Crompton, 2004 and other), of its role as a health influencing factor (Nearly, 2002; Oja, 2004; Pate et al., 1995; Philips et al., 1996) and a factor determining the degree of citizens' contentment and their other needs. In developed countries, the basic sport infrastructure has been built according to standards and norms different for each country. Despite the different norms the countries are now facing an identical set of issues – full use is not made of sport facilities because of the recent shift in customer demand, driven by newly emerging sports. From the economic point of view, this has a common impact – unpleasant repercussions on municipal budgets – loss generated by the unused facilities have to be covered.

Western countries have lately been developing new development conceptions to be able to respond to citizens' needs while using the already existing facilities. Urbanistic norms still being used, the core main tool governing the leisure infrastructure development are now extensively elaborated capacity calculations.

The article talks about ways to use, to its full extent, the municipality's potential to provide for sport (and other leisure) infrastructure.

METHODOLOGY

Municipal sport infrastructure conception planning is based on analyses of the current development of municipal policies, on an analysis of the Czech Republic's legislation and its budget, on the ongoing expert and scientific discussion on the non profit sector grant policy and on expert discussions on urbanistic norms related to municipal social infrastructure.

The issue being mostly an economic and conceptual one, we used mostly qualitative research methods. Analysis and synthesis of primary data, gathered in the researched municipalities (regions, towns and villages) helped us to model optimal variants of sport infrastructure development. We then compared our model with the German one (used in eastern Europe) and drew up a theoretical basis of a municipal sport infrastructure conception. The final capacity calculations were based on demand oriented calculations by the Bundesinstitut für Sportwissenschaft (Federal Sport Science Institute, BISp) (BISp, 2000).

Differences in the way different municipalities (regions, towns and villages) conceive the support granted to sport infrastructure development

Regions, towns and villages base their development of sport activity conceptions on a very similar basis

(Fig. 1). The ways they use to analyze and synthesize their knowledge however differ, as do the forms of the financing of leisure activities and the extent to which their conceptions are put into practice.

Regional conceptions prefer to apply grant policy in order to finance the development in the following ways:

- promotion of non investment and investment activities allowing the development of the region owned infrastructure,
- grants awarded to non profit non governmental sport organizations (NNOs),
- grants awarded to other subjects operating in the field of sport and sport education,
- grants awarded to region organized events, marketing and human resources development.

Towns and villages tend to develop their own municipal sport infrastructure development projects, the main financing tools being:

- non investment support of the municipality owned facilities (financing of operation costs),
- conception of investment into municipality owned sport facilities.

Grant policy is used, by towns and villages, only as a additional tool to grant financial support to NNOs and to various profit oriented subjects, offering them in this way to cooperate with the municipalities¹ on the basis of “free” grant rules² and so provide for the needed sport services. Towns and villages also cooperate with other subjects on the basis of the PPP projects (Public – Private Partnership projects).

An important difference between the regional and municipal conceptions lies in the potential use of capacity and demand simulated calculations – towns and villages are most likely to use them, but they have not been applied in the Czech Republic yet. Until now, they have been usually replaced by architectural norms, the use of which, however, is limited.

The following chapters (Relationship between the sport development conceptions documents with other conception documents; Regional grant policy figures/grant policy proposals; Grant policy for towns and villages/grant policy proposals; Defining the needs of municipal sport infrastructure via capacity calculations) will speak about the proposed theoretical foundations

of the sport infrastructure conception development in regions, towns and villages and documentation backing them.

Relationship between the sport development conception

Documents with other conceptional documents

Sport development conceptions have, like any other ones, a systematic inner structure and are linked to a number of other conceptual materials related to sport, mainly to the following:

- European Union’s Conceptions (European Sports Charter, 2002; Sport and EU, 2004; White Book on Sport, 2007, etc.),
- the Czech Republic’s conceptions worked out by various different ministries (Act No. 115/2001, on the support granted to sport activities and the following resolutions),
- conceptions worked out by the Ministry of Education, Youth and Sport’s expert committees (directives and methodical instructions),
- conceptions worked out by local self governments,
- other kinds of scientific papers and findings (see bibliography).

Mainly the analytical part of the conception develops theoretical foundations, serving as a basis for final project conclusions. Particular sport and sport education trends are defined within the proposed grant policy and are linked to the basic orientations of the regional development programme and its individual parts (“Human resources”, “Tourism development”, and “Service development activation”).

Simultaneously, a link is proposed to the approved territory planning documentation; investment plans and operations subsidies are dealt with according to the subsidiarity principle, i. e. within the region, town and village development areas, and for individual domains (culture, sport and leisure, education, health care, etc.) by an independent and target oriented grant policy. The grant policy is linked to current budgeting processes as well as to planned regional development. The complex and diverse character of the theoretical foundations underlying the conception is shown on Fig. 1.

The main chapters of the currently developed “Sport and sport education conceptions” are usually structured as follows³:

¹ In this section, the term “municipal” refers here to towns and villages.

² Only several towns and villages have been applying these “free” grant policies. Most of the municipalities restrict their grant policies to non profit non governmental subjects (this meaning, however, a cutting down of the efficiency of the spent resources, free competition being limited).

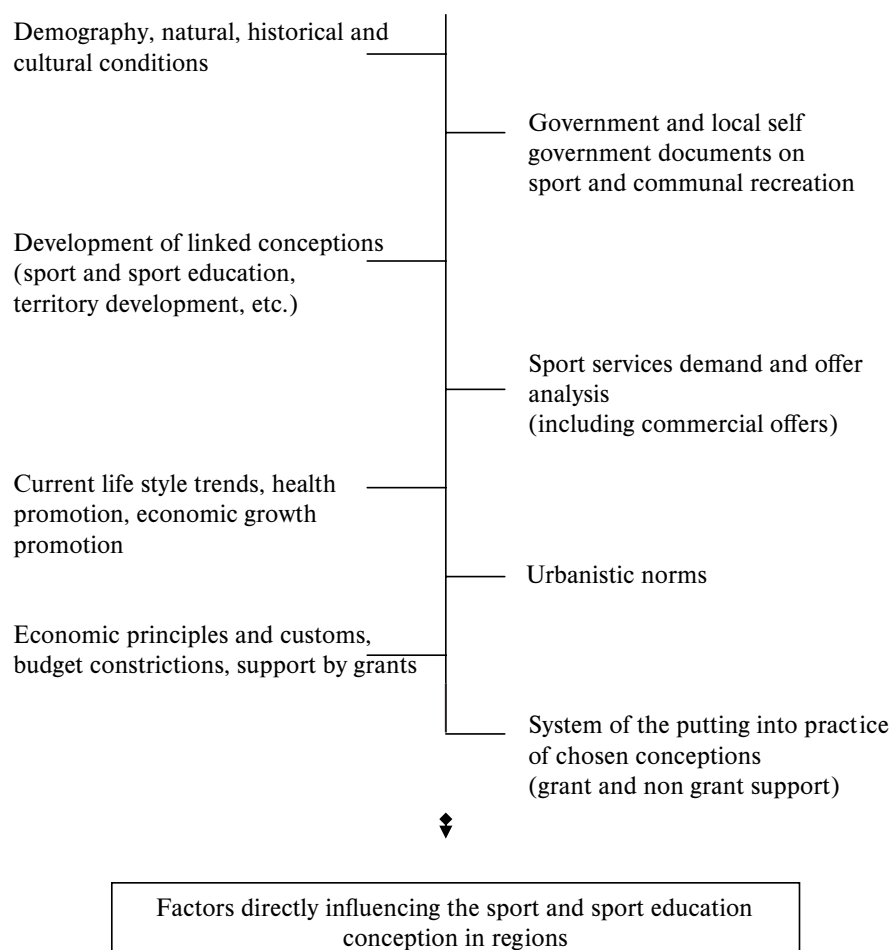
³ As an example, we use the following regional projects:

Dohnal, T., Hobza, V., Skoumal, J., Kotíková, H., Čihovský, J., & Vaďurová, R. (2006). *Analýza současného stavu tělovýchovy a sportu v Moravskoslezském kraji*. Moravian-silesian local government: A Moravian-silesian regional project (269 pages incl. annexes).

Dohnal, T., Hobza, V., Skoumal, J., Kotíková, H., Čihovský, J., & Vaďurová, R. (2007). *Analýza současného stavu tělovýchovy a sportu ve Středočeském kraji*. Central Bohemian local government: A Central Bohemian regional project (240 pages incl. annexes).

Fig. 1

Sport and the sport education conception in regions – theoretical foundations

**I. Analytical Part**

1. Region defined.
2. Conception documents outlined (sport in the EU, in the Czech Republic and on the given territory). Current local (mainly tourism) conceptions analyzed.
3. Inhabitants value orientations analyzed.
4. The state and level of the given sport, sport education and recreation analyzed.
5. Sport, sport education and sport recreation offers on the given territory analyzed.

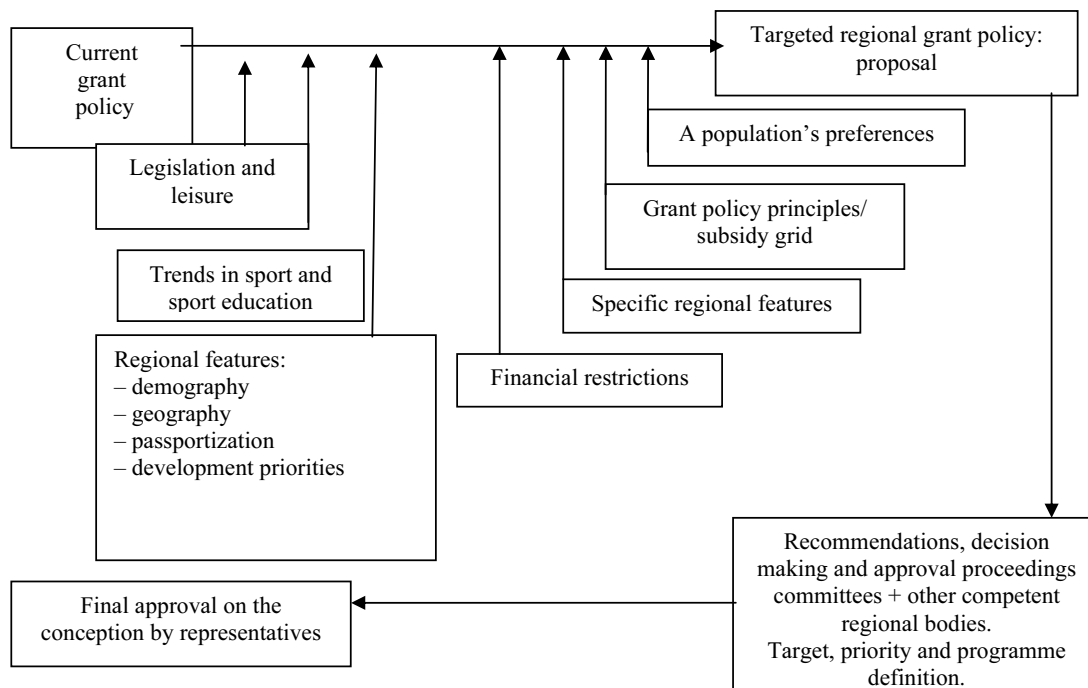
II. Structured overall SWOT analysis of the conditions necessary to introduce sport programmes within the region.**III. Action plan** aiming at sport, sport education and sport recreation development.**IV. Grant policy**, time schedule and financial restrictions.**Regional grant policy scheme: Grant policy proposal**

As we have already mentioned in the previous chapters, the current regional subsidy policy applied to sport activities comprise grant as well as non grant support. The two differ significantly, not only they rely on different kinds of decision making processes (from which are derived the sums allocated to individual subjects) but also by the way that links them to sport and sport education conceptions. Meanwhile the grant policies take into consideration different factors and are developed on an analytical basis (Fig. 2), the decision making on non grant policies is direct, carried out by regional representatives. In this group are mostly included decisions on support granted to significant sport clubs, large regional as well as international events, etc.

The sport and sport education conceptions are related to a number of fields promoting physical activities development. They are not solely oriented to sport and sport organizations, neither do they concentrate solely on leisure time activities. We have already specified that

Fig. 2

Grant strategie – basic documentation, used analysis



they comprise the development of different kinds of activities, listed below as priorities:

- creating sport and sport education infrastructure,
- sport and sport education products offer,
- a good quality of services being offered in the field of sport and sport education,
- human resources development in the field of sport and sport education,
- marketing and marketing communication in the field of sport and sport education,
- creating a sport and sport education management system.

Regionally appointed committees recommend concrete priorities picked from the above mentioned list, taking into consideration sport and sport education development orientation as well as financial restrictions, e.g. the Infrastructure programme might be given priority over the Service quality programme, or vice versa. The grant attribution procedure on the regional level is finished by their communication and assessment and allocation of means and control.

Grant policy scheme in towns and villages: Grant policy proposal

On the local level (towns and villages), sport and sport education promotion follows principles similar to

the ones used at the regional level. Differences among the regional and local approach can be summarized as follows:

- towns and villages, unlike regions, dispose of their own sport infrastructure, and are therefore more oriented towards their own property,
- towns and villages dedicate, on average, two (or more) times more budget resources to sport and sport education than regions. Investment related budget repercussions evidently influence their future budgets,
- towns and villages vary to a very large extent in their plans related to sport and sport education (unlike the regions). They emphasize not only sport and sport education but also communal recreation, development of sport activities organized by local clubs as well as leisure activities related tourism,
- support granted to local sport clubs may often be provided in a hidden way, e.g. by free or cheap leasing of local sport facilities,
- towns and villages (unlike the regions) also take into consideration space organisation rules, as defined by urbanistic norms. On the other hand, they do not take into consideration capacity calculations, according to which an expansion or reduction of current sport facilities capacity may be recommended.

Towns and villages also do prepare their sport development conceptions but, unlike the regions, their conceptions often fall under other ones, for example under the communal recreation conception, leisure activities conceptions, tourism and sport development conceptions, etc. Most of the towns above 20 thousand inhabitants, however, do prepare independent sport and sport education conceptions.

In the Czech Republic, three basic conception trends can be distinguished. According to these, sport and sport education shall be developed through:

- town and village owned facilities,
- direct grant and non grant support of sport and sport education, and
- a combination of the promotion of municipal owned sport infrastructure and grant and non grant support of sport and sport education.

The basic framework governing sport and sport education development at the municipal level is given by the creation of sport and sport education development conceptions. These conceptions usually have the following structure:

- legislative and organisational conditions,
- needs and demand analysis (for all population groups),
- current offer of sport activities, sport education and leisure activities within the given territory analysis,
- demand and offer assessment, comparison with other municipalities and norms,
- capacity calculations,
- SWOT analysis,
- action and conception plan,
- specifying the development fields,
- developing municipality's own assets for sport and sport education,
- proposing financial and realizational limits, grant policy.

Municipalities more and more often prefer building their own sport infrastructure, including leisure facilities, to using leased facilities. This is also why the grant policy becomes rather a complement to the overall sport and sport education conception.

The basic scheme governing the grant policy in towns and villages does not, methodically, differ from the regional schemes. However, it has some specific features – a municipality's own facilities and tradition of concrete, local favourite, successful and traditional sports. Sport based recreation is usually provided for by local sport facilities owned by the municipality, performance oriented sport and recreational sport are organized mostly by clubs and associations which are supported

by the municipality's grant policy. Municipalities not owning any sport facilities usually work on the basis of a full grant system.

Non grant policy (i.e. budget subsidies, provided without tender), is applied mainly to support performance oriented (professional) sport and will probably always be a part of political and interest related decisions.

Fig. 3 shows the way grant policy is created on the municipal level. It demonstrates clearly that grant procedures do not concern the development of the municipality owned facilities.

Urbanistic norms represent one of the tools helping to equip municipal areas, including the implementation of sport infrastructure. Nikodým (2001) partially updated the norms, which have, however, been going through more revision and consulting – another reform is being expected. TABLE 1 describes the situation.

TABLE 1

Norms concerning sport facilities (Nikodým, 2001)

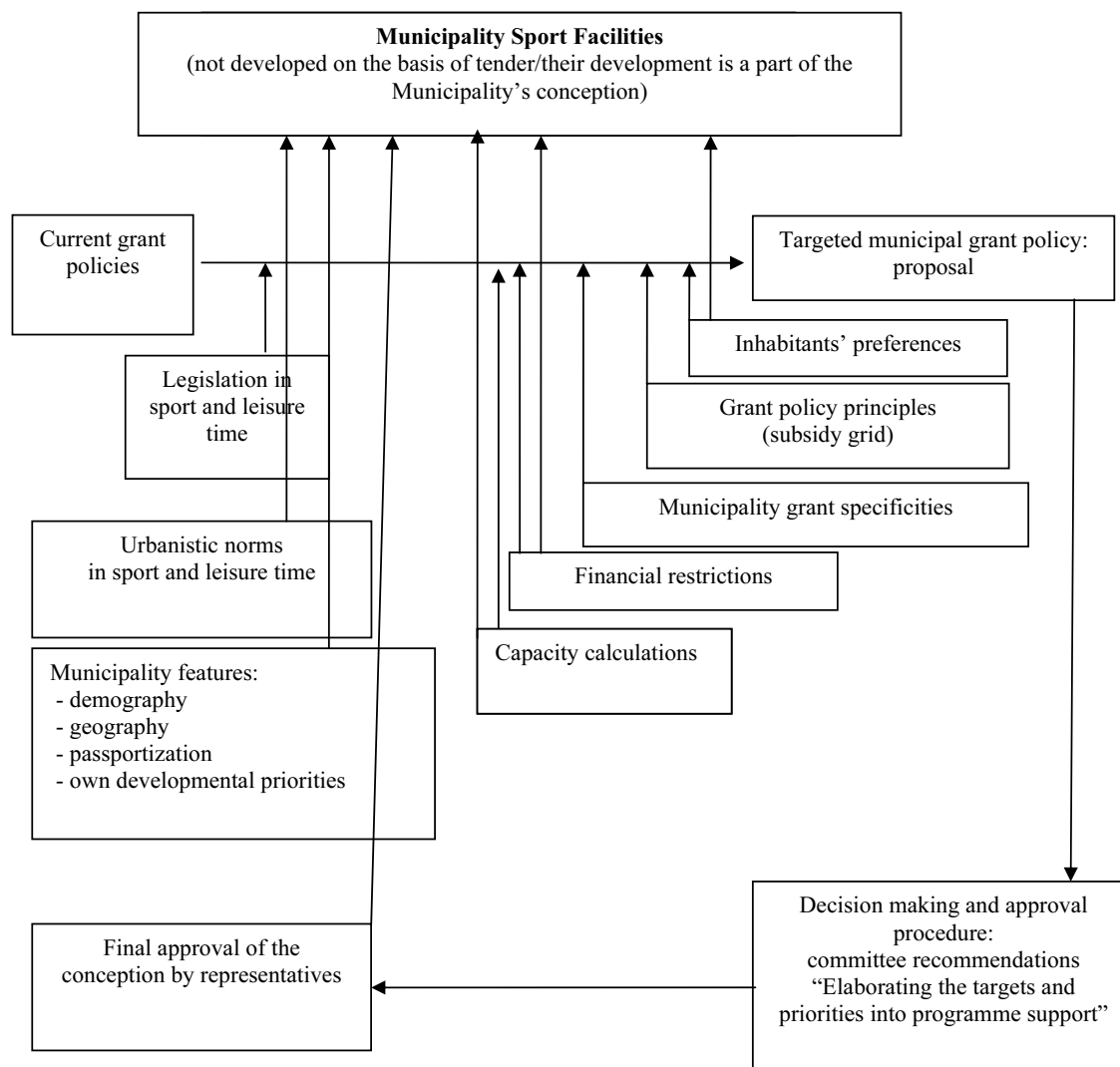
Activity	Exercising surface (m ² /inhabitants)	Usable surface (m ² /inhabitants)	Inhabitants (%)
Organized sport education	1.99	2.88	6
School sport education	1.79	2.22	19
Non organized sport education	1.31	2.14	75
Total	5.09	7.24	100

Defining needed municipal sport infrastructure through capacity calculations

It is possible to define the ideal recommended need level of sport and recreational facilities for the community by comparing current citizens' needs, local sport product offers and urbanistic norms with capacity calculations. The following case study illustrates the way capacity needs in the municipal sport equipment infrastructure are calculated. This kind of calculation has not yet been applied in the Czech Republic, they are currently being tested – it is assumed that, as a result of a changing population's demand and its orientation to new sports, significant changes have been and will be happening in the way current sport infrastructure is used. A need has arisen and will continue arising to reconstruct the current infrastructure not only according to the population's demands, but also on the basis of healthy life style stimulation initiatives.

Fig. 3

Grant policy scheme in towns and villages



According to the German example (see the case study), financial support in the field of sport infrastructure (sport grounds, sport halls, swimming pools), rendered by the municipalities, can be conceived of as support of infrastructure available to all citizens interested in sport activities, according to their preferences and based on their demands. Until the 1990's, the sport facility equipment rate was based in Germany on the so called "Golden plan for health, games (sport) and leisure" and, step by step, applied and put in practice on the entire territory of the Federal Republic of Germany – common methods and defined urbanistic norms were used. In the 1990's, however, the population's demand for sports and recreation started to change (Opaschowski, 2000). Meanwhile, as a result of the improved sport infrastructure, the number of members of the sport active population in Germany rose to as much as 75% of the population, the highest increase being represented by older population groups. At the same time,

there was a fundamental change in people's motivation – sport started being perceived as an activity of a non competitive character, performed rather to keep oneself healthy, to entertain oneself and to relax. New kinds of sport and sport activities were created and some of the old, previously highly popular sports became less favoured and less widespread. In the general perception, sport on the communal level is no longer perceived as a performance oriented competition activity, but rather as a game, as entertainment and relaxation for an active majority of the population. As a result of this opinion shift, a lot of commercial facilities were created – they were able to respond very flexibly to the population's new needs and added to the traditional offers furnished by both traditional sport clubs and new communal sport facilities. The newly created communal sport infrastructure became gradually less and less used and effective, its creation not having been demand driven and not having taken into consideration the population's prefer-

ences (neither the previous nor the current ones). As a result of these circumstances, the BISp created and recommended new methods. Their application is based on scientific findings and on a recommended set of procedures – a study on all population groups' needs in the field of sport designing the proportions of new sport infrastructure, closely linked to its current state (BISp, 2000; Bach 2001; Bach, 2005; Nagel, 2006).

Since, in the Czech Republic, no verified capacity calculations have been used so far, that would enable sport infrastructure dimension planning. We refer to an abbreviated case study that can illustrate the aforementioned.

Case study

Town of Rottenburg/Neckar, Germany.

Demand oriented requirements on sport infrastructure: Basic procedure

The basic question to be asked when developing demand oriented sport infrastructure is: "How many citizens within a community practise exercise sports, what kind of sport activities (sports) are exercised and how much time is spent on them?" (BISp, 2000). The answer defines the basic needs in the field of sport infrastructure (its volume, i.e. units of sport facilities as well as its configuration). This is a four step procedure:

- sport offer, including sport activities offering a survey,
- a sport facility related population's needs survey,
- a sport facility current state analysis,
- sport equipment's current state and a population's needs balance.

School sport is not included in the planning. The result of the procedure represents an assessment of capacities (facilities) – it says which ones are redundant or not used, which ones are not sufficient and what kind of them should be added.

Capacity calculations

The total sport facility need (KSZ) is calculated as follows (BISp, 2000):

$$(1) KSZ = \frac{E \times QA \times fpr \times F \times T \times ft}{Bd \times Kw \times fa}$$

- E – number of inhabitants living in the community
- QA – actively sporting inhabitants ratio
- Fpr – preference factor for particular kinds of sports
- F – frequency of sport activities per week
- T – time consecrated to sport
- Ft – allocation factor (sport allocated to a particular facility)

Bd – capacity load factor

Kw – technical utilization capacity of the facility per week

Fa – utilization factor

Definition of the scope of sport facilities is done in three steps:

a) First, the number of sport exercising citizens, actively using the sport facilities by practising exercise and sport activities (Esp), is calculated for all kinds of sports.

$$(2) Esp = E \times QA \times fpr$$

b) Based on the number of active sports practising and exercising citizens (according to individual sport activities) and the average of sport exercise done per week and the average length of sport exercise in the particular facility, the "sport facility need, Ksp" is calculated.

$$(3) Ksp = Esp \times F \times T$$

The F and T parameters are defined separately for each kind of sport and for the summer and winter seasons.

c) In the end, the sport ground needs are calculated according to the following formula: Faculty of Education.

$$(4) KSZ = \frac{Ksp \times ft}{Bd \times Kw \times fa}$$

Individual sport activities are assigned to various sport facilities. Therefore ft represents an accumulation of sport activities within one type of sport facility. The principle of different summertime and wintertime use of these facilities is respected. According to methodical rules, weekends are used for matches, therefore the Kw indicator takes into consideration 5 days in a week only of use. The real utilization factor depends on specific circumstances influencing the way the particular facilities, sport grounds and type of sport function – switch over times, cleaning and maintenance pauses, etc. (For example, in the case of grass playgrounds, the fa indicator is set at the level of 0.3 only – it wears down rather easily.) The final result attained by the aforementioned methodical procedures is put into a table showing – the current state of the facility – defined (detected) need – difference. For a concrete example, please see the aforementioned Rottenburg/Neckar (Germany) case study (Nagel, 2006).

The balance shows a surplus of sport halls and sport grounds (even if sports are accumulated in one facility) and a lack of swimming pools, mainly the indoor ones. When the demand was analyzed, the demand considerably exceeded the offer, mainly during winter⁴.

⁴ A more detailed overview of the calculations is to be seen in Nagel (2006). *Sportökonomie*, 8, 143–154. Schorndorf: Hofmann.

TABLE 2

Current state vs. needs balance – sport facilities and playgrounds (in facility norm units)

Sport facilities	Current state	Need	Balance
Sport halls	37.00	28.24	+8.76
Sport grounds	38.00	30.27	+7.74
Indoor swimming pools	1.69	3.49	-1.80
Outdoor swimming pools	2.48	2.83	-0.35

CONCLUSION

The current stage of any municipality's development is characterised by a continuous improvement of their technical and social infrastructure and transport. Municipalities, helped by subsidiarization decision-making processes and a linked financial decentralization, have, more often, both the competency and financial opportunities to decide on their development, including resource allocation. Social infrastructure covers both sport and sport education infrastructure, which becomes increasingly important (after the completion of the municipality's technical infrastructure (technical, transportation, etc.). The Department of Recreation works on Sport and Sport Education Development Conception projects for regions, towns and villages. It has, therefore, sufficient experience working on these projects at different levels of state administration and local self-government. These conceptions are based on local conditions, they show however some general regularities, on the basis of which it is possible to create a scheme of generally-applicable steps, leading to the creation of a system-based, demand-oriented conception, applicable in practice. The theoretical foundations of these conceptions are based on an interdisciplinary view of the physical culture and healthy life-style and enriched by the experience provided by our own research as well as by foreign countries' experience, which also works with capacity calculations.

REFERENCES

Bach, L. (2001). Der neue Leitfadens für die Sportstättenentwicklungplanung. In A. Hummel & A. Rüttingen (Eds.), *Handbuch Technik und Sport* (pp. 301–312). Schorndorf: Hofmann.

Bach, L. (2005). Sportentwicklungsplanung. *Sportwissenschaft*, 35, 39–60.

Dohnal, T., Hobza, V. et al. (2007). *Vybrané kapitoly z komunální rekreace*. Olomouc: Univerzita Palackého.

Felderer, B., Halmenstein, A., Kleissner, A., Moser, B., Schindler, J., & Treitler, R. (2006). *Sport und Ökonomie in EU*. Wien: SportsEconAustria.

Hodaň, B. (1997). *Úvod do teorie tělesné kultury*. Olomouc: Univerzita Palackého.

Hobza, V., Rektorík, J. et al. (2006). *Základy ekonomie sportu*. Praha: Ekopress.

Howard, D. R., & Crompton, J. L. (2004). *Financing sport* (2nd ed.). Morgantown: Fitness Information Technology Inc.

Nagel, S. (2006). Verhaltensorientierte Sportstättenentwicklungsplanung anhand des BISp – Leitfadens. In *Sportökonomie* (p. 8). Schorndorf: Hofmann.

Nearly, J. P., McKenzie, D. C., & Bhambhani, Y. N. (2002). Effects of short term endurance training on muscle deoxygenation trends using NIRS. *Medicine and Science in Sports and Exercise*, 34, 1725–1732.

Nemec, J., & Wright, G. (1998). *Verejné financie*. Bratislava: NISPAcee.

Novotný, J. (2000). *Ekonomika sportu*. Praha: ISV.

Oja, P., & Borms, J. (2004). *Health enhancing physical activity*. Oxford: Meyer & Meyer Sport Ltd.

Opaschowski, H. W. (2000). Zukunftstrends im nächsten Jahrzehnte: Folgen und Forderungen. In G. Trosien & M. Dinkel (Eds.), *Ökonomische Dimensionen von Sport-Events*. Afra Verlag.

Pate, R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C., Buchner, D., Ettinger, W., Heath, G. W., King, A. C., Kriska, A., Leon, A. S., Marcus, B. H., Paffenbarger, R., Patrick, S. K., Pollock, M. L., Rippe, J. M., Sallis, J., & Wilmore, J. H. (1995). Physical activity and public health: A recommendation from the centres for the disease control and prevention and the American college of sports medicine. *Journal of American Medical Association*, 273(5), 402–407.

Philips, S. M., Green, H. J., Tarnapolsky, M. A., Heigenhauser, G. J. F., & Grant, S. M. (1996). Progressive effect of endurance training on metabolic adaptations in working skeletal muscle. *American Journal of Physiology*, 270, 265–272.

(2003). *Směry státní politiky v tělovýchově a sportu*. Praha: MŠMT.

(2003). *Směry státní politiky ve sportu na léta 2004–2006*. Praha: Úřad vlády České republiky.

(2000). *BISp – spolkový institut pro sportovní vědy. Metodika kapacitních propočtů sportovní infrastruktury obcí*.

(2004). *Sport a EU – Evropská unie a její vliv na sportovní prostředí v České republice*. Praha: MŠMT, Odbor sportu a tělovýchovy.

Weber, W., Schneider, C., Kortlueke, N., & Horak, B. (1995). *Die wirtschaftliche Bedeutung des Sports*. Schorndorf: Hofmann.

(2007). *Bílá kniha o sportu*. Brusel, Praha: MŠMT.

(2002). *Evropská charta sportu*. Brusel, Praha: MŠMT.
Usnesení vlády č. 718/1999 k zásadám komplexního zabezpečení státní sportovní reprezentace.
Usnesení vlády č. 17/2000 k národnímu programu rozvoje sportu pro všechny.
Usnesení vlády č. 114/2001 o zásadách vlády pro poskytování dotací ze státního rozpočtu ČR nestátním neziskovým organizacím ústředními orgány státní správy.
Usnesení vlády č. 673/2003 ke směrům státní politiky ve sportu na roky 2004–2006.
Zákon č.115/2001 Sb., o podpoře sportu.

TEORETICKÁ VÝCHODISKA KONCEPČNÍHO PLÁNOVÁNÍ ROZVOJE SPORTOVNÍ INFRASTRUKTURY V MUNICIPALITÁCH (Souhrn anglického textu)

Současná etapa rozvoje municipalit je charakterizována stálým zlepšováním a zdokonalováním jejich technické, dopravní a sociální infrastruktury. V rámci subsidiarizačních rozhodovacích procesů a s nimi související decentralizace finančních prostředků mají municipality více než v dřívějších dobách možnosti – kompetenční i finanční – rozhodovat o svém rozvoji včetně alokace zdrojů. Do sociální infrastruktury patří sportovní a tělovýchovná infrastruktura, která po dobudování technické infrastruktury obce (technické, dopravní atd.) v současné době nabývá na významu.

Katedra rekreologie na základě veřejných zakázek zpracovává projekty koncepce rozvoje tělovýchovy a sportu krajů, měst a obcí, má tedy dostatek zkušeností ze zpracování těchto koncepcí na různých stupních státní správy a samosprávy. V koncepcích, které vycházejí z místních podmínek, je možno specifikovat obecné zákonitosti, na základě nichž lze vytvořit schéma obecně platných postupných kroků, vedoucích ke zpracování systémově založené, poptávkově orientované koncepce, uplatnitelné v praxi.

Teoretická východiska zpracování těchto koncepcí vycházejí z interdisciplinárního pohledu na tělesnou kulturu a zdravý životní styl člověka, jsou však doplněna o zkušenosti z vlastního výzkumu a ze zahraničí, kde jsou navíc aplikovány kapacitní propočty, vedoucí ke stanovení potřebné infrastruktury jako podmínky k potenciálnímu rozvoji předmětné oblasti podle přání a potřeb místních obyvatel.

Klíčová slova: koncepce, municipální koncepce, sportovní infrastruktura, grantová politika, komunální rekreace.

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THE EFFECT OF PARENTS' PHYSICAL ACTIVITY AND INACTIVITY ON THEIR CHILDREN'S PHYSICAL ACTIVITY AND SITTING

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Next to genetic predispositions, performance of physical activity (PA) in children is influenced by a variety of variables including the parents' PA. The aim of this study is to describe associations between PA and sitting in children aged 8–13 and their parents according to sex and to examine whether their participation in organized PA influences a higher level of total PA.

The level of performed PA, time spent sitting and their participation in organized PA were examined in 193 children (84 girls and 109 boys) and their parents (183 mothers and 157 fathers) using the Czech version of the IPAQ questionnaire.

We have identified positive associations between parents' physical activities, which are the strongest in the duration of walking ($r_s = 0.48-0.71$; $p < 0.001$). A longer duration of total PA in daughters, sons and their fathers and mothers is related to a shorter daily period of time spent sitting ($r_s = 0.08-0.40$). A longer period of time spent daily in sitting in parents is associated ($r_s = 0.28-0.42$; $p < 0.006$) with a longer period of time spent sitting in their children. Children, both daughters and sons, and their mothers, who participate in organized PA twice or more times a week, show a significantly longer period of time spent performing vigorous PA ($p < 0.02$; $\eta^2 > 0.05$) than children whose mothers are without any participation in organized PA.

Based on the associations found between physical activity, sitting and participation in organized PA, we can agree with the statement that "more physically active parents are bringing up more physically active children" (it is more apparent in sons). On the other hand "less physically active parents are bringing up less physically active children" (it is more apparent in daughters). Participation in organized PA in children and mothers positively influences higher levels of PA in total, especially of vigorous PA.

Keywords: Walking, vigorous and organized physical activity, IPAQ questionnaire, mother, father, daughter, son.

INTRODUCTION

Education of children towards the active development and protection of their physical, mental and social health has been a priority in contemporary educational trends at the elementary schooling level (Jeřábek & Tupý, 2007). In kinanthropology, we attempt to establish a healthy and physically active lifestyle in children and youth. This includes monitoring of physical activity (PA) and the environment regarding the relations between "school-family-leisure time" with an aim of emphasizing the determiners that are either enhancing or limiting physical activity and to create PA recommendations and programs. PA performance in children is, next to genetic predispositions, conditioned and influenced by a range of variables that include parents' PA.

The influence of parents' behavior on physical activity in children and adolescents has been frequently analyzed in literature (Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2005; Gustafson & Rhodes, 2006; Kalakanis, Goldfield, Paluch, & Epstein, 2001; Medeková, Zaple-

talová, & Havlíček, 2000; Prochaska, Rodgers, & Sallis, 2002; Sallis, Prochaska, Taylor, Hill, & Geraci, 1999; Sallis, Taylor, Dowda, Freedson, & Pate, 2002; Voss, Hosking, Metcalf, Jeffery, & Wilkin, 2008), but due to the variety of methods applied, the findings are often contradictory or limited (Prochaska, Rodgers, & Sallis, 2002; Welk, Wood, & Morss, 2003). Less frequently, the associations between parents' PA and children's PA are studied according to sex – mothers \approx daughters (or sons); fathers \approx sons (or daughters) (Bois et al., 2005; Medeková, Zapletalová, & Havlíček, 2000) or the type or intensity of PA performed (Andersen & Wold, 1992; Sallis et al., 2002).

Gustafson and Rhodes (2006) argue, on the basis of the results of 34 American and European cross sectional and longitudinal studies concerning the relation of parents' PA and children's PA over the last 20 years, that positive support from parents predicts higher PA in their children. By the parents' support, they understand motivating children, providing physical activity and sports equipment and their own involvement in PA

and leading PA. It has been shown that this positive influence is more apparent in younger children (Sallis et al., 1992) and in vigorous PA (Andersen & Wold, 1992; Sallis et al., 2002).

Frequently, the support of PA in children is associated with the socioeconomic status of the family; however, the results are often contradictory. Monitoring weekly PA in 214 children aged 7–8 using the ActiGraph accelerometer, Voss et al. (2008) found out that children from families with a lower financial income participate less in organized PA but their total weekly PA is independent of their parents' income. On the other hand, a higher parents' socioeconomic status is positively associated with higher PA at weekends ($r = 0.34$) in their 8–10 year old children (Ziviani, MacDonald, Ward, Jenkins, & Rodger, 2008). Similarly, Sallis and Owen (1999) suggest that children of parents' having a higher education or from families with higher financial incomes, have better conditions in order to perform PA and at the same time, they are more physically active than the children of parents' who have a lower education level or lower financial incomes.

In a study carried out in 9 year old children ($n = 297$) and their parents, Sallis et al. (1992) found out that boys from incomplete families showed higher PA than boys from families with both parents. "Boys from incomplete families are perhaps more active since they are not so attended to by parents and they have to rely more on themselves in terms of transportation such as walking or cycling than boys from complete families" (Sallis et al., 1992, 1387).

The relationship between the physical activity of children and their parents is not clearly unequivocal; it is likely conditioned by various psychological variables (the temperament, type and preference of leisure time activities), social ones (completeness of the family, number and sex of siblings and friends), environmental ones (location and type of housing, the availability and safety of sports facilities and other areas for PA), somatic ones (weight, health) and other variables that need to be emphasized when creating effective health and physical activity enhancing programs. Our study's purpose is to describe the relations between different kinds of physical activity (walking, moderate and vigorous PA), time spent sitting and time spent performing organized PA in parents and their children according to sex – mother \approx daughter (or son), father \approx son (or daughter).

AIM

The aim of the study is to assess whether "more physically active parents bring up more physically active children" applying the analysis of the associations

between PA and sitting in 8–13 year old children and their parents according to sex. A further goal is to assess whether the participation of children and their parents in organized physical activity influences higher PA in total.

METHODS

Selection of methods and surveys

The analysis of the association between PA of parents and their children was a part of a broader research effort aimed at the assessment of the somatic state of children aged 8–13 regarding the determinants of overweight (Turoňová, 2008). In three directly selected elementary schools in Olomouc that agreed to participate in our research, 138 girls and 154 boys aged 8–13 were addressed to participate in the study. Upon the explanation of the aims of the study, the children obtained the IPAQ questionnaire. Along with the questionnaire, the children and their parents received a form of consent regarding participation in the study.

Out of the total of the addressed participants, 70% of the children (88 girls and 117 boys) and 63% of the parents (191 women and 177 men) gave written consent to participation in the study. Of IPAQ questionnaires from children, 6.3% and from parents, 7.6% were not fully or correctly completed. In the end, data from 192 children (84 boys and 109 girls) and 340 parents (183 mothers and 157 fathers) were included into the analysis of the associations between PA and sitting.

The children's and parents' participation in the study was voluntary and no incentives were paid to them. The study was approved by the ethics committee of the Faculty of Physical Culture at Palacký University in Olomouc.

IPAQ questionnaire

The level of weekly PA of the participants was estimated using the Czech version of the IPAQ short version questionnaire on physical activity (Frömel, Bauman et al., 2006). The Czech short version of the questionnaire was translated and standardized from the English standardized original "International Physical Activity Questionnaire" (Craig et al., 2003). The first page of the short administrative IPAQ questionnaire includes one question on the duration and weekly frequency of vigorous PA, moderate PA and walking.

Vigorous PA is reflected in faster breathing and an apparent increase in heart rate. It includes physically demanding PA such as running, aerobics, fast cycling or digging or lifting heavy loads (Frömel et al., 2006; Haskell et al., 2007). Moderate PA involves medium exertion, when one breathes faster than when resting and

the heart rate noticeably increases. Walking is a general example of this type of activity.

The second page of the administrative version of the IPAQ questionnaire asks about demographic characteristics of the respondent (sex, age, education, employment, size of residence), one additional question concerning the time spent sitting on working days, and other personal characteristics (weight, height, nationality, type of housing, smoking, material background and regular participation in organized PA) (Frömel, Bauman et al., 2006). Organized PA is understood to be intentional, planned and targeted PA controlled by a teacher, an instructor, or a trainer, aimed at meeting a physical activity goal, and very often at maintaining or improving one's fitness and health at the same time (Frömel, Novosad, & Svozil, 1999).

The final score obtained from the IPAQ questionnaire is based on the daily or weekly duration of total PA or its individual types (minutes/week), or its level (METmin/week). The number of METminutes of vigorous PA = $6 \times$ duration of vigorous PA (minutes/week). The number of METminutes of moderate PA = $4 \times$ duration of moderate PA (minutes/week) and the number of METminutes of walking = $3.3 \times$ duration of walking (minutes/week). The values of multiples 6.4 and 3.3 are equivalents of PA intensity which were set when standardizing the IPAQ questionnaire.

Statistical processing and data interpretation

Data were analyzed using the STATISTICA 6 (Statsoft ČR, 2002) software. The associations between participation in organized PA, duration of individual types of PA and sitting in parents and their children were quantified using the Spearman's coefficient of ordinal correlation r_s . The degree of association expressed by the absolute values of the r_s coefficient (0.1–0.3; or 0.3–0.7; 0.7–1) can be interpreted as being small, medium or large (Hendl, 2004). To identify the statistical significance of differences between the duration of PA and sitting in groups of children and their parents, we divided the groups according to their participation in organized PA (none : $1 \times$: $\geq 2 \times$ week), using the Kruskal-Wallis non parametric test. To assess the logical significance of the tested differences, we used the "effect size" η^2 coefficient. The most common interpretation of the values of the η^2 coefficient is 0.01 – small effect, 0.06 – medium effect and 0.14 – large effect (Morse, 1999).

RESULTS

The closest associations between PA in parents and their children are found in walking and total PA (TABLE 1). This finding is moreover enhanced by the

identification of the inverse relationship between the time spent performing PA by children and time their parents spent sitting. Physical inactivity in parents, represented by sitting, is closely associated with a longer period of time spent sitting in children. The analysis of the relationships between PA and sitting in parents and their children has not shown any apparent differences in values of correlation coefficients r_s when taking into consideration the age of daughters and sons. Positive relations between PA in parents and their children or inverse relations between time spent performing PA in children and sitting in their parents are independent of the children's age.

The results point at closer relationships between mothers' PA and that of their children rather than fathers' PA (TABLE 1); the differences are not however statistically or logically significant. Fathers have a closer relationship to their sons' PA than to their daughters' PA.

More frequent participation in organized PA is positively reflected in a higher level of weekly PA (METmin) especially in mothers and their children (both sons and daughters) and in vigorous PA (TABLE 2). When testing statistically the differences in PA between groups of parents and their children, categorized according to their weekly participation in organized PA, we have found out that children (both sons and daughters) and mothers participating in organized PA show a significantly higher level of vigorous PA (METmin/week) than children and mothers without participation in organized PA [daughters: $H(2, n = 84) = 7.84, p = 0.02, \eta^2 = 0.10$; sons: $H(2, n = 109) = 17.63, p = 0.0001, \eta^2 = 0.16$; mothers: $H(2, n = 183) = 22.28, p = 0.0001, \eta^2 = 0.12$].

A higher degree of participation in vigorous PA in children and mothers with more frequent participation in organized PA was not reflected in a lesser performance of moderate PA or walking.

The level of total weekly PA and its individual types in children and parents, depending on their participation in organized PA, is shown in Fig. 1 and 2. Fig. 1 shows that an increase in vigorous PA in children participating once or twice a week in an organized PA session is significantly reflected in higher weekly PA in total than in children without any participation in any organized PA while keeping approximately the same levels of walking and moderate PA in both groups.

In children participating twice or more times a week in organized PA, we observe a positive finding of less time spent sitting than in children without participation in an organized PA. The results apply to both girls and boys where we do not find any differences between them in terms of PA and sitting.

In comparison to children, already one instance of participation in an organized PA a week in parents is positively reflected in their total PA (Fig. 2). Along with

TABLE 1

Relationships (r_s) between time spent walking, moderate PA and vigorous PA and sitting in parents and their children.

r_s		MOTHERS					FATHERS				
		Overall PA	Walking	Moderate PA	Vigorous PA	Sitting	Overall PA	Walking	Moderate PA	Vigorous PA	Sitting
D A U G H T E R S	Overall PA	0.50	0.63	0.20	0.05	-0.22	0.24	0.41	0.11	0.02	-0.01
	Walking	0.48	0.71	0.06	0.01	-0.05	0.23	0.48	0.03	0.01	-0.12
	Moderate PA	<i>0.28</i>	<i>0.30</i>	0.19	0.04	-0.23	0.15	0.16	0.25	0.07	-0.15
	Vigorous PA	0.27	0.22	0.24	0.11	-0.25	0.10	0.10	0.10	0.02	-0.07
	Sitting	-0.04	0.06	-0.17	-0.11	0.40	-0.09	-0.11	-0.10	0.02	0.42
S O N S	Overall PA	0.53	0.44	0.46	0.21	-0.28	0.46	0.39	<i>0.33</i>	0.23	-0.30
	Walking	0.54	0.54	0.44	0.10	-0.32	0.43	0.48	0.20	0.19	-0.36
	Moderate PA	<i>0.30</i>	0.19	0.34	0.13	-0.11	0.39	0.25	0.39	0.15	-0.20
	Vigorous PA	0.17	0.06	0.11	<i>0.28</i>	-0.10	0.08	0.04	0.10	0.13	0.01
	Sitting	0.05	0.09	-0.03	0.03	<i>0.28</i>	0.01	0.01	-0.05	0.09	<i>0.29</i>

Legend:

r_s – Spearman's coefficient of ordinal correlation,

PA – physical activity,

Statistical significance – *italics* $p \leq 0.01$,

bold $p \leq 0.001$.

TABLE 2

Relationships (r_s) between the level of walking, moderate PA and vigorous PA (METmin/week) in parents and their children regarding organized PA ($0 \times$ week, $1 \times$ week $\geq 2 \times$ week)

r_s	Daughters	Sons	Mothers	Fathers
Overall PA	<i>0.29</i>	<i>0.29</i>	0.13	0.04
Walking	0.13	0.06	0.04	0.11
Moderate PA	<i>0.27</i>	0.14	0.05	0.04
Vigorous PA	0.25	0.36	0.31	0.03

Legend:

r_s – Spearman's coefficient of ordinal correlation,

PA – physical activity,

Statistical significance – *italics* $p \leq 0.01$,

bold $p \leq 0.001$.

more frequent participation by parents in organized PA, we can observe an increase in vigorous PA (Fig. 2). Neither in children nor in parents, is the more frequent

participation in an organized PA accompanied by less walking nor by an increase in sitting (Fig. 1, 2).

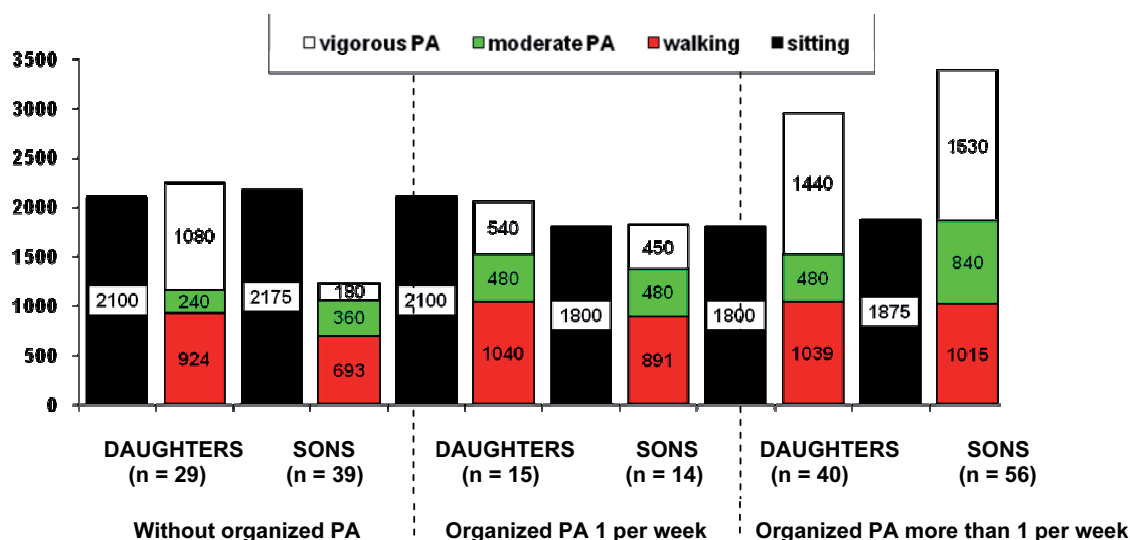
DISCUSSION

The aim of the study was to assess whether “more physically active parents bring up more physically active children” by applying the analysis of the associations between PA and sitting in 8–13 year old children and their parents according to sex.

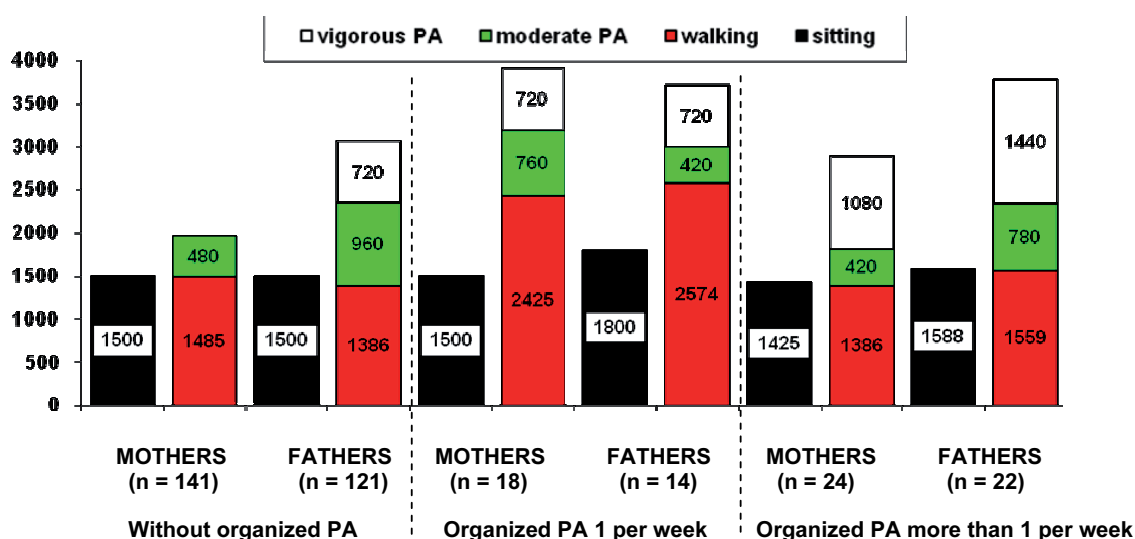
Similarly to international studies (Medeková, Zapletalová, & Havlíček, 2000; Gustafson & Rhodes, 2006; Sallis, Taylor, Dowda, Freedson, & Pate, 2002; Welk, Wood, & Morss, 2003) analyzing larger samples of participants, we have found positive relations between parents' PA and their children's PA. Yet, the associations we have found are higher than in the mentioned studies. Among the reasons we can find the homogeneity of the observed sample of children (3 geographically related schools, with the same programs and similar facilities,

Fig. 1

The comparison of medians of individual types of PA (METmin/week) and sitting (MIN/week) in children divided according to their participation in organized PA

**Fig. 2**

The comparison of medians of individual types of PA (METmin/week) and sitting (MIN/week) in parents divided according to their participation in organized PA



the same place of residence) and parents (similar higher education and similar socioeconomic status) and moreover also a good organization of this single time survey. The fact that we can be still considered a “walking” society is proved by the closest associations between PA in parents and children found in walking, which is a dominant type of weekly PA performed.

Similarly to Medeková, Zapletalová and Havlíček (2000) in 6–9 year olds or Welk, Wood and Morss (2003) in children aged 8–11, we argue that “more physically active parents bring up more physically active children”. Yet, only Medeková, Zapletalová and Havlíček (2000) have not confirmed a stronger influence of fathers on their children’s PA than mothers; un-

like Sallis et al. (2002) in 9–17 year old children. In our study, mothers are showing a slightly closer relationship to their children's PA (both sons and daughters) than fathers, who tend to devote themselves more to their sons' PA than to their daughters'. We can assume that mothers do not tend to prefer either sons or daughters, unlike fathers, who tend to support more their sons' ambitions in PA.

Another goal of the study was to identify whether parents' and children's participation in organized PA is reflected in a higher level of total PA. This secondary goal may seem to be tautological, yet it is not. Based on previous studies of adolescents, it was found that vigorous PA performed in the form of organized PA was often "compensated for" by longer periods of physical inactivity (sitting, lying, watching TV or using a computer) and by shorter length of time spent walking in leisure time in comparison to non participation in an organized PA which could be associated with longer periods of time spent walking or performing leisure PA (Frömel, Novosad, & Svozil, 1999).

Participation in organized PA is a significantly positive correlate of PA in daughters, sons and mothers, which is apparent mainly in an increase in vigorous PA. While in children participation twice or more times a week in organized PA becomes apparent in a higher weekly rate of PA in total, in mothers already the participation once a week in organized PA influences a higher weekly rate of PA in total. Moreover, we have observed that more frequent participation in organized PA is associated with less time spent sitting and at the same time there is not less walking observed.

More than the influence of actual parents' PA on their children's PA, the parents' support of their children towards PA has been discussed (Gustafson & Rhodes, 2006; Sallis et al., 1992; 1999; 2002). The transportation of children to sport facilities, paying of fees and buying of certified sports equipment are becoming more important due to the decrease of the availability of a natural environment for PA, the overall decline of PA in children, the increase of more technical sport activities and the emphasis on safety and health aspects of PA performance.

Monitoring of the relationships between parents' PA and their children's PA is also important due to, for example, the creation of effective physical activity programs. Not only their support, but the parents' actual participation in PA helps to increase their children's PA. In a study describing PA in 8–12 year old obese children, Kalakanis, Goldfield, Paluch and Epstein (2001) found that PA in their parents is a good predictor of the children's PA intensity. Therefore, they recommend physical activity intervention programs in obese children to include also their parents' participation in PA.

LIMITS AND RECOMMENDATIONS OF THE STUDY

The application of the standardized questionnaire to assess the level of weekly PA and the relationship between parents and children is considered to be the major limit of the study, which does not allow for an overall generalization of the findings. Despite that fact that Sallis et al. (2002) found similarity between the results obtained from the questionnaire and more objective PA monitoring using CSA accelerometer concerning the relationship between PA in parents and their children. In questions concerning the volume of PA, the participants tend to overestimate its real volume, in general. To reduce the number of incorrect or incomplete IPAQ questionnaires, a trained university student was involved in the study to assist the participants with questionnaire completing in both children and parents.

In further studies, we recommend assessing the relationships between PA in siblings, schoolmates or friends who can also play a vital role in motivation them to participate in PA (Sallis et al., 1999; 2002). An analysis of children's PA in the school, out of school and family environments can be important, as well as the assessment of PA stability in relationship to parents' PA. A school environment motivating children to participate in PA along with providing safe and qualified instructors can be a significant stimulus influencing children aged 12–14 to participate in PA (Sallis, Conway, Prochaska, McKenzie, Marshall, & Brown, 2001).

CONCLUSIONS

- Regardless of sex and age, the relationships between physical activity in 8–13 year olds and their parents are positive. The closest relationship between children's PA and their parents PA are found in the daily time spent walking, then in total weekly PA and moderate PA. We can conclude that "more physically active parents (both mothers and fathers) bring up more physically active children" (it is more apparent in sons).
- A longer period of time spent performing PA in both sons and daughters and mothers and fathers is related to a shorter daily period of time spent sitting. Overall, we can argue that "less physically active mothers and fathers bring up less physically active children" (it is more apparent in daughters).
- Children (both sons and daughters) and their mothers, who participate twice or more times a week in organized PA show significantly ($p < 0.02$) longer periods of time performing vigorous PA than children and mothers without participation in organized

PA. Participation in organized PA is thus positively reflected in a higher level of weekly PA in total.

REFERENCES

- Andersen, N., & Wold, B. (1992). Parental and peer influences on leisure time physical activity in young adolescent. *Research Quarterly for Exercise and Sport*, 63(4), 341–348.
- Bois, J. E., Sarrazin, P. G., Brustad, R. J., Trouilloud, D. O., & Cury, F. (2005). Elementary schoolchildren's perceived competence and physical activity involvement: The influence of parents' role modelling behaviours and perceptions of their child's competence. *Psychology of Sport and Exercise*, 6(4), 381–397.
- Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, U., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12 country reliability and validity. *Medicine and Science in Sports and Exercise*, 35(8), 1381–1395.
- Frömel, K., Bauman, A. et al. (2006). Intenzita a objem pohybové aktivity 15–69leté populace České republiky. *Česká kinantropologie*, 10(1), 13–27.
- Frömel, K., Novosad, J., & Svozil, Z. (1999). *Pohybová aktivita a sportovní zájmy mládeže*. Olomouc: Univerzita Palackého.
- Gustafson, S. L., & Rhodes, R. E. (2006). Parental correlates of physical activity in children and early adolescents. *Sports Medicine*, 36(1), 79–97.
- Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D., & Bauman, A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise*, 39(8), 1423–1434.
- Hendl, J. (2004). *Přehled statistických metod zpracování dat*. Praha: Portál.
- Jeřábek, J., & Tupý, J. (2007). *Rámcový vzdělávací program pro základní vzdělávání (se změnami provedenými k 1. 9. 2007)*. Praha: Výzkumný ústav pedagogický.
- Kalakanis, L. E., Goldfield, G. S., Paluch, R. A., & Epstein, L. H. (2001). Parental activity as a determinant of activity level and patterns of activity in obese children. *Research Quarterly for Exercise and Sport*, 72(3), 202–209.
- Medeková, H., Zapletalová, L., & Havlíček, I. (2000). Habitual physical activity in children according to their motor performance and sports activity of their parents. *Acta Universitatis Palackianae Olomucensis. Gymnica*, 30(1), 21–24.
- Morse, D. T. (1999). Minisize 2: A computer program for determining effect size and minimum sample for statistical significance for univariate, multivariate, and nonparametric tests. *Educational and Psychological Measurement*, 59(3), 518–531.
- Prochaska, J. J., Rodgers, M. W., & Sallis, J. F. (2002). Association of parent and peer support with adolescent physical activity. *Research Quarterly for Exercise and Sport*, 73(2), 206–210.
- Sallis, J. F., Alcaraz, J. E., McKenzie, T. L., Howel, M. F., Kolody, B., & Nader, P. R. (1992). Parental behavior in relation to physical activity and fitness in 9 year old children. *American Journal of Diseases of Children*, 146, 1383–1388.
- Sallis, J. F., Conway, T. L., Prochaska, J. J., McKenzie, T. L., Marshall, S. J., & Brown, M. (2001). The association of school environments with youth physical activity. *American Journal of Public Health*, 91(4), 618–620.
- Sallis, J. F., & Owen, N. (1999). *Physical activity & behavioral medicine*. Thousand Oaks, London: SAGE.
- Sallis, J. F., Prochaska, J. J., Taylor, W. C., Hill, J. O. & Geraci, J. C. (1999). Correlates of physical activity in a national sample of girls and boys in grades 4 through 12. *Health Psychology*, 18(4), 410–415.
- Sallis, J. F., Taylor, W. C., Dowda, M., Freedson, P. S., & Pate, R. R. (2002). Correlates of vigorous physical activity for children in grades 1 through 12: Comparing parent reported and objectively measured physical activity. *Pediatric Exercise Science*, 14, 30–44.
- Statsoft ČR. (2002). *Statistica Cz. Verze 6.0* [Computer software]. Praha: StatSoft.
- Turoňová, K. (2008). *Somatický stav dětí ve věku 8–13 let s ohledem na determinanty nadváhy*. Diplomová práce, Univerzita Palackého, Fakulta tělesné kultury, Olomouc.
- Voss, L. D., Hosking, J., Metcalf, B. S., Jeffery, A. N., & Wilkin, T. J. (2008). Children from low income families have less access to sports facilities, but are no less physically active: Gross sectional study (earlybird 35). *Child: Care, Health and Development*, 34(4), 470–474.
- Welk, G. J., Wood, K., & Morss, G. (2003). Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science*, 15, 19–33.
- Ziviani, J., Macdonald, D., Ward, H., Jenkins, D., & Rodger, S. (2008). Physical activity of young children: A two year follow up. *Physical & Occupational Therapy in Pediatrics*, 28(1), 25–39.

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VLIV POHYBOVÉ AKTIVITY A INAKTIVITY RODIČŮ NA POHYBOVOU AKTIVITU A SEZENÍ JEJICH DĚTÍ (Souhrn anglického textu)

Provádění pohybové aktivity (PA) dětí je vedle genetických predispozic podmíněno a ovlivněno řadou proměnných, mezi něž patří také PA rodičů. Cílem této studie je s ohledem na pohlaví popsat vztahy mezi PA a sezením u 8–13letých dětí a jejich rodičů a zjistit, zda se účast v organizované PA podílí na celkově vyšší úrovni realizované PA.

Úroveň realizované PA, doba sezení a účast v organizované PA byla u 193 dětí (84 děvčat a 109 chlapců) a jejich rodičů (183 matek a 157 otců) zjišťována prostřednictvím české standardizované verze dotazníku IPAQ.

Mezi pohybovou aktivitou rodičů a dětí nacházíme pozitivní vztahy, které jsou nejtěsnější u doby trvání chůze ($r_s = 0,48-0,71$; $p < 0,001$). Delší doba realizace celkové PA se u dcer i synů a jejich matek i otců vztahuje ke kratší době každodenního sezení ($r_s = 0,08-0,40$). Delší doba každodenního sezení rodičů je asociována ($r_s = 0,28-0,42$; $p < 0,006$) s delší dobou sezení jejich dětí. Děti, dcery i synové, a jejich matky, které se dva a vícekrát týdně účastní organizované PA, vykazují signifikantně delší dobu provádění intenzivní PA ($p < 0,02$; $\eta^2 > 0,05$) než děti a jejich matky bez účasti v organizované PA.

Na základě zjištěných vztahů mezi pohybovou aktivitou, sezením a účastí v organizované PA lze souhlasit s tvrzením, že „pohybově aktivnější rodiče vychovávají pohybově aktivnější děti“ (zřetelněji u synů). A naopak „pohybově méně aktivní rodiče vychovávají pohybově méně aktivní děti“ (zřetelněji u dcer). Účast v organizované PA se u dětí a matek příznivě podílí na celkově vyšší úrovni realizované PA, zvláště pak u intenzivní PA.

Klíčová slova: chůze, intenzivní a organizovaná pohybová aktivita, sezení, dotazník IPAQ, matka, otec, dcera, syn.

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First-line publications

- Sigmund, E., Croix, M. D. S., Sigmundová, D., Mitáš, J., & Frömel, K. (2008). Monitoring of physical activity using accelerometers and pedometers and possibility to change physical activity behavior using individualized feedback [Abstract]. In J. B. J. Bussmann, H. L. D. Horemans, & H. L. P. Hurkmans (Eds.), *International Conference on Ambulatory Monitoring of Physical Activity and Movement* (p. 105). Netherlands: Rotterdam.
- Sigmund, E., Mitáš, J., Sigmundová, D., & Frömel, K. (2008). Lifestyle correlates of physical activity in random samples of Czech adults [abstract]. In *2nd ICPAPH International Congress on Physical Activity and Public Health* (p. 225). Netherlands: Amsterdam.
- Sigmund, E., Croix, D. S. M., Mikláňková, L., & Frömel, K. (2007). Physical activity patterns of kindergarten children in comparison to teenagers and young adults. *European Journal of Public Health*, 17(6), 646–651.
- Sigmund, E., Mikláňková, L., & Frömel, K. (2006). Overview comparison of physical activity in Czech preschool children and adolescents in relation to health recommendations [Abstract]. *European Journal of Public Health*, 16(Suppl. 1), 89.
- Sigmund, E., Frömel, K., Formánková, S., Ludva, P., & Klimtová, H. (2005). Activity preferences in girls and boys aged 10–14 from Moravia region. *Human Kinetics*, 13(1), 95–105.

PREDICTION OF LEARNING DIFFICULTIES WITH THE TEST OF COMPLEX IMITATION OF MOVEMENT

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Developmental Coordination Disorder (DCD) is one of all of the heterogeneous range of developmental disorders affecting the initiation, organization and performance of actions. It is often being overlooked in school practice and in everyday work with children. Therefore, the aim of this article is to draw attention to this problem and prove how children with DCD can be easily recognized by teachers of different subjects. Especially PE teachers are those who can recognize pupils with learning difficulties, in informal tasks, and later on organize appropriate intervention. A quicker prognosis can lead to faster intervention resulting in the progress of children with DCD in their movement abilities. This research has shown that on the basis of twenty tasks of the Bergès-Lézine's test of the complex imitation of movement/gestures, we can predict which children have some learning difficulties and which do not. Particularly we wish to emphasize three tasks (12, 17 and 20) where children had to cross the vertical midline of their bodies. These three tasks involve bilateral coordination. Children with DCD signs face problems in spatial orientation and in complex imitation of movement/gestures. On the basis of great differences, found in tasks where pupils had to cross the vertical midline of their bodies and rotate their palms, children can be classified into two groups (with and without motor and learning difficulties).

Keywords: DCD, learning difficulties, manual constructional dyspraxia.

INTRODUCTION

Movement is very important during a child's development. It shapes their bodies' scheme, their sense of time and space, their planning ability and adaptability. It is based on self esteem, acquirement of self confidence and personal motor skills, as well as progressive knowledge in motor learning and knowledge of cooperation, mutual and self respect and consideration of diversity. Sometimes a child's motor development is not in proportion with his/her general development. This can be recognized by parents and/or by teachers, especially those of physical education, or by other school experts. These children can have Developmental Coordination Disorder (DCD), also known as Developmental Dyspraxia (Kirby, 2005). It can be recognized in children who experience movement difficulties and who are without any known medical condition or identifiable neurological disease (American Psychiatric Association, 2000). The specific manifestations of the disorder are varied and pervasive including both gross and fine motor skills (Visser, 2003). These problems make a child's day to day activities (such as dressing/undressing, tying shoe laces, doing up a button and writing), as well as sports activities (such as skipping and ball dribbling), extremely difficult. Therefore, in comparison with older children, the lack of different movement abilities can

be observed. In a way these characteristics may be recognized as motor immaturity. Often the problems described are associated with yet other difficulties (such as dropping objects, frequent falls, fine motor skills problems, sensor integration, visual perception, reading and writing difficulties). Gross motor skills problems occur in an overflow of energy spent for the practice of even such a basic skill as standing upright (Williams, Fisher, & Tritscher, 1983). In addition to that, problems occur in jumping, roller-skating, accurate throwing of different objects; and especially in the simultaneous coordination of hands with different or identical motor patterns. Even more problems appear with the timing of movement/gestures. Children experience lack of balance, rhythm and spatial orientation, as well as fear of heights and climbing. The realization of the complex movement/gesture is not problematic, however the problem is in its planning.

It has been estimated that between 5% and 9% of all school aged children meet the diagnostic criteria for DCD (Henderson & Hall, 1982; Sugden & Wright, 1998). It was also found that more boys than girls have DCD. These children often have difficulties with reading, writing and mathematical reasoning. Primary school teachers explain school failure with a lack of learning and effort, also with shallowness of character, etc. During PE classes, different problems can occur. Some of

them were presented in the introduction (body scheme problems, lack of balance and coordination, difficulties with time and spatial orientation, problems with timing, and so on). All these skills influence a child's ability to master reading, writing and mathematical reasoning. They are also an important factor which determines school success. Therefore, PE and other teachers can be the first ones who recognize different learning difficulties and other problems at school. Previous researchers (Henderson & Hall, 1982; Sugden & Wright, 1998) did not answer the following question: Can manual practise tests help to predict learning difficulties?

In some cases there are no major problems with the simple movements/gestures observed. Difficulties in reading and writing, in complex motor tasks or in difficult motor coordination are observed much later during the school period. Deconinck et al. (2006) divided the underlying causes of the motor impairment into two main lines. The first line focuses on the sensory information process prior to and during the motor response, while the second focuses on the motor component itself. Visuospatial processing (Wilson & McKenzie, 1998) and kinesthetic perception (Smyth & Mason, 1997) as well as cross modal perception were found to contribute to motor coordination impairment in children with DCD. Children with DCD are by definition delayed in the results of norm referenced motor tests (BOTMP – Bruininks, 1987; Movement ABC – Henderson & Sugden, 1992). It is to be mentioned that these tests measure the outcome of the movement rather than how the movement was performed. Motor problems are usually associated with lack of satisfaction in movement. It is not surprising, therefore, that children with DCD tend to participate less in social activities than do other children (Chen & Cohn, 2003), especially when the task is of a motor practical nature. Here the environment plays an important role.

The first persons who can recognize a child with DCD at his/her school are teachers and in particular, teachers of PE class. They can observe a child in his/her complex motion involving difficult coordination as well as time and space oriented tasks. A dance/rhythmic gymnastics/aerobics teacher can observe a child's sense for rhythm and a music teacher can observe his/her coordination when playing different instruments. Teachers can encourage children to participate in various sports activities. However, unlike other conditions such as muscular dystrophy or cerebral paralysis, DCD is often not recognized by parents or primary school teachers as a condition requiring intervention or special assessment. Children with DCD are often observed to be clumsy, unmotivated and lazy. Their problems are often assumed to be the result of other conditions such as ADD or a learning disability. Cairney, Hay, Faught, Corna and Flouris (2006) named children with DCD

as "hidden cohorts" and at risk of social exclusion. By experience the condition of DCD is often overlooked in the school field and it could be very efficient and useful to screen pupils during their PE lessons in the first or second class of elementary school.

The purpose of this research was to present a relatively simple way for predicting DCD in the children observed. These tasks, based on the Bergès-Lézine's test of the complex imitation of movement, can be used by primary school teachers (as well as PE teachers) in order to recognize pupils with learning difficulties. Based on simple imitation, the tasks can help to expose the ones with specific problems, such as dyslexia, dyscalculia, dysortographia etc. as well as those without. A quicker prognosis can lead to faster intervention and progress in the development of children with DCD.

The aim of this research was also to find prediction variables. The following hypothesis was exposed: Based on some variables of the complex movement/gestures imitation of the Bergès-Lézine's test (1972) it is possible to predict the classification of children into two groups: those with learning difficulties and those without.

METHOD

SUBJECTS

Children from the first triad of the Slovenian primary school in Italy participated in this research. In total, 46 children were tested (52.2% boys and 47.8% girls). Their average was 9 years (SD = 1.572). Children with intellectual disabilities were excluded from the research.

The control group presented 35 children (48.57% boys and 52.94% girls) aged 9.6 years on the average (SD = 1.46). No coordination problems nor learning difficulties were observed beforehand in this group. The experimental group presented 11 children (72.73% boys and 27.27% girls) aged 8.1 years on the average (SD = 1.49). These children were chosen by their teachers who observed and reported coordination problems and learning difficulties. The two groups present independent variables in our research.

PROCEDURES

The second part of the Bergès-Lézine's test (1972 in Išpanović-Radojković, 1986) was used. The 20 different tasks are suitable for children aged 6 to 10 years of age. These 20 tasks examine:

- a) recognition of fingers, maturity of fine motor skills (tasks number 1, 2, 3, 4, 5, 6, 7, 9),

- b) coordination of directions in space, control of particular body parts, and the ability to asymmetrically use their hands (tasks number 5, 8, 10, 12, 14, 17, 19, 20),
- c) recognition of the fingers as a base of a global model where cognitive presentation is needed (tasks number 11, 13, 15, 16, 18).

Each child's execution was numerically evaluated with a zero (failed) or 1 point (passed). Thus 20 dependent variables were exposed (berg1–berg 20). Children were assessed during PE classes.

METHODS OF DATA ANALYSIS

Descriptive statistics, the K-S normal distribution test and regression analysis with step wise methods were used. Data were processed with the statistical programmed package SPSS for Windows (release 13.0).

RESULTS

Cronbach's Alpha coefficient shows a relatively reliable internal consistency of the test (0.756). The regression analysis (step wise method) was used. Of complex hand gesture imitation possibilities, 20 variables were

included. Three variables entered the discriminant analysis: bergb 12, bergb 17 and bergb 20 (Sig. 0.000) (TABLE 1). The value of R and R² increases from the first to the third model whereas standard error decreases. All three tasks represent hand coordination where crossing the vertical midline of the body is involved. They examine coordination of directions in space, control of particular body parts/limbs, and the ability to asymmetrically use their hands.

In addition, TABLE 1 shows that 46.3% of variance is explained by prediction variables. This means that almost 50% of the explained variance is conditioned by practical variables. The unexplained part of the variance can be attributed to the following factors: verbal memory, phonological awareness, attentional disorders, dysortographia, etc.

TABLE 1
Summary of regression analysis

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.550	.302	.286	.364
2	.670	.449	.423	.328
3	.706	.499	.463	.316

TABLE 2
Differences between experimental and control group

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	1.210	1	1.210	7.440	.009
	Residual	7.159	44	.163		
	Total	8.370	45			
2	Regression	1.858	2	.929	6.135	.005
	Residual	6.512	43	.151		
	Total	8.370	45			
3	Regression	4.173	3	1.391	13.923	.000
	Residual	4.196	42	.100		
	Total	8.370	45			

TABLE 3
Prediction of classification into experimental or control group

Model		Unstandardized coefficients		Standardized coefficients		t	Sig.
		B	Std. error	Beta			
1	Constant	1.782	.054			33.035	.000
	bergb 12	.395	.091	.550		4.363	.000
2	Constant	1.791	.049			36.883	.000
	bergb 12	.315	.085	.437		3.709	.001
	bergb 17	.272	.080	.399		3.385	.002
3	Constant	1.799	.047			38.254	.000
	bergb 12	.276	.084	.383		3.281	.002
	bergb 17	.287	.078	.422		3.688	.001
	bergb 20	.183	.089	.229		2.041	.048

The third model (TABLE 2) at sig. = 0.000 shows that the dependent variable classifies pupils into two groups; the F value increases from model 1 to model 3 up to the value of 13.923. ANOVA shows that there are significant differences between the groups.

The equation constant + 0.383 bergb 12 + 0.422 bergb 17 + 0.229 bergb 20 (TABLE 3) predicts classification into the experimental or control group. Tasks 12 and 17 (sig. < 0.005) show the highest statistical significance, whereas task 20 has the lowest statistical significance (sig. < 0.05).

DISCUSSION AND CONCLUSIONS

For sufficient and quality prediction three variables used in the regression analysis (step wise method) of the second part of the Bergès-Lézine's test, are important: bergb 12, bergb 17 and bergb 20 (Fig. 1). All of the three variables represent tasks where hands needed to be crossed; in tasks 12 and 17 intertwining of fingers was demanded, while in task 20, palm rotation was needed. All of the three tasks represent a complex structure where crossing the vertical midline of the body is involved. The above tasks are in connection with bilateral coordination (i.e. coordinated activities of the left and right side of the brain).

Good coordination of the two body sides is an important foundation for writing with pencils and cutting with scissors. Children learn to coordinate their body sides when they play with toys (for example threading beads, assembling Lego cubes, skipping rope and playing rhythmic games over a rope) or riding a bicycle as suggested in Chen and Cohn (2003).

The ability to coordinate the right and left side of the body and to cross the midline of the body is an indication that both sides of the brain are working well together and sharing information efficiently. Coordination of the two body sides is an important foundation for the development of many gross and fine motor skills. It is essential for the development of cerebral specialization for the skilled use of a dominant hand. A child with poor coordination of the two body sides may adjust his/her body to avoid crossing the midline. He/she may not

be able to coordinate one hand's movement while the other is acting as an assistant to ease the effort. A child may switch hands when performing a fine motor task because he/she is experiencing frustration. Namely, in this case, skilful use of both hands is simultaneously needed.

Based upon the results of the complex imitation of the movement/gestures of the Bergès-Lézine's test, the classification of pupils with and without DCD is possible. We can adopt the following hypothesis: the variables of the imitation of the movement/gestures of the Bergès-Lézine's test are good prediction variables for classification into groups.

The results of this research have practical value. The biggest problem was observed in pupils' mental involvement and consequently in their motor performance. Therefore, pupils faced problems with their body scheme and coordination, as well as in spatial perception. As a result of these problems, learning difficulties can occur. With the systematic testing of pupils with the Bergès-Lézine's test, problems in visual perception and in cognitive reasoning can be detected.

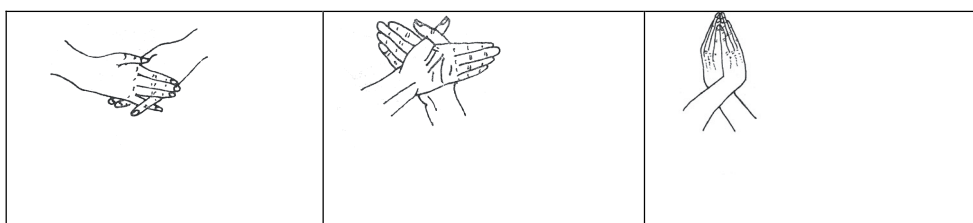
Children with DCD signs face problems in spatial orientation and in the complex imitation of movements/gestures. On the basis of differences found in tasks where pupils had to cross the vertical midline of the body and rotate their palms, children can be distributed into two groups (with and without motor and learning difficulties). School teachers, especially PE teachers, are those who can predict learning difficulties in pupils, in informal tasks, and later on organize appropriate physical activities.

REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental health disorders* (6th ed.). Washington, DC: Author.
- Bergès, J., & Lézine, I. (1972). *Test d'imitation de gestes*. Paris: Masson.
- Bruininks, R. H. (1987). *Bruininks-Oseretsky test of motor proficiency: Examiner's manual*. Circle Pines, MN: American Guidance Service.

Fig. 1

Tasks 12, 17 and 20 of Bergès-Lézine's test (1972 in Išpanović-Radojković, 1986, 147–148)



- Cairney, J., Hay, J., Faight, B. E., Corna, L. M., & Flouris, A. D. (2006). Developmental coordination disorder, age and play: A test of divergence in activity deficit with age hypothesis. *Adapted Physical Activity Quarterly*, 23, 261–276.
- Chen, H., & Cohn, E. S. (2003). Social participation for children with developmental coordination disorder: Conceptual evaluation and intervention considerations. *Physical and Occupational Therapy in Pediatrics*, 23, 61–78.
- Deconinck, F. J. A., Savelsbergh, G. J. P., Van Coster, R., Oostra, A., Dewitte, G., & Lenoir, M. (2006). Adaptations to task constraints in catching by boys with DCD. *Adapted Physical Activity Quarterly*, 23, 14–30.
- Henderson, S. E., & Hall, D. (1982). Concomitants of clumsiness in young schoolchildren. *Developmental Medicine and Child Neurology*, 24, 448–460.
- Henderson, S. E., & Sugden, D. A. (1992). *Movement assessment battery for children*. London: The Psychological Corporation.
- Išpanović-Radojković, V. (1986). *Nespretno dete: Poremećaji praksije v detinjstvu*. Beograd: Zavod za udžbenike i nastavna sredstva.
- Kirby, A. (2005). *Dyspraxia: Developmental coordination disorder* (6th ed.). A Condor Book, Souvenir press (E & A) Ltd.
- Smyth, M. M., & Mason, U. C. (1997). Planning and execution of action in children with and without developmental coordination disorder. *Journal of Child Psychology Psychiatry*, 38, 1023–1037.
- Sugden, D. A., & Wright, H. C. (1998). *Motor coordination disorders in children*. London: Sage Publications.
- Visser, J. (2003). Developmental coordination disorder: A review of research on subtypes and comorbidities. *Human Movement Science*, 22, 479–493.
- Williams, H. G., Fisher, J., & Tritschler, M. (1983). Descriptive analysis of static postural control in 4–6 and 8 year old motorically awkward children. *American Journal of Physical Medicine*, 62, 12–26.
- Wilson, P. H., & McKenzie, B. E. (1998). Information processing deficits associated with developmental coordination disorder: A meta analysis of research findings. *Journal of Child Psychology Psychiatry*, 39, 829–840.

PREDIKCE PORUCH UČENÍ POMOCÍ TESTU KOMPLEXNÍ IMITACE POHYBU

(Souhrn anglického textu)

Vývojová porucha motorické koordinace (DCD) je součástí heterogenní skupiny vývojových poruch a postihuje iniciaci, organizaci a provádění činností. Ve školské praxi i v každodenním životě s dětmi je často přehlížena. Proto si tento článek klade za cíl upozornit na tento problém a ukázat, jak mohou vyučující v různých předmětech děti s DCD snadno rozpoznat. Žáky s poruchami učení mohou rozpoznat zejména vyučující tělesné výchovy při neformálních úkolech a tito mohou později iniciovat příslušnou intervenci. Rychlá prognóza může vést k rychlejší intervenci, což vede ke zlepšení pohybových dovedností u dětí s DCD. Tento výzkum prokázal, že na základě dvaceti úkolů testu Bergès-Lézine pro komplexní imitaci pohybu/gest můžeme určit, které z dětí mají určité poruchy učení a které ne. Chceme zejména vyzdvihnout tři úkoly (12, 17 a 20), při kterých děti musejí protnout vertikální osu svých těl. Tyto tři úkoly zahrnují oboustrannou koordinaci. Děti s příznaky DCD mají problémy s prostorovou orientací a komplexní imitací pohybu/gest. Na základě velkých rozdílů, nalezených při úkolech, kdy žáci musí protnout vertikální osu svých těl a otáčet dlaně, lze děti rozdělit do dvou skupin (s motorickými poruchami a poruchami učení a bez nich).

Klíčová slova: DCD, poruchy učení, instrumentální dyspraxie.

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First-line publications

- Filipčič, A., Filipčič, T., & Leskošek, B. (2004). The influence of tennis motor abilities and basic anthropometric characteristics on the competition successfulness of young tennis players. *Kinesiol. slov.*, 10(1), 16–26.
- Filipčič, A., & Filipčič, T. (2005). The influence of tennis motor abilities and anthropometric measures on the competition successfulness of 11 and 12 year old female tennis players. *Acta Universitatis Palackianae Olomucensis. Gymnica*, 35(2), 35–41.
- Pinter, S., Filipčič, T., Šolar, A., & Smrdu, M. (2005). Integrating children with physical impairments into sports activities: A “golden sun” for all children? *J. Philos. Sport*, 32(2), 147–154.
- Filipčič, A., & Filipčič, T. (2005). The relationship of tennis specific motor abilities and the competition efficiency of young female tennis players. *Kinesiology*, 37(2), 164–170.
- Filipčič, T., & Filipčič, A. (2006). Analysis of tennis strokes in wheelchair tennis. *ITF Wheelchair Tennis Coaches Review*, 14, 17–21.
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GLOBAL SELF ESTEEM IN A SAMPLE OF CZECH SENIORS AND ADOLESCENTS

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In this paper, we have reported on the results of two follow up studies concerning various aspects of global self esteem (GSE). We used the Rosenberg self esteem scale to measure GSE. In study no. 1, we examined the level of global self esteem with respect to gender perspective within a sample of 106 seniors. In the follow up study, we compared the levels of global self esteem of seniors and a sample of 102 adolescents.

The results of study no. 1 showed significant differences in GSE between men and women in the sample of seniors. The results of the follow up study showed significant differences in the levels of GSE between seniors and adolescents.

Keywords: Seniors, self esteem, motor activity.

INTRODUCTION

Self esteem as a component of self concept is affected by many intervening factors including cultural, ethnical, and social factors. The role of self esteem as an indicator of an individual's appraisal of personal value in his/her overall individual self concept has been one of the major issues in personality research (Osecká & Blatný, 1997). The researchers understand self esteem as a construct that is able to explain many psychological and social phenomena such as social status, interpersonal relationships, employment, and employment affiliation etc. (Trzesniewski, Moffitt, Poulton et al., 2006). The measurement of self esteem by means of self report tools has brought new topics into debate such as validity issues, dimensionality of self esteem, etc. There are several measures used in self esteem evaluation. For example, the Coopersmith Self Esteem Inventory (CSEI), which assesses the attitude toward oneself in general, as well as in specific contexts – peers, parents, school, and personal interests. It was originally designed to be used with children, drawing on items from scales that were previously used by Carl Rogers (Coopersmith, 1981). The Tennessee Self Concept Scale (TSCS) consists of 100 items measuring self worth in individuals 12 years old and above (Fitts, 1965). Inventories rarely used include the Janis-Field Feelings of Inadequacy Scale (JF-FIS) (Janis & Field, 1959) or the Self Esteem Scale of the Jackson Personality Inventory (SEJPI). However, the Rosenberg Self Esteem Scale (RSES) is the most reported measure of self esteem in the literature (Schmitt & Allik, 2005; Martin, Thompson, Chan et al., 2006; Halama & Bieščad, 2006; Vermillion, 2007). In

the case of RSES, self esteem is referred to as global self esteem (GSE).

The connotations of self esteem and other personality characteristics such as neuroticism, extraversion, or depression were scrutinized across age cohorts (Trzesniewski, Moffitt, Poulton et al., 2006; Pullman & Allik, 2000; Corwyn, 2000). Studies focusing on the population of seniors are scarce. Thus, knowledge about self esteem in seniors is lacking, although psychological traits have been reported to be associated with health beliefs. There is evidence in the literature that seniors who participate in motor activities (walking, doing exercises) are more likely to perceive their health problems, such as back and joint pain or respiration difficulties etc., as a natural part of their lives. They do not perceive their health problems as being limiting in their daily and free time activities (McAuley et al., 2005). Though it has not been proven that motor activity improves the quality of life, higher satisfaction with one's health status is observed in seniors participating in some type of motor activity. Other authors suggested that involvement in non specific motor activity is associated with higher levels of self esteem in adolescents and adults (Ruuskanen & Ruoppila, 1995; McAuley & Blissmer, 2000).

The level of self esteem in those seniors who participate in regular motor activities has not been reported on so far. Therefore, in study no. 1, we examined the level of self esteem in seniors who attend regular motor activity (exercise). We looked at differences between men and women.

Up to the present time, the process of ageing has been explored from different perspectives. Both biological and social aspects have been discussed. Some au-

thors examine the stability of the GSE score throughout the life span with regard to functional health (Reitzes & Mutran, 2006) or life style (Greenberger et al., 2003; Trzesniewski, 2006). In general, the experts agree on the stability of self esteem as a part of an individual's personality characteristics. However, the research on the psychological differences in ageing is lacking.

Therefore, in our follow up study we aimed at the potential differences in self esteem in seniors and the younger population of adolescents from the age perspective.

Maintenance of an active life in seniors has become a highlighted issue recently because of its economic and social implications. Currently, more than 650 million people world wide are 60 years old or older. According to demographic estimates the number may increase up to one billion by the year 2025 (WHO, 2008). In 2007, more than two million people over 60 lived in the Czech Republic according to the Czech Statistical Institute (CSU, 2007).

Particularly in developed countries, supporting programs have been started in order to improve the health and social situation of seniors. The most important determinants of the success of these programs are associated with the knowledge of the attitudes of seniors towards themselves as persons and towards their life style. The population of seniors is often denoted as being an economic burden for the society. This perspective has been disclaimed by the WHO as one of the myths concerning the population of seniors. Seniors often complain about feeling useless and discarded from social life. However, they often perceive themselves as being still productive and able to contribute, which is related to psychosocial characteristics including self esteem (WHO, 2008).

OBJECTIVES

The objective of the two studies conducted in our follow up design was to examine the level of self esteem in seniors who practice an active life style, including participation in regular motor activities as compared to their younger aged cohorts. In study no. 1, the level of global self esteem was measured with respect to gender within a sample of 106 seniors. In the follow up study, the levels of self esteem were compared between a sample of seniors and a sample of adolescents.

With this paper we aim to contribute a baseline for further research focusing on self esteem in seniors who do not participate in motor activities and lead rather a non active lifestyle. We presume that self esteem would be higher in seniors leading an active life style.

This finding may support the development of strategies empowering the population of seniors in their social environment by means of active life style promotion and maintenance.

METHODS

The Rosenberg Self Esteem Scale (RSES)

The Rosenberg Self Esteem Scale (Rosenberg, 1965) monitors global self esteem (GSE) as one factor. The studies used the Czech version of this scale that was validated in 1994 by M. Blatný and L. Osecká (Blatný & Osecká, 1994; Osecká & Blatný, 1997). The questionnaire is composed of 10 items formulated as statements. The respondents assess their personal agreement with the statements on the Likert type scale ranging from 1 = not valid for me at all to 4 = completely valid for me (in the English original the score ranges from 1 = strongly disagree to 4 = strongly agree). Five items are formulated positively, the other five are formulated negatively. The scores of negative items were coded reversely. Administration of questionnaires required approximately 10 minutes. All participants provided informed consent prior to the study.

Study 1

Global self esteem in seniors – a gender perspective

A sample of 106 subjects participated in study no. 1 (75 females and 31 males). The mean age of the participants was 70.08 (SD 6.56). The mean age was 68.20 (SD 5.69) in women and 74.62 (SD 6.33) in men. The participants were members of the Czech sport organization Sokol. The questionnaire was administered from February through May 2008.

Follow up study

Global self esteem – the age perspective

For the purposes of the follow up study (self esteem from the age perspective), the comparison data of a group of 102 adolescents were obtained from a sample of secondary school students (41 women, 61 men). The mean age of the students was 17.15 (SD = .68). The mean age was 16.98 (SD = .56) in women and 17.28 (SD = .52) in men.

First, the data were analyzed by means of descriptive statistics. The statistical properties of the data substantiated the use of the non parametric Kolmogorov-Smirnov test to assess the GSE score with regard to gender differences within a sample of seniors. Second, analysis of variance (ANOVA) was employed to assess the differences between the group of seniors and adolescents using the NCSS 2007 (Hintze, 2007).

RESULTS

The obtained data were analyzed first by means of descriptive statistics. The statistical properties of the data substantiated the use of the non parametric Kolmogorov-Smirnov test to assess the GSE score with regard to gender differences within a sample of seniors. Second, analysis of variance (ANOVA) was employed to assess the differences between the group of seniors and adolescents using the NCSS 2007 (Hintze, 2007).

Study 1

Global self esteem in seniors – a gender perspective

The objective of study no. 1 was to examine the level of GSE from the gender perspective in a sample of 106 seniors. We presumed that there are no significant differences in the GSE score between men and women in our sample of seniors.

However, the results suggest that the GSE scores as well as SD differed in men and women (TABLE 1,

Fig. 1). The median GSE score was 32 in men and 30 in women. The mean GSE score was 32.00 (SD 3.12) in men and 31.15 (SD 4.91) in women. To assess whether the variances in men and women differed significantly we ran the Modified-Levene Equal-Variance test. The results suggested unequal variances and thus the non parametric Kolmogorov-Smirnov test for ordinal scaling for different distributions was run in order to assess the significance of the differences. The results showed that the GSE score is significantly higher in men than in women ($p = .008$).

TABLE 1

Global self esteem score in seniors – descriptive statistics

	N	Mean age (SD)	Median GSE score	Mean GSE score (SD)
Men	31	74.6 (6.33)	32	32 (3.12)
Women	75	68.2 (5.69)	30	30.14 (4.91)

TABLE 2

Analysis of variance in GSE score in a sample of seniors and adolescents with regard to gender

Source	DF	Sum of squares	Mean square	F-ratio	Probability level
Term					
A: seniors – adolescents	1	232.7506	232.7506	9.44	.002411*
B: gender	1	123.9753	123.9753	5.03	.026001*
AB	1	2.183701	2.183701	.09	.766290
S	204	5028.924	24.65159		
Total (adjusted)	207	5307.077			
Total	208				

Legend:

* Term significant at $\alpha = .05$.

TABLE 3

Tukey-Kramer multiple comparison test

Response: GSE Score			
Term A: Age			
Term B: Gender			
Group	Count	Mean	Different from groups
Adolescents	102	28.83147	Seniors
Seniors	106	31.07333	Adolescents
Women	116	29.13431	Men
Men	92	30.77049	Women

Legend:

$\alpha = .05$,

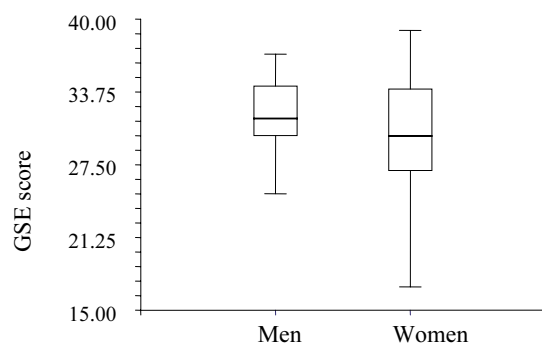
Error Term = S (AB),

DF = 204,

MSE = 24.65159,

q = 2.7884.

Fig. 1
Global self esteem score variances



Follow up study

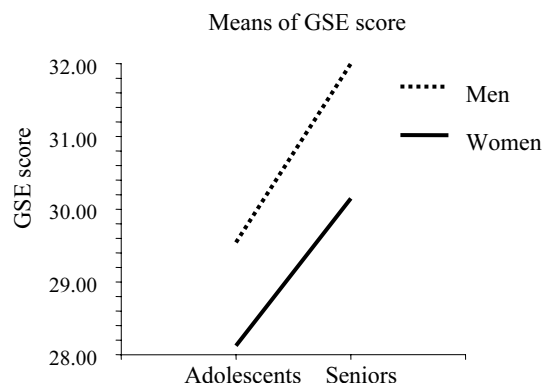
Global self esteem – the age perspective

The objective of the follow up study was to compare the levels of GSE between samples of seniors and adolescents.

In study no. 1 the significant differences of the GSE score related to gender were found in a sample of seniors. In order to check for the gender related differences in the study, we employed a two way analysis of variance that enabled us to detect potential GSE score differences in data obtained from seniors and adolescents with respect to gender and age. To assess the significance of the difference, four groups were recognized with respect to gender and age – adolescent men, adolescent women, senior men and senior women. In accordance with our presumption, the results suggested that there was a significant difference in the GSE score between seniors and adolescents. Seniors scored significantly higher than adolescents (mean GSE in seniors = 31.07, mean GSE in adolescents = 28.83, $F = 9.44$, $p = .002$). A significant difference in the GSE score was also found with regard to gender at $\alpha = .05$ ($F = 5.03$, $p = .026$). The differences associated with interaction of the two factors – age and gender were non significant at $\alpha = .05$. The results are summarized in TABLE 2. Simultaneously, the Tukey-Kramer multiple comparison test confirmed the significance of the differences. The test compares the means of every treatment to the means of every other treatment, and identifies where the difference between two means is greater than the standard error would be expected to allow (Hintze, 2007). The test is referred to as conservative and thus it identifies only true significance (TABLE 3).

In Fig. 2, the upper dashed line indicates the situation in men with regard to age. It is apparent that the GSE score is higher in seniors. The lower line indicates the GSE score in women with regard to age. The linear trend is similar to the trend described in men. At the same time, the trend of the GSE score in men and women within samples is almost identical in both samples,

Fig. 2
GSE score in seniors and adolescents with regard to gender



therefore the difference resulting from gender and age interaction was recognized as being non significant.

GENERAL DISCUSSION

Global self esteem in seniors represents a broad area of psychosocial research that has been underreported. Therefore, two follow up studies on global self esteem (GSE) in seniors participating in regular motor activities were conducted. The aim of study no. 1 was to describe self esteem in seniors who follow an active life style including participation in regular motor activities. The aim of the follow up study was to compare self esteem from the point of view of the age perspective between adolescents and seniors.

According to the results, the level of GSE in the whole sample was high according to the standards set by Rosenberg (1965). Next, in study no. 1, we found significant differences between women and men in the senior sample. The results showed that men scored higher in GSE than women. However, the RSES scale was reported to show a lower ability to distinguish between individuals with high GSE scores (Halama & Bieščad, 2006). Therefore, these findings need to be interpreted deliberately for practical use in order to avoid overestimation of differences although the results showed statistical significance. Furthermore, findings of gender related differences in a GSE score are not in line with reported studies where men and women did not differ in their GSE scores (Pullman & Allik, 2000). On the other hand, the cited studies were focused on age differences.

Participation in motor activities may be the distinguishing variable. Further research in a larger sample size is needed. If supported by the results of the research, the gender related differences may be explained by an individualistic and collectivistic paradigm (Bhawuk &

Triandis, 1996). According to this paradigm, men tend to be more individualistic in terms of the distinguishing self from others which is manifested in their higher self esteem in contrast to women who tend to be more collectivistic and their self scheme is not that prominent.

The stability of the GSE score throughout the life span is an issue often discussed in the literature with regard to life style, health beliefs, employment etc. (Greenberger, Chuansheng, Dmitrieva et al., 2003; Trzesniewski, Moffitt, & Poulton, 2006). In general, the experts agree on the stability of self esteem as a part of individual personality characteristics. In the follow up study, we compared two samples of physically active individuals from two age groups – seniors and adolescents. Our results suggest that the level of the GSE score was significantly higher in seniors than in adolescents. This finding may be explained by a potential underestimation of positively worded items and an overestimation of negatively worded items in adolescents. The question is, whether the estimation of adolescents is less realistic than the estimation of seniors or vice versa. At the same time, there were no significant gender related differences across the two groups. An additional measure of other personal characteristics, e.g. the big five inventory – NEO-5, is needed for advanced interpretation (Aluja et al., 2007; Pullmann & Allik, 2000). The correlations of the level of self esteem with other personality traits were the focus of studies in samples from the younger population. For example Fick (1999) found a significant correlation between high scores in self esteem and extraversion and conscientiousness in adolescents 14–17 years of age. Accordingly, low self esteem correlated significantly with high neuroticism and anxiety. According to Fick (1999) neuroticism and conscientiousness are reliable predictors of self esteem. The implication of such findings may be relevant with respect to the psychosocial profile of older people with regard to quality of their life.

CONCLUSION

Global self esteem is a theoretical construct representing one of the psychological characteristics of the personality. The exploration of its aspects in seniors is limited. In this paper, we have reported on the results of two follow up studies concerning these issues. In study no. 1, we examined the level of global self esteem with respect to gender perspective within a sample of 106 seniors (75 women and 31 men, mean age 70.08, SD = 6.56). In the follow up study, we compared the levels of global self esteem in a sample of seniors and a sample of adolescents. The Rosenberg Self Esteem Scale was used to measure the level of global self esteem. For the purposes of follow up study, the comparison data were

obtained from a sample of 102 secondary school students (adolescents), 41 women, 61 men (mean age 17.15, SD = .68).

The results of study no. 1 suggest that there are significant differences between men and women seniors in terms of their GSE scores. However, the GSE score was high in both men and women. We may propose that the environment and the life style of the respondents could be the determinants of the level of GSE. A deliberate interpretation of these findings is needed in regard to the real significance of these differences.

In the follow up study, a significantly different global self esteem score was found between the group of adolescents and seniors. Seniors were more likely to report higher GSE scores than adolescents. The difference may be explained by underreporting in adolescents who may be more critical towards themselves. The differences in understanding the items might have also helped cause the discrepancies.

REFERENCES

- Aluja, A., Rolland, J. P., García, L. F., & Rossier, J. (2007). Dimensionality of the Rosenberg Self Esteem Scale and its relationships with the three and the five factor personality models. *Journal of Personal Assessment*, 88, 246–249.
- Bhawuk, P. S., & Triandis, H. C. (1996). The role of cultural theory in study and intercultural training. In D. Landis & R. S. Bhagat (Eds.), *The Handbook of Intercultural Training*. Thousand Oaks, CA: Sage Publications.
- Blatný, M., & Osecká, L. (1994). Rosenbergova škála sebehodnocení: struktura globálního vztahu k sobě. *Československá psychologie*, 38, 481–488.
- Corwyn, R. F. (2000). The factor structure of global self esteem among adolescents and adults. *Journal of Research in Personality*, 34, 357–379.
- Coopersmith, S. (1981). *The antecedents of self esteem*. Palo Alto, CA: Consulting Psychologists Press.
- Český statistický ústav. (2007). *Pohyb obyvatelstva: rok 2007*. Retrieved 15. 5. 2008 from the World Wide Web: <http://www.czso.cz/csu/csu.nsf/informace/coby032008.doc>
- Fick, E. (1999). Personality dimensions and self esteem indicators relationships. *Studia Psychologica*, 41, 323–328.
- Fitt, W. H. (1965). *The manual for the Tennessee Self Concept Scale*. Nashville: Counselor Recording Tests.
- Greenberger, E., Chuansheng, C., Dmitrieva, J. et al. (2003). Item wording and the dimensionality of the Rosenberg Self Esteem Scale: Do they matter? *Personality and Individual Difference*, 35, 1241–1254.

- Halama, P., & Bieščad, M. (2006). Psychometrická analýza Rosenbergovej škály sebahodnotenia s použitím metód klasickej teórie testov (CTT) a teórie odpovede na položku (IRT). *Československá psychologie*, 50, 569–583.
- Hintze, J. (2007). *NCSS and GESS*. Utah: NCSS LLC Kaisville.
- Janis, I. L., & Field, P. B. (1959). A behavioral assessment of persuasibility: Consistency of individual differences. In C. I. Hovland & I. L. Janis (Eds.), *Personality and persuasibility* (pp. 29–54). New Haven, CT: Yale University Press.
- Martin, C. R., Thompson, D. R., & Chan, D. S. (2006). An examination of the psychometric properties of the Rosenberg Self Esteem Scale (RSES) in Chinese acute coronary syndrome (ACS) patients. *Psychology Health and Medicine*, 11, 507–521.
- McAuley, E., & Blissmer, B. (2000). Self efficacy determinants and consequences of physical activity. *Exercise and sport sciences reviews*, 28, 85–88.
- McAuley, E., Elavsky, S., Motl, R. W., Konopack, J. F., Hu, L. et al. (2005). Physical activity, self efficacy, and self esteem: Longitudinal relationships in older adults. *Journals of Gerontology (series B): Psychological Sciences and Social Science*, 60, 268–275.
- Osecká, L., & Blatný, M. (1997). Struktura globálního vztahu k sobě: analýza Rosenbergovy škály sebehodnocení – replikace. *Československá psychologie*, 61, 481–486.
- Pullmann, H., & Allik, J. (2000). The Rosenberg Self Esteem Scale: Its dimensionality, stability and personality correlates in Estonian. *Personality and Individual Differences*, 28, 701–715.
- Reitzes, D. C., & Mutran, E. J. (2006). Self and health: Factors that encourage self esteem and functional health. *The Journals of Gerontology (series B): Psychological Sciences and Social Sciences*, 61, 44–51.
- Rosenberg, M. (1965). *Society and the adolescent child*. Princeton, NJ: Princeton University Press.
- Ruuskanen, J. M., & Ruoppila, I. (1995). Physical activity and psychological well being among people aged 65 to 84 years. *Age and Ageing*, 24, 292–296.
- Trzesniewski, K. H., Moffitt, T. E., Poulton, R. et al. (2006). Low self esteem during adolescence predicts poor health, criminal behavior and limited economic prospects during adulthood. *Developmental Psychology*, 42, 381–390.
- Vermillion, M., & Dodder, R. A. (2007). An examination of the Rosenberg Self Esteem Scale using collegiate wheelchair basketball student athletes. *Perceptual and Motor Skills*, 104, 416–418.
- WHO. (2008). *Age friendly cities: Global ageing and urbanization are successes of humanity*. Retrieved

12. 9. 2007 from the World Wide Web: http://www.who.int/ageing/age_friendly_cities/en/index.html

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GLOBALNÍ SEBEHODNOCENÍ U SKUPINY ČESKÝCH SENIORŮ A ADOLESCENTŮ (Souhrn anglického textu)

Globální sebehodnocení (GSH) je teoretický konstrukt, který představuje jednu z psychologických charakteristik osobnosti. Aspekty GSH dosud nejsou dostatečně prostudovány. V tomto článku předkládáme výsledky dvou na sebe navazujících studií, které se těmto aspektům věnují. Ve studii 1 jsme sledovali úroveň GSH vzhledem k pohlaví v souboru seniorů (75 žen, 31 mužů, průměrný věk 70,08 let, SD = 6056). Jednalo se o aktivní seniory, kteří se pravidelně účastnili organizovaných pohybových aktivit v rámci TJ Sokol na území České republiky. V navazující studii jsme srovnali úroveň GSH tohoto souboru seniorů a souboru adolescentů, studentů středních škol (41 žen, 61 mužů, průměrný věk 17,15 let, SD = 0,68). Pro měření úrovně GSH jsme použili Rosenbergovu škálu sebehodnocení.

Výsledky studie 1 ukázaly, že ve výzkumném souboru seniorů existují statisticky významné rozdíly v úrovni GSH mezi ženami a muži. Hodnoty však byly vysoké u mužů i u žen. Z výsledků navazující studie vyplývá, že z hlediska úrovně GSH existují mezi soubory adolescentů a seniorů statisticky významné rozdíly. Zjistili jsme, že senioři vykazují vyšší hodnoty GSH častěji než adolescenti.

Klíčová slova: senioři, sebehodnocení, pohybová aktivita.

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First-line publications

During her graduate studies she has attended and presented papers related to both, the emotions and motor control as well as active life style, on several domestic as well as international scientific meetings as the main author (e.g. the 15th International WCPT Congress: World Physical Therapy, Vancouver 2007; the 10th European Congress of Psychology, Prague 2007; the 12th Congress of Sport Psychology, Halkidiki 2007; the 5th International Scientific Conference on Kinesiology, Zagreb 2008; the International Student Conference UNICA Student Conference, Warsaw 2008).

OPTIMISATION OF THE SIZE OF A TARGET AND THE THROWING DISTANCE DURING A THROW AT A TARGET FOR ADULTS

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The aim of the study is to optimise throwing distance and the size of a target as a basis for constructing a test of accuracy of a throw at a target, using a tennis ball. The optimal combination must fulfil two conditions – the tested group will achieve an average score of the count of successful hits out of all throws and using a specific combination of the throwing distance and the size of a target and it will fulfil the condition of normal distribution. The tested group consisted of 79 men and 71 women, students of the first year at the Ostrava University in Ostrava, majoring in the Physical Education and Recreation study fields. Three target sizes (0.5, 0.7 and 0.9 m) and three throwing distances (6, 10 and 14 m for men and 4, 6 and 8 m for women) were selected for both categories for the experiment, altogether nine combinations. The score of the experiment is formed by the count of successful hits of the target, out of ten throws, using each combination of the size of a target and the throwing distance. To solve the issue, the methods of testing the normal Gaussian distribution of data (Kolmogorov-Smirnov), the one way analysis of variance (Scheffe) and descriptive statistics have been used. The research confirmed that the determined conditions are fulfilled by the 10 m/0.7 m combination of the throwing distance and the size of a target for the men's category and the 6 m/0.7 m combination for the women's category.

Keywords: Accuracy, throw, dexterity test, throwing distance, target size.

INTRODUCTION

The skill to throw accurately represents an important part of the human dexterity package. These days, a throw at a target is missing its purpose within activities regarding livelihood or defence but it is still a useful item in a number of sport disciplines. Preschool children spontaneously manage a simple long distance throw and throw at a target at shoulder height, using available projectiles such as cones, snow balls, stones, etc. The youth of today, however, doesn't have an interest in the spontaneous development of a throw in their free time, within the framework of various activity games. This fact is highlighted in towns, where there is no suitable space capacity nor natural projectiles for throwing. Current education programmes (Primary school education programme 1996, the Framework education programme 1998) offer some free choice in selecting learning programmes in physical education at schools. However, learning a simple throw at a target is not being given enough attention at schools, although it represents a suitable emotional activity for improving the throw technique. One of the main reasons can be seen in the absence of a standardised test of the accuracy of a throw at a target, which would be able to cover and

subsequently check the development of a specific skill, which is the accuracy of a throw at a target.

The issue of constructing a test of the accuracy of a throw at a target was the main interest of many authors. There are tests in literature which use a horizontally oriented target (Broer, 1966; Ejem & Ambrož, 1969; Miller & Bartlett, 1992) or a vertically orientated target (Bayios & Boudolos, 1998; Brace, 1966; Malina, 1968; Merfield, 1969). Hits are scored by the authors either alternatively (Brace, 1966; Merfield, 1969), or the result of the test is often recorded as a deviation from the centre of the target by randomly allocating the area outlined with concentric circles of various diameters (Malina, 1968; Mecner, 1975). Another option is measuring deviations of both horizontal and vertical direction from the centre of the target (Malina, 1968; Mecner, 1975; Měkota & Blahuš, 1983), or by totalling points achieved by hitting sectors of a competitor's field, which are scored by various points' values (Broer, 1966; Měkota & Blahuš, 1983). The most common targets are the ones based on the principle of concentric circles. All of the above mentioned tests of the accuracy of a throw at a target are guided by specific requirements of a particular sport and therefore they can not be used at schools. In literature, we could have seen only two tests

of the accuracy of a throw at a target, which have been created for school youth (Boss, 2005; Mecner, 1975). Both tests are too complicated for routine use. We find that the most suitable method for evaluating the test of the accuracy of a throw at a target at schools is the dichotomy method, which means hit – no hit. The important thing is that the subject can check his/her own success at throwing.

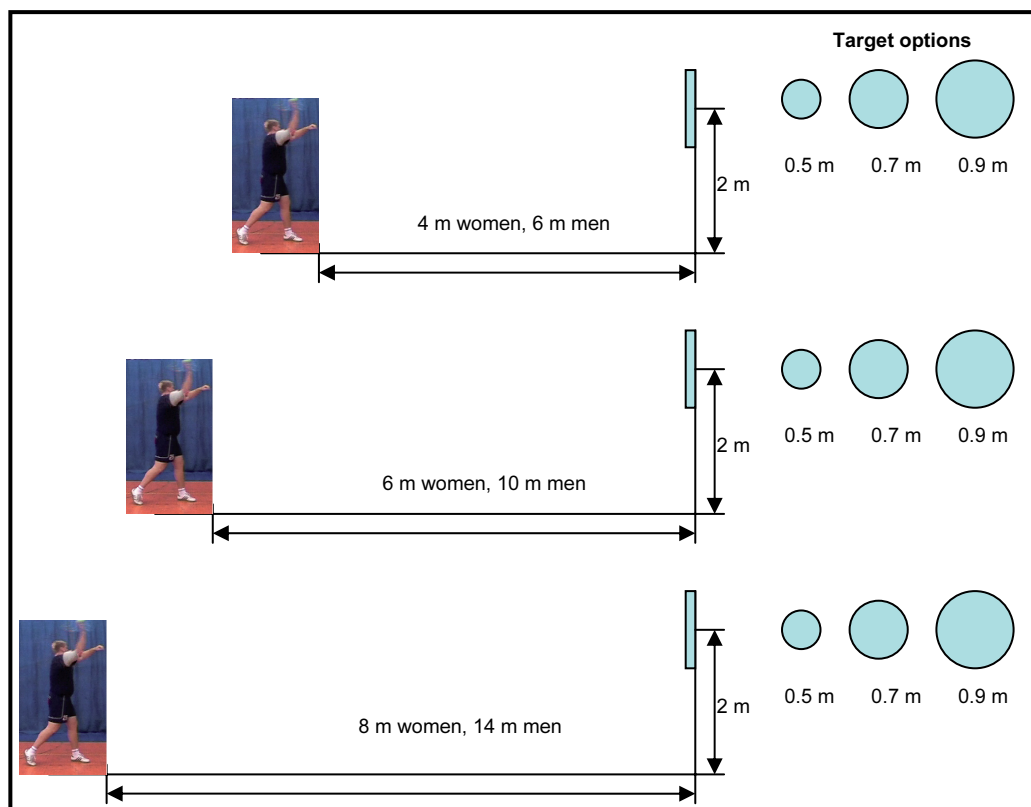
A successful hit of the target is guided by the optimal combination of the throwing angle and the throwing speed in relation to the throwing distance and the size of a target. The throwing subject must let out a projectile by optimal combination of force, which will be displayed in the throwing speed and angle, so that it hits the target. There are endless options of combinations of throwing parameters for reaching the target and it is almost impossible to reach two identical throwing parameters in two subsequent throws (Hubbard, 2000). The skill of accuracy of a throw is closely linked with the issue of controlling movement and the coordination of the eye – head – hand (Schmidt & Lee, 2005). A successful hit of a target can be theoretically achieved by limited combinations of throwing parameters. The throwing subject can use a combination of a fast throwing speed

and a small throwing angle or a slower throwing speed with a large throwing angle. In both cases, a successful hit of a target will be achieved providing that their combination is correct (Barttlet, 2000). The relationship between the speed and accuracy is known as a compromise of speed and accuracy (Schmidt & Lee, 2005). With the growing speed of a movement the accuracy drops and visa versa (Fitts, 1954). Slower throwing speed and larger angle lead to better results in tests of accuracy of a throw at a target. Bancazio (1992) states Barttlet (2000) confirms the existence of a specific throwing angle heading towards the centre of a target and its related optimal throwing speed. Simultaneously, deviation limits are mentioned for speed and for angle regarding this pair of figures, so that successful hit of a target is achieved. The deviation limits can grow with the size of a target.

The main issue in working out the test of the accuracy of a throw at a target is determining the optimal size of a target and the throwing distance for a targeted group of people. The aim of the study is to optimise the size of a target and the throwing distance for a selected group of university male and female students.

Fig. 1

Schematic representation of the combination of the size of a diameter of a target and the throwing distance



METHOD

Basic criteria for optimising the size of a target and the throwing distance for a test of the accuracy of a throw at a target

Optimisation of the size of a target and the distance is guided by the following conditions:

- The tested group will achieve an average amount of successful hits of the target out of the total amount of throws, in a specific combination of the size of a target and the throwing distance.
- The tested group will have a standard distribution of the count of successful hits of the target, in a specific combination of the size of a target and the throwing distance.

Research group

The research group was made up of 79 men and 71 women, students of the first year at the Ostrava University in Ostrava, the Physical Education and Recreation study fields. The group included only those persons who successfully fulfilled the conditions for being accepted in the above mentioned study fields. We assume the students to have a relatively high skill level of a simple throw above shoulder height. The age of the tested persons ranged from 20 to 23 years.

The process and organisation of measuring

The experiment included a combination of 3 different distances (men 6, 10 and 14 m and women 4, 6 and 8 m) and the size of a target (0.5, 0.7 and 0.9 m), altogether 9 combinations.

The tested persons (TP) had, in each of the nine combinations of the size of a target and the throwing distance, 10 throws, which means that each TP performed altogether 90 throws, in three combinations of the size of a target and at three distances from the target. Prior to the commencement of measuring, each TP carried out 10 practise throws with the combination of a target and distance at which he or she started throwing. With regard to the timely and organisational intensity, we selected the following procedure of measuring. The TPs threw from one distance at three different sizes of targets, always from the smallest diameter to the biggest, and then they moved to another distance from where they again threw at three different sizes of targets. The tested persons threw a tennis ball whilst standing, from a marked throwing point, using a preferred arm to throw above shoulder height at a vertical round target (Fig. 1). The final score of the experiment is then made up of the count of successful hits of the target, out of ten throws, achieved in all of the nine combinations of the throwing distance and the size of a target.

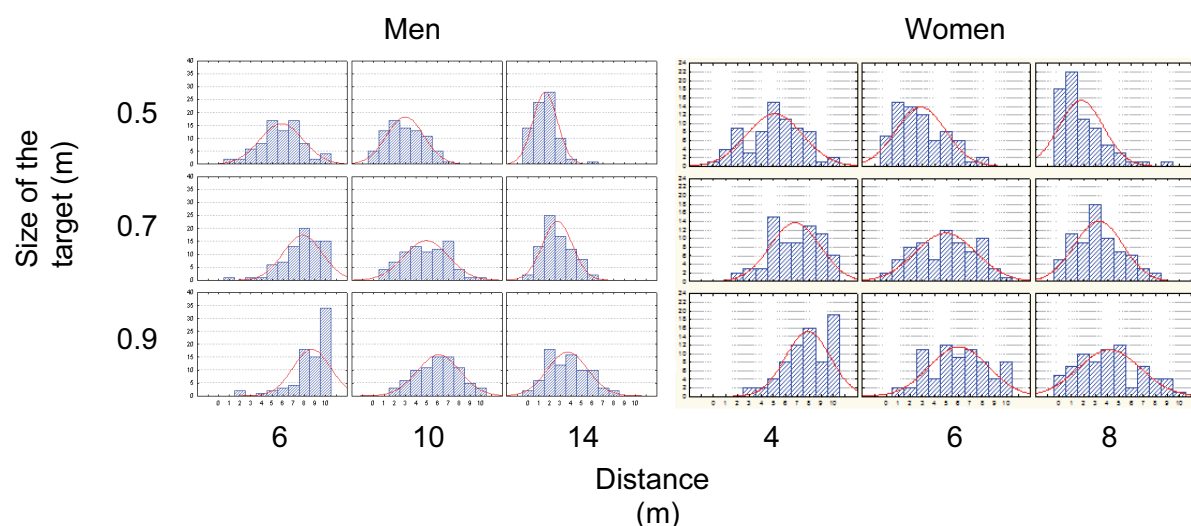
To eliminate the training of tested persons, the method of a Latin square was used. The tested persons were split into threes. Each trio of TPs started to throw from a different throwing distance at all three sizes of targets.

Statistical methods

The following methods were used to solve the issue: normal Gaussian distribution of data was tested by the Kolmogorov-Smirnov test, the one way ANOVA

Fig. 2

Histograms showing the count of distribution of successful hits in different combinations of the throwing distance and the size of a target, men ($n = 79$), women ($n = 71$)



(Analysis of variance) (Scheffe) and descriptive statistics. The results were processed with the help of a statistic programme SPSS.

RESULTS

Optimisation of the size of a target and the throwing distance

The aim of the study is to find a suitable combination of the throwing distance and the size of a target, which will suit the determined conditions.

The test score of the experiment was represented by the number of successful hits of the target out of ten throws in a specific combination of the size of a target and the throwing distance.

The condition of the normality of distribution of experimental data was verified within the experiment. The Kolmogorov-Smirnov test confirmed the normality of distribution of the experimental data in all combinations of the size of the target and the distance, except from the 6 m/0.9 m combination in the men's category and with the exception of the 4 m/0.9 m and 8 m/0.5 m combinations in the women's category. Visual information on the distribution of the count of experimental data is given in the histograms shown in Fig. 2.

All nine combinations of the size of the target and the distance were subject to the one way analysis of

variance. Statistically important differences between variations regarding the group of men and of women were found by the analysis of variance (TABLE 1a) and between the averages of successful hits using individual combinations of the size of the target and the throwing distance in men (TABLE 1b) and women (TABLE 1c).

One way analysis of variance (Scheffe) divided the average scores of successful hits of the target using individual combinations of the throwing distance and size of a target into 5 homogeneous groups in the men's category. The combination of the size of the target and the throwing distance in the homogeneous group 3, resembles the condition for achieving the average score of the count of successful hits of the target. The combinations are 10 m/0.7 m and 6 m/0.5 m. Out of the two, the 10 m/0.7 m combination fulfils the basic conditions best.

One Way Analysis (Scheffe) similarly divided the individual combinations of throwing distances and target sizes into 6 homogeneous groups in the women's category. In this category, the condition that the tested group will achieve an average score of the count of successful hits resembles the combination of the target size and the throwing distance in the homogeneous group 3, which represents combinations 8 m/0.9 m, 6 m/0.7 m and 4 m/0.5 m. Out of this group, the combination 6 m/0.7 m suits the above stated condition best.

TABLE 1a

One Way Analysis of Variance - variance analysis (Scheffe) men (n = 79), women (n = 71)

Men								Women									
Throwing distance / Size of target			Homogeneous groups					Throwing distance / Size of target			Homogeneous groups						
	\bar{x}	s	1	2	3	4	5		\bar{x}	s	1	2	3	4	5	6	
14/0.5	1.36	2.00	x					8/0.5	1.80	1.76	x						
14/0.7	2.70	1.81		x				6/0.5	2.84	1.91	x	x					
10/0.5	2.94	1.75		x				8/0.7	3.25	2.55	x	x					
14/0.9	3.65	1.72		x				8/0.9	4.14	1.72		x	x				
10/0.7	4.88	2.06			x			6/0.7	4.90	2.47			x	x			
6/0.5	5.82	1.98			x	x		4/0.5	5.07	2.30			x	x			
10/0.9	6.03	1.13				x		6/0.9	6.00	2.44				x	x		
6/0.7	7.79	1.39					x	4/0.7	6.76	2.11					x	x	
6/0.9	8.64	1.86					x	4/0.9	7.83	1.84						x	

Legend:

Combination of distance (m)/target (m),

\bar{x} - diameter,

s - standard deviation,

x - homogeneous groups.

TABLE 1b

Variations between average scores of successful hits, men (n = 79), one way analysis of variance (Scheffe)

Throwing distance / Target size	Precise scores of variations of averages for various throws								
	14/0.5	14/0.7	10/0.5	14/0.9	10/0.7	6/0.5	10/0.9	6/0.7	6/0.9
14/0.5	–	1.34*	1.58*	2.29*	3.52*	4.46*	4.67*	6.43*	7.28*
14/0.7		–	0.24	0.95	2.18*	3.12*	3.33*	5.09*	5.97*
10/0.5			–	0.71	1.94*	2.88*	3.09*	4.85*	5.89*
14/0.9				–	1.23*	2.17*	2.38*	4.14*	4.99*
10/0.7					–	0.94	1.15*	2.91*	3.76*
6/0.5						–	0.21	1.97*	2.82*
10/0.9							–	1.76*	2.61*
6/0.7								–	0.85
6/0.9									–

Legend:

Throwing distance (m)/target size (m),

*p < .05,

the stated figures represent precise scores of variations of averages.

TABLE 1c

Variations between average scores of successful hits, women (n = 71), one way analysis of variation (Scheffe)

Throwing distance / Target size	Precise scores of variations of averages for various throws								
	8/0.5	6/0.5	8/0.7	8/0.9	6/0.7	4/0.5	6/0.9	4/0.7	4/0.9
8/0.5	–	1.04	1.45	2.34*	3.10*	3.27*	4.20*	4.96*	6.03*
6/0.5		–	0.41	1.30	2.06*	2.23*	3.16*	3.92*	4.99*
8/0.7			–	0.89	1.65*	1.82*	2.75*	3.51*	4.58*
8/0.9				–	0.76	0.93	1.86*	2.62*	3.69*
6/0.7					–	0.17	1.10	1.86*	2.93*
4/0.5						–	0.93	1.69*	2.76*
6/0.9							–	0.76	1.83*
4/0.7								–	1.07
4/0.9									–

Legend:

Throwing distance (m)/target size (m),

*p < .05,

the stated figures represent precise scores of variations of averages.

DISCUSSION

The available dexterity tests, covering the skill of an accurate throw, stem from a particular sports event (Bayios & Boudolos, 1998; Malina, 1968; Miller, 1992). Non specific tests of accuracy determined for school children are presented by (Böss, 2005; Měkota & Blahuš, 1983). What method was used by the authors of the above stated tests, to arrive at the used throwing distance and the size of a target is not evident. We assume that their reasoning was based on the practical

needs of sport divisions or on the personal opinions of the authors. In the submitted contribution we try to show the exact method of solving the basic issue in constructing a test of accuracy of a throw at a target, which means optimisation of the throwing distance and the size of a target.

Optimisation of the size of a target and the throwing distance consisted in finding such a combination of the size of a target and a distance, which would suit the two above stated conditions, which means that the tested group will achieve an average count of successful hits

out of all throws and simultaneously the final score of the given group will suit the condition of the normal distribution of the experimental data.

Both of the set out conditions ensure the test of the accuracy of a throw at a target having the option of using parametric statistical methods in other statistical analyses.

A basic requirement was set out during the early considerations of constructing a test of the accuracy of a throw at a target, which was for the test to cover the whole range of the current level of skill of throw accuracy within a tested group. The whole range of the level of skill of throw accuracy can be covered, when the achieved results for a specific combination of the throwing distance and the size of a target have a normal distribution and the medium score is around the middle of the variation span of the tested group. The consideration is based on the practical experimental situation of extreme combinations of the throwing distance and the size of a target. A long throwing distance with a small size target or a short throwing distance combined with a large target will result in a shift of the count of successful hits of the target for individual tested persons towards extreme scores. In the first case, it will be extremely low scores of the count of successful hits of the target and vice versa, in the second case it will be towards the high scores of successful hits (see histograms of counts, Fig. 2). The test of the accuracy of a throw at a target was constructed using a sample of students of the Physical Education and Recreation fields. Following the verification of other criteria, which the test must fulfil (reliability, validity) it will be modified for school education use. There is a presumption that with the age of school children descending, the importance of the throw technique and the force capacity of the throwers will grow. These important factors may have a significant influence on the achieved results of the test of the accuracy of a throw at a target. Within the next stage of the research, we shall adapt individual combinations of the throwing distance and the size of a target, so that they are suitable for a particular age group of school children. The presented contribution suggests a specific approach for constructing a test of accuracy of a throw at a target. We assume that the test of the accuracy of a throw at a target will be a suitable and easily available test, which will be used not only for the diagnostics of the skill of the accuracy of a throw, but also as a tool for developing the skill of throwing. The easy quantification of the test result of the accuracy of a throw at a target by the actual thrower has an important motivational effect. The test fulfils the basic condition of safety, as throwing a tennis ball minimises the risk of injury.

CONCLUSION

Optimisation of the size of a target and the throwing distance for the test of the accuracy of a throw at a target for the adult category (university students), is conditioned by the fulfilment of two conditions:

- Our research confirmed that the condition of achieving a final score as an average of the total count of throws is, for the men's category, fulfilled by the combination of the throwing distance and the size of a target of 10 m/0.7 m and the 6 m/0.7 m combination for the women's category.
- The research confirmed that the condition of the normal Gaussian distribution of experimental data is fulfilled in both categories by most tested combinations of the distance and the size of a target, except for extreme situations (the combination 6 m/0.9 m for men and the combinations 4 m/0.9 m and 8 m/0.5 m for women).
- While respecting the determined conditions, for the test of the accuracy of a throw at a target for adults, we suggest using the 10 m/0.7 m combination of the throwing distance and the size of a target for men and 6 m/0.7 m for women.

REFERENCES

- Bartlett, R. (2000). Principles of throwing. In V. M. Zatsiorsky (Ed.), *Biomechanics in Sport* (pp. 365–380). Oxford: Blackwell Science.
- Bayios, I., & Boudolos, K. (1998). Accuracy and throwing velocity in handball. In H. J. Reihle & M. M. Vieten (Eds.), *XVI International Symposium on Biomechanics in Sports* (pp.55–58). Konstanz: Universitätsverlag Konstanz.
- Böss, K. (2005). *Handbuch Motorische Tests*. Göttingen: Hogrefe.
- Brace, D. K. (1966). *Basketball skill test manual*. AAHPER.
- Broer, M. R. (1966). *Skill test manual football*. AAHPER.
- Ejem, M., & Ambrož, M. (1969). Příspěvek k hodnocení pohybových dovedností v odbíjení. *Teorie a praxe tělesné výchovy*, 36, 35–45.
- Fitts, P. M. (1954). The information capacity of the human motor system in controlling the amplitude of movement. *Journal of Experimental Psychology*, 47, 381–391.
- Hubbard, M. (2000). The flight of sports projectiles. In V. M. Zatsiorsky (Ed.), *Biomechanics in Sport* (pp. 381–400). Oxford: Blackwell Science.

- Malina, M. R. (1968). Reliability of different methods of scoring throwing accuracy. *Research Quarterly*, 39, 149–160.
- Mecner, J. (1975). Příspěvek k hodnocení spolehlivosti testu házení na cíl. *Teorie a praxe tělesné výchovy*, 23, 727–733.
- Merrfield, H. H. (1969). Battery of ice hockey skill test. *Research Quarterly*, 40, 146–152.
- Měkota, K., & Blahuš, P. (1983). *Motorické testy v tělesné výchově*. Praha: SPN.
- Miller, S., & Bartlett, R. (1992). The effects of increased distance on basketball shooting kinematics. In R. Rodano, G. Ferrigno, & G. C. Santambrogio (Eds.), *Proceedings of the tenth ISBS Symposium* (pp. 44–47). Milano: Edi. Ermes.
- Rámcový vzdělávací program pro základní vzdělávání. Retrieved 12. 11. 1998 from the World Wide Web: www.vuppraha.cz
- Schmidt, R. A., & Lee, D. L. (2005). *Motor control and learning: A behavioural emphasis* (4th ed.). Champaign, IL: Sheridan Books.
- (1996). *Vzdělávací program základní škola*. Praha: Fortuna.
- Zahradník, D. (2008). *Výpracování a ověření testu hodu na cíl a vztah mezi hmotností projektilu a délkou hodu*. Disertační práce, Univerzita Palackého, Fakulta tělesné kultury, Olomouc.

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OPTIMALIZACE VELIKOSTI TERČE A ODHODOVÉ VZDÁLENOSTI PŘI HODU NA CÍL PRO DOSPĚLÉ OSOBY (Souhrn anglického textu)

Cílem studie je optimalizovat odhodovou vzdálenost a velikost terče jako východisko ke konstrukci testu přesnosti hodu na cíl tenisovým míčem. Optimální kombinace musí splňovat dvě podmínky – testovaný soubor dosáhne u konkrétní kombinace velikosti terče a odhodové vzdálenosti průměrné hodnoty počtu úspěšných zásahů terče z celkového počtu hodů a bude splňovat podmínku normálního rozdělení. Zkoumaný soubor tvořilo 79 mužů a 71 žen, studentů prvního ročníku oborů tělesná výchova a rekreologie Ostravské univerzity v Ostravě. Pro experiment byly zvoleny pro

obě kategorie tři velikosti terče (0,5; 0,7; 0,9 m) a tři odhodové vzdálenosti (6, 10, 14 m pro muže a 4, 6, 8 m pro ženy) – celkem devět kombinací. Skóre experimentu tvoří počet úspěšných zásahů terče z desíti hodů v každé kombinaci velikosti terče a odhodové vzdálenosti. Pro řešení problematiky byly použity metody testování normality rozložení experimentálních dat (Kolmogorov-Smirnov), jednofaktorová analýza rozptylu (Scheffe) a základní statistické charakteristiky. Výzkum prokázal, že stanovené podmínky splňuje v kategorii mužů kombinace odhodové vzdálenosti a velikosti terče 10 m/0,7 m a v kategorii žen kombinace 6 m/0,7 m.

Klíčová slova: hod, přesnost, motorický test, odhodová vzdálenost, velikost terče.

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- Zahradník, D., Vaverka, F., & Gajda, V. (2005). Test of accuracy throwing – target size and distance optimization [Abstract]. In W. Starosta & S. Squatrito (Eds.), *Sports Kinetics 2005 – Proceedings [CD ROM]*. Bologna: Centro Universitario Spletivo Bolognese in Bologna.
- Zahradník, D., & Měkota, K. (2004). Changes in some motor skills in university freshmen during the last forty years. In F. Vaverka (Ed.), *Movement and Health* (pp. 291–292). Olomouc: Palacký University.
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EVALUATION OF THE ELITE SPORTS RESULT FROM THE VIEWPOINT OF DIFFERENT TYPES OF PUBLIC

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A sports result fulfils its true goal only after monitoring the public and its response, and thus the result acquires additional important dimensions. The significance of a sports result is most often evaluated intuitively and on the basis of emotional reactions and beliefs about its importance on a national and not the worldwide level. An analysis of the evaluation of an elite sports result, achieved at the most important competitions, reveals that various types of public value sports results differently. A sports result is significantly more appreciated by the general and expert public, whilst journalists appreciate it the least. The latter strive to remain objective even when reporting about a one off event, such as major sports event; nevertheless, at the same time they do not sufficiently recognise that an important achievement is the product of a long term training process. The expert public appreciates a competitive sports result more than journalists; presumably, this is a result of the understanding of the importance of the prior training process for the competition achievement. The general public appreciates a sports result the most, which indicates two things – firstly, although media can create public opinion, it has a small influence on the general public; secondly, the results are appreciated mostly on an emotional basis, caused by the road to success and not only by the moment of the achievement of success. Obviously people long for “stories” as well as for “heroes”. Thus far the media has not been able to provide these stories for the public.

Keywords: Elite sports result, different types of public, evaluation.

INTRODUCTION

People often evaluate the sports results of national and foreign sportspeople. The evaluation is based not only on the actual understanding of the sports discipline and personal experience, but also on the basis of previously formed beliefs and preconceptions. According to the previously achieved results, the level of competition and the “knowledge” of an individual sports discipline, people somehow form an expectation of the level of results sportspeople should achieve. Therefore, it often comes as a surprise if results are not in accordance with the expectations of people (Godnič, 2005; Kolar, 2005; Starc, 2005).

People carry around a variety of unspoken beliefs and expectations and they are not aware of how often they use them to evaluate things (Musek, 1997). As a result, people constantly form and check their assumptions and constructs about themselves, others and the world and they evaluate these intuitive judgments on the basis of available information (Kelly, 1955). A characteristic of this so called intuitive evaluation is a relatively low level of informedness (Sruk, 1995); the

lack of which leads to the formation of “theories” about actual phenomena in the mental images of people. One such phenomenon, which people always evaluate on the basis of numerous intuitive judgments, is undoubtedly sports results (Starc, 2005). Modern cognitive and personality psychologies have revealed that evaluation is influenced by acquired experience, beliefs, attitudes and prejudice on one hand and, on the other hand, latent hidden dimensions, structures and mechanisms, which function “beyond” experienced and conscious cognitive activity. All these subconsciously acting aspects of human cognitive functioning (evaluation, thinking, predicting, etc.) are described by some authors (Flavell, 1979 in Musek, 1997) as meta-cognition. Meta-cognition consists of implicit comprehension (comprehension and images which are a part of subconscious human mental functioning), attribution (description samples), cognitive schemes (images and comprehension that people create about things, phenomena, persons and events), prototypes (prejudice and stereotypes) and scriptures (hidden cognitive scenarios). Despite their everyday frequency, the intuitive evaluations of achieved sports results are (most) often incorrect, as people usually

make mistakes in intuitive evaluation. Their evaluations are often one sided, their conclusions superficial and unreliable (Kolar, 2005).

An elite sports result is usually subjected to very superficial and most often entirely intuitive judgment and evaluation (Kolar, 2005). As the elite sports result is being claimed by everyone (Kolar, Bednarik, Kovač, & Jurak, 2007), the present study examined how it is being evaluated by the representatives of different types of public – the laypersons with intuitive evaluation (general public), experts with previous knowledge and experience (the expert public) and others with knowledge about the different effects and roles of a specific sports result (journalists, sponsors). The expert public most often creates the elite sports result, sponsors and journalists give it a certain external value and the general public consequently creates an opinion about this result in their role of observers, who as taxpayers support the elite sport (Elvin & Emery, 1997; Kolar, 2005).

Sports events and the achieved elite results have an extensive social, cultural and economic impact, as they encourage greater interest for active sports participation (Bartoluci, 2003; Bednarik, 1996; Elvin & Emery, 1997; Gratton & Taylor, 2000). At the same time, they are an important factor in the formation of the national identification of individuals and groups (Kovač, Starc, & Doupona Topič, 2005). Consequently, it matters significantly how different types of the public evaluate the result, with media playing a significant role, particularly the television and press, as they are important in the production, reproduction and distribution of numerous discourses related to sport in the modern world (Boyle & Haynes, 2000).

METHODOLOGY

Sample of measured subjects

Sampling of the general public was carried out by the Slovenian statistical office, while sampling of other types of the public was carried out by the Public institution for sport in Slovenia. The representative sample of the general public includes 855 people; Slovenian residents aged 19 to 65. The sample of the expert public included 574 people, representatives of national sports governing bodies, coaches, members of the Association of Slovenian sports, pedagogues and members of the highest executive committees in sport. The sample of journalists included 40 journalists and members of the Association of Slovenian sports journalists. The sample of sponsors included 494 potential sponsors – managers of Slovenian medium and large companies.

Sample of measured variables

The sample of variables consists of the evaluation of the achievements of sportspeople (divided into six levels of participation: 1st–3rd place, 4th–8th place, 9th–16th place, 17th–32nd place, worse than 32nd place,) at major international competitions (Olympic Games, World and European senior and junior championships). Questions were included within the segment “Evaluation of competitive sports results”, which formed a part of a questionnaire entitled “Sport in the role of national identity of the Slovenian people” SNI-01 – general public; SNI-02 – expert sports public; SNI-03 – journalists and SNI-04 – sponsors (Kovač, Doupona-Topič, Bednarik, Jurak, Brenk, Starc, Majerič, & Kolar, 2003). The evaluation included 77 sports disciplines, which in 2004 had categorised sportspeople according to the criteria of Slovenian Olympic Committee (report by SOC, February 2004). The measured subjects evaluated achievements of sportspeople on a six level Likert scale.

Data collection method

Data were collected within the research project Sport in the role of national identity of the Slovenian people (Kovač et al., 2003, 2005). Interviewing of the general public took place in February 2004 with the assisted individual approach of the interviewer. All the interviewed subjects were previously notified of the purpose and procedure of the study. Interviewing was carried out with the use of standard procedure by trained interviewers, undergraduate and postgraduate students of the University of Ljubljana. Interviewing of all other types of public was carried out by post by the Public institution for sport in Slovenia. Data collection was carried out according to the regulations of the law on the protection of personal information (published in official gazette no. 59/99), in order to ensure the anonymity of the interviewed subjects.

Data analysis

An average mark was calculated for each evaluation of every type of public. Differences between the evaluations of different types of the public were tested with a single factor variance analysis.

RESULTS

Firstly, interviewed subjects of all four types of public have “regardless of the sports discipline evaluated sports achievement” by marking the five levels of achieved results (1st–3rd place, 4th–8th place, 9th–16th place, 17th–32nd place, worse than 32nd place) at the Olympic Games and

the value of participation at the Olympic Games. The interviewed subjects have marked individual achievements with marks of 1 to 6, where 1 represented “a poor result” and 6 “an excellent result” (TABLE 1).

All types of the public evaluated a medal won at the Olympic Games with very high and consistent marks, so no statistically significant differences were observed. For all other levels of achieved results and for participation at the Olympic Games, the marks of individual types of the public were significantly different on a 1% risk level; the evaluations of individual achievements decrease with the level of the achieved result. Participation in the Olympic Games received better evaluation than placement below the 32nd place in all types of public.

Secondly, representatives of the expert public and the journalists have then “regardless of sports discipline evaluated sports achievements” (1st–3rd place, 4th–8th place, 9th–16th place, 17th–32nd place, worse than 32nd place) and participation at the senior and junior world and European championships. Interviewed subjects marked individual achievements with marks 1 to 6, where 1 represented “a poor result” and 6 “an excellent result” (TABLE 2, 3).

Representatives of the expert public evaluated, with statistically significant higher marks, all levels of

achievements at senior and junior championships in comparison to journalists. The only two results where statistically significant differences were not revealed between the marks of selected types of public is “participation in the World and European championships”. Both types of the public marked participation as being higher than a result below the 32nd place.

The evaluation of Slovenian sportspeople at the junior World and European championships reveal the same results as the previous group, regardless of sports discipline.

Thirdly, representatives of the expert public and journalists evaluated “the importance of a medal won by Slovenian sportspeople at the World championships in a particular sports discipline”. The interviewed subjects marked the achievements (a medal won at the World championships) for 77 selected sports disciplines with marks of 1 to 6, where 1 represented “an unimportant result” and 6 “an extremely important result”. Out of 77 selected sports disciplines, the expert public marked a medal won at the World championships with higher marks in 75 sports, whereas the journalists awarded higher average marks to two sports (car racing and motorbike racing). The expert public evaluated the importance of a medal significantly higher than the media on

TABLE 1

Average values of the evaluation marks of specific results, achieved at the Olympic Games, from the viewpoints of different types of public at a risk level (not on)

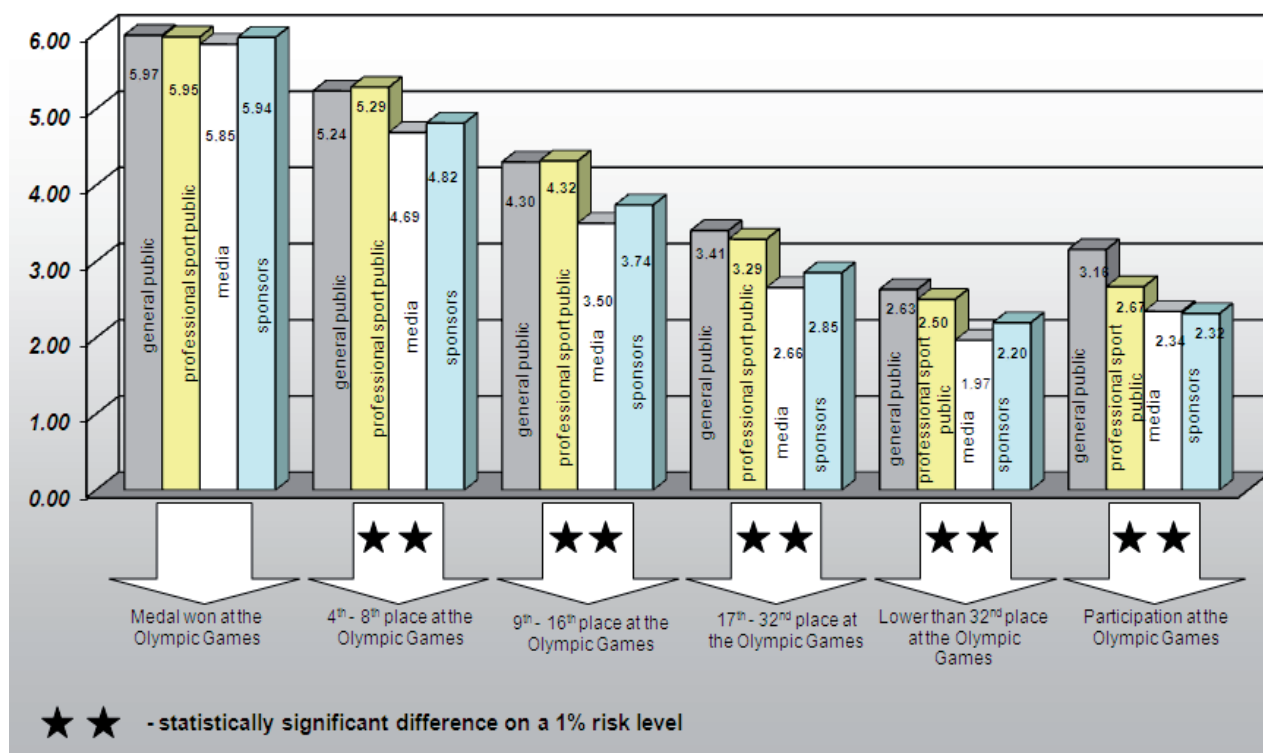


TABLE 2

Average values of the evaluation marks of particular results, achieved at the senior World and European championships, from the viewpoints of the expert public and the journalists

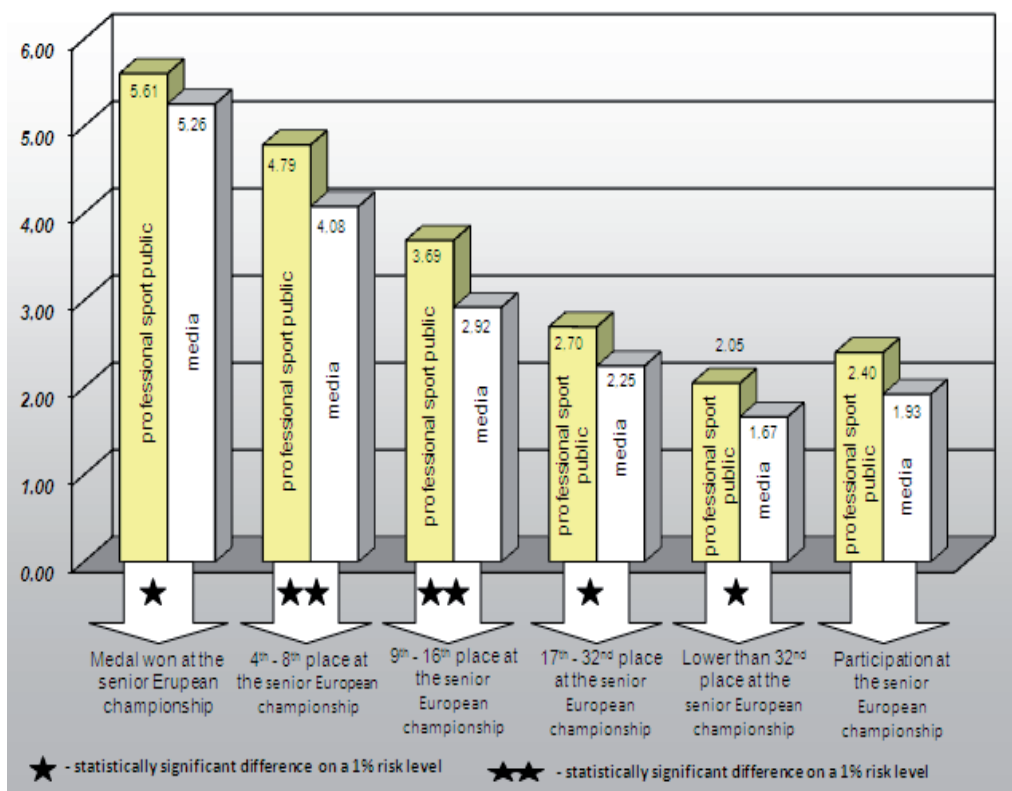
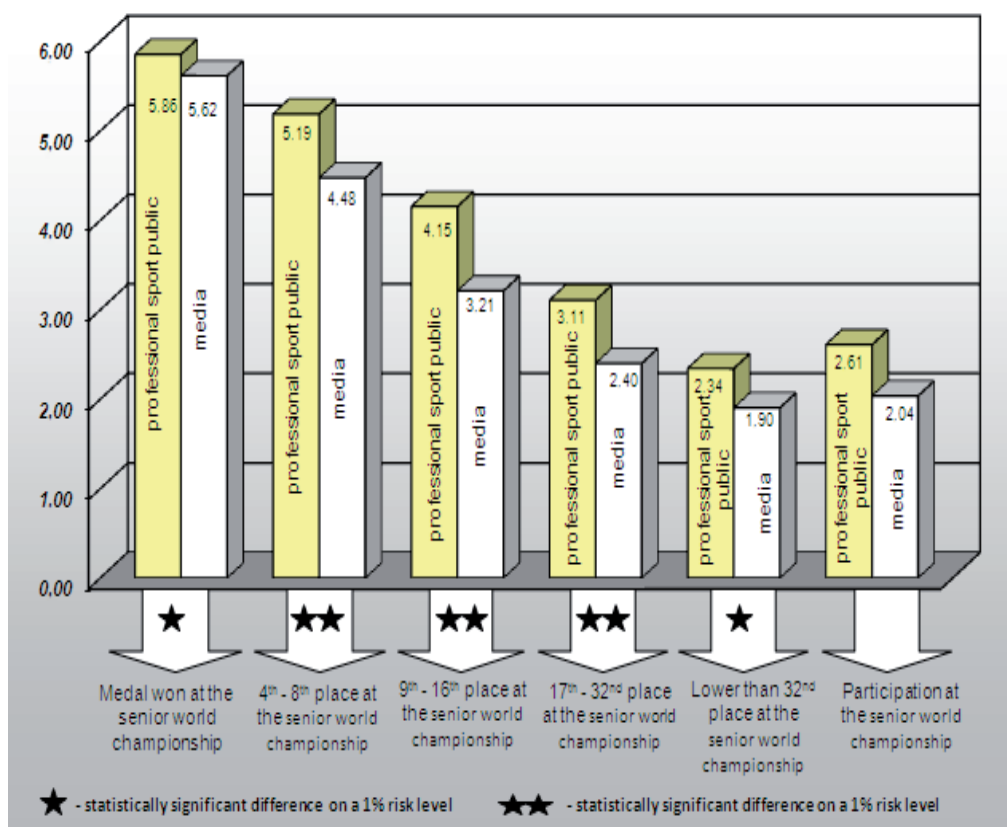
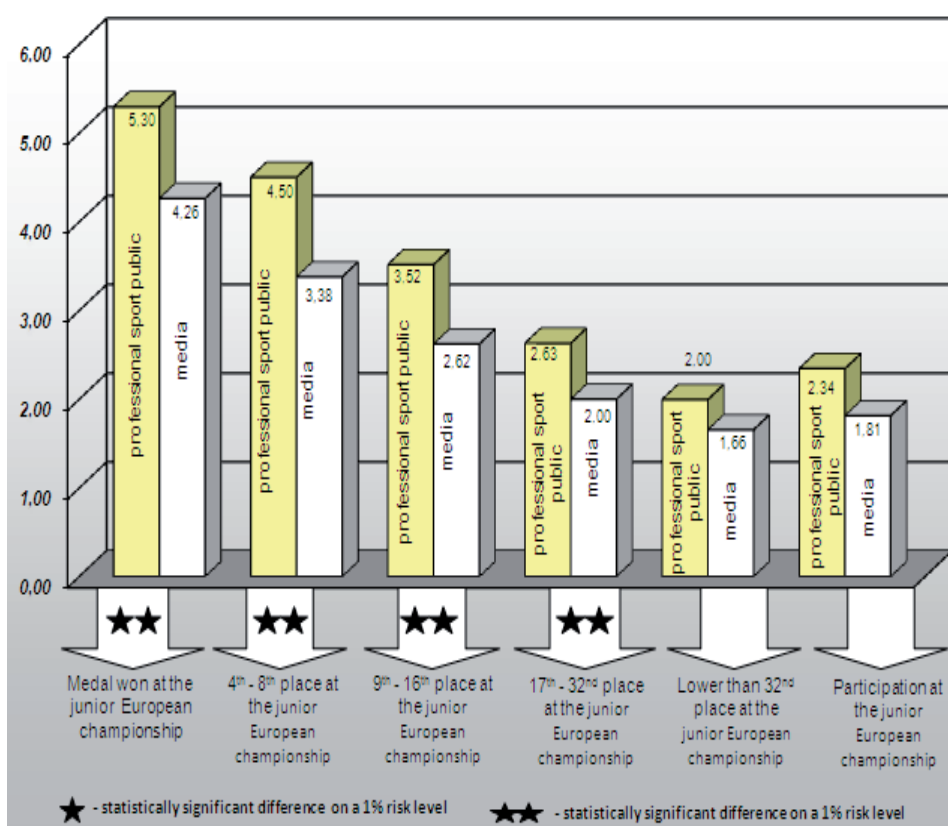
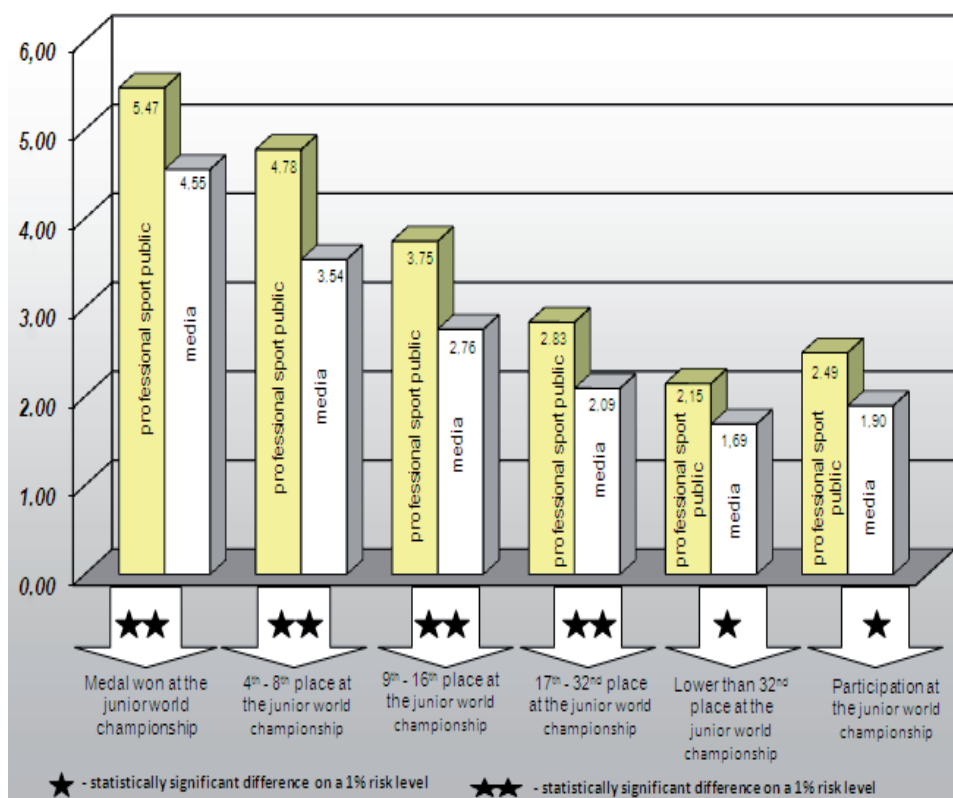


TABLE 3

Average values of the evaluation marks of particular results achieved at the junior World and European championships, from the viewpoint of the expert public and the journalists



a 1% risk level in 53 sports and on a 5% risk level in 10 sports. Both types of the public evaluated with the highest average mark the importance of a medal won at the World championships in athletics (expert sports public at 5.88 and journalists at 5.67).

Fourthly, representatives of the expert public and journalists answered the question: "In your opinion, what result of Slovenian sportspeople is considered to be good at the World championship?" The interviewed subjects marked the achievement with marks of 1 (participation at the WC), 2 (placement worse than 32nd place), 3 (result between 17th and 32nd place), 4 (result between 9th and 16th place), 5 (result between 4th and 8th place) and 6 (1st–3rd place at the WC). Out of 77 sports disciplines, the expert public evaluated a lower achieved result as good in 55 sports whereas the journalists did so in 22 sports. The expert public evaluated as being good significantly lower results on a 5% risk level in two sports (sailing and white water kayak – canoe), whereas the journalists evaluated as being good significantly lower results on a 5% risk level in football. Both types of the public evaluated as good mostly high results in traditionally successful Olympic sports (athletics, artistic gymnastics, white water kayak – canoe, swimming, alpine skiing, ski jumping, rowing) and considerably lower results in some less successful sports (baseball, boxing, water polo, triathlon, etc.).

The expert public evaluated a medal won at the World championships as a good result in a total of 52 sports (with an average mark of between 3.5 and 4.5 in 31 sports), a very good result (an average mark of between 4.5 and 5.5) in 14 sports or an excellent result (an average mark of between 5.5 and 6) in seven sports; in contrast, representatives of journalists shared the same opinion on only 28 sports (a good result for 15 sports, a very good result for 11 sports and an excellent result for two sports).

The majority of the marks of both types of the public are between the average values of 3 and 5, showing that the representatives of both types of the public evaluated a result around 16th place in most sports at the World championships as a good result. Representatives of the expert public expect the highest results in alpine skiing, as in their opinion a good result would be placement around 4th place at the World championships (average mark – 5.01) and the lowest in baseball (2.97) and golf (2.92). Representatives of journalists would be satisfied only with high results in white water kayak – canoe (5.21), alpine skiing (5.16) and ski jumping (5.14). All three sports have been traditionally successful, with Slovenian sportspeople achieving the highest places at major international competitions, yet the international degree of presence of these sports is modest at best. The lowest mark has been awarded by journalists to the sport that also receives the most media attention in Slovenia – football (2.72).

DISCUSSION

The findings of the presented comparisons reveal that the four different types of the public evaluate achievements at the Olympic Games differently, although all types of public evaluated a medal won at the Olympic Games as an excellent result regardless of the sports discipline. In contrast, the journalists and sponsors evaluated all other levels of results one mark lower on average than the general and expert public. The latter presumably evaluated sports results on the basis of their understanding about the international competition, the effort invested in the development of an individual result and the possibilities for achieving such a result at the Olympic Games. Undoubtedly, the expert public also accepts the Olympic Games as a unique event, where the final results sometimes surprise even the best experts. As a result, their evaluation could be considered the most valid. Sponsors presumably evaluated individual achievement from the marketing value viewpoint and journalists from the media response perspective. The general public probably added, beside the evaluation of the difficulty of achieved results at the Olympic Games and the media response, an emotional component of the response to the achievement of the result of sportspeople at the Olympic Games. Specifically, it has been revealed that the elite sports result has an important influence on the national identification of the Slovenian people; furthermore, representatives of the general public listed the elite sports result as a factor that makes them the proudest for the recognition of Slovenia abroad (Kovač, Starc, & Doupona Topič, 2005).

All types of public consider a placement below the 32nd place at the Olympic Games as some kind of disappointment and evaluate it lower than more participation at the Olympic Games. Participation opens new possibilities and expectations of achievement, particularly as the Olympic Games represent a one off event where sometimes totally unknown sportspeople sometimes achieve extremely good results. Nevertheless, the evaluation shows that the society currently values the motto "to be an Olympian" considerably more than "participating is more important than winning".

Whereas a comparison of the results achieved at the Olympic Games as the biggest sports event included all four types of the public, the rest of the analysis tested only the differences between the expert public and the journalists.

On the basis of the analyses of the differences between the average values, which the representatives of the expert public and the journalists awarded to different levels of the achieved results of the four biggest international competitions in senior and junior category, it can be observed that the expert public evaluated the achievements of Slovenian sportspeople higher in twenty four

cases of evaluation when compared to the journalists. The differences in the evaluation of the achievements of individual competitions are larger in the junior than the senior category, as the representatives of the expert public presumably evaluate the results in the junior category also from the point of view of the future potential of an individual result. The sports results and the competition ability of a sporter develop in different individual trends and according to the nature of each individual sports discipline. The time needed for the achievement of an elite sports result is as a result of the particularities of specific sports disciplines (Bednarik, 1996; Kolar, 2005) and the representatives of the expert public understand that the result can be achieved only with a long term, systematic and continuous process of suitable sports training (Bednarik, Petrovič, & Tušak, 2001). It can be assumed that journalists undervalue the results in the junior category, which results in less media attention towards the achievements of Slovenian sportspeople in junior categories.

Both types of the public evaluated achievements below 32nd place as being lower than mere participation in the competition. Presumably, the evaluation also indicates that the largest competitions should be for sportspeople who can achieve a significant result, concluding that the criteria for participation at the events should be stricter. This can also be explained with the decrease of the costs of competitions, as financial means should not be invested into average results. The primary product of elite sports training as the main activity of sports disciplines, considered as a production process, is an elite sports result (Bednarik, 1996). This result has its value based on the production costs and the trading value of the result (Bednarik et al., 2001). The analyses of recent years show that elite sports results are becoming more expensive (Bednarik, Remih, Močnik, Simoneti, Štiblar, & Šugman, 2000), whereas sponsorship money is being decreased in a smaller environment due to the conditions of globalisation (Chelladurai, 2001); therefore, the majority of sports require a rationalisation of participation at events.

The difference between a medal and 4th–8th place is larger in the case of journalists compared to the expert public on all levels of competition. It can be concluded that the expert public evaluates an achieved 4th–8th place mainly through the understanding of the difference in the quality between the third and fourth placed sportspeople at the big competition, whereas journalists evaluate the result mostly from the media response to the medal or the achieved fourth place. All statistical reports in the media show that the success of the country at large competitions is being evaluated by the number of medals won (Kolar, Bednarik, Kovač, & Jurak, 2007; Beijing Competition information. Overall medal stand-

ing, 2008; Lazar, 2003; Yahoo! Sports Overall medal count, 2008).

Both types of the public, out of 77 sports, evaluated with the highest average mark a medal won at the World championships in athletics. Athletics is a sport to which different types of the public would award the largest support from public finances; furthermore, the results of Slovenian women athletes are extremely high on the scale of achievement that bring out in people feelings of national pride (Kovač, Starc, & Doupona Topič, 2005). Both types of the public, according to the average mark of the achieved medal at the world championships, placed their emphasis on the top ten sports of basketball, swimming, football, ski jumping, artistic gymnastics, handball, volleyball and ice hockey in addition to athletics. The expert sports public also values alpine skiing while the media views road cycling as being highly regarded. All top ten sports disciplines are Olympic sports, which indicates the extreme attention paid to the Olympic Games and also gives the Olympic sports special value in various classifications, e.g. financial support from public finances, interest of sponsors, media coverage, etc. (Kolar, 2005). The expert public evaluated the importance of a medal won at the World championships even more highly than the journalists in the majority of sports and also evaluated a worse result achieved at the World championships as a good achievement. Both types of the public evaluated as a better result those of sports that are highly regarded in Slovenia than of sports, which are not highly successful, developed or well known in Slovenia.

For the expert public, the sporting success of Slovenian sportspeople is considered in a much broader way and in more sports in comparison to the journalists, who have limited this recognition only to few sports. This is also confirmed by reviewing the articles in daily and weekly newspapers or in daily and weekly sports information programmes, where the amount of reporting and space allocated for individual sports depend on the type of sport or the achieved result.

These findings reveal that the evaluation of results was based mainly on the personal understanding of each result for every interviewed subject, who compared it with the previous achievements of the particular sport and not to objective criteria, such as the world wide expansion of the sports discipline and the number of participating competitors at the World championships. That is to say, it is difficult to be satisfied with the achievement of around 16th place in the sports disciplines in which Slovenian sportspeople achieve good competitive results and medals. The result itself is realistically significant in these sports; however, the observers consider it a disappointment, as their expectations are much higher. In contrast, in sports disciplines with no tradition of achieving such high results, the expecta-

tions are lower and the satisfaction with worse results is considerably higher.

It is expected that both of the observed types of public possess a high degree of expertise, an understanding of the problems of Slovenian sport and the position of each particular sport in the international sports framework. When comparing the selected types of public, it is interesting to notice that the journalists value the achievements of Slovenian sportspeople at the European and World championships as being at a significantly lower level than the expert public does and the achievements at the Olympic Games are regarded as the lowest by all types of public. According to Bednarik (1996), a sports result has psychological and financial aspects in trading value; both aspects influence the evaluation of a sports result. The present study is concerned with the psychological aspects of the sports result, which are experienced by both the expert type of public, who directly or indirectly participate in the making of a result, and the journalists, who monitor the making and the achievement of the result, write about it and present it to other types of public. As the psychological aspects of a sports result are measurable mainly by the satisfaction of participants at the achievement of the result and as they influence the evaluation of sports achievement (Bednarik, 1996), it is understandable that the direct producers of the sports result (the expert public) value the achievement higher than passive observers (journalists). Nevertheless, this argument does not withstand scrutiny, as the representatives of the general public should, at the achievements of elite sports results of Slovenian sportspeople, consequently experience even a smaller degree of satisfaction than the journalists and this should have been reflected also in their evaluation of the importance of the result in comparison to the journalists. The results of general public proved the opposite, as they experienced a larger degree of satisfaction than the expert public by evaluating the achievements of Slovenian sportspeople with the highest marks out of all studied types of public.

It is possible that the reasons for the low evaluation of sports achievements by the journalists should be looked upon from the financial perspective of the trading value of a sports result. This argument also does not withstand a serious examination, as the sponsors, whose purpose are commercial goals (Hong, 1997) expressed in the financial aspect of the trading value of the sports result, evaluated sports results higher than the journalists (Kolar, 2005). Therefore, it is reasonable to ask why the journalists evaluate sports achievements of Slovenian sportspeople with low marks. Is jealousy a possible reason due to the "merely" passive role of the media in sport, or are the other types of public over evaluating the value of the sports result? Or is perhaps the real reason the insufficient understanding and un-

derestimation of the actual circumstances needed for the achievement of the elite sports result? Under evaluation of the elite sports results of sportspeople by the journalists is not a problem in itself, as it only reflects the opinion of the journalists about the importance of the sports achievements of Slovenian sportspeople. The problem occurs when the expression of this opinion in the articles and reports about the sports achievements of Slovenian sportspeople influences the attitude of other types of the public to the sport. The results of the present and other studies (Godnič, 2005; Kolar, 2005) reveal that the media do not significantly influence the formation of public opinion, despite the contrary arguments of several other authors (Boyle & Haynes, 2000; Košir & Ranfl, 1996). Significant differences in the evaluation of sports achievements between the expert public and the journalists could be also seen in the lack of expert knowledge of the journalists, which could start a debate about the need for introduction of sports journalism as a separate study programme. Specifically, journalists nowadays often prove that the media can use negative topics in sport (scandals, doping, rows between sportspeople and coaches, etc.) and turn them into selling strategies for increasing their audiences (Godnič, 2005), rather than supplying expert commentary, which requires more knowledge.

CONCLUSION

Sport may be seen as a social, cultural, economic and media phenomenon (De Knop, 1998; Larive, 1994). It has various aims and goals such as winning a competition, learning sports skills, relaxation, staying healthy, rehabilitation, creating an income, having fun and mostly a lifestyle which in a "chaotic sense" involves the term "quality of life" (Chelladurai, 1992; De Knop, 1998; Kolar, 2005; Sasser, Olsen, & Wyckoff 1978).

Another way in which sport manifests itself is elite sport. Every result in elite sports has, via its feedback and in line with the logic of system theory, an effect on the entire training process as well as on the consumers of top sports: spectators and the sports industry (Bednarik, 1996). Therefore, such a result can be viewed as a multiplier and creator of other types of sport such as the sport of children and young people, commercial sport and sports recreation (Bednarik & Petrovič, 1998).

As a result of media attention and the recognition of elite sportspeople and teams, sports results are often the subject of evaluation by all types of the public. Such evaluation of individual sports results is amateur in most cases, as the reviewers, who are not the subjects of any expert public, evaluate sports achievements on the basis of their perceptions and the available commentaries of

sports journalists from different media (radio, television, daily, weekly and monthly newspapers, and the internet), which are often partial and incomplete and present only the opinions of journalists. These opinions are not always objective, as they are limited by the editorial policy of individual media, the amount of finances an individual sport sets aside for media attention, the knowledge of journalists about particular sports disciplines, the criteria journalists set when evaluating sports achievement and, finally, with the emotional attachment of the journalists to a particular sports discipline. As a result, perception and evaluation are not always a realistic reflection of the achieved sports result, but only an emotional response, caused by an achieved sports result according to the expectations of different types of public (journalists, the general public, etc.). Predicted and expected high sports achievements create high expectation and sometimes a sense of euphoria in people that can easily turn into major disappointment. As a result, an elite sports result (e.g. 5th place at the Olympic Games) can be seen as a bad and unsatisfactory result of the sporter from the amateur public point of view. In contrast, some results with a lower degree of quality, when achieved unexpectedly, can receive positive evaluation and appreciation.

The presented findings can be at least partially explained by means of an introductory discussion about the subconscious aspects of the cognitive acting of people (Flavell, 1979 in Musek, 1997), which direct and influence an understanding of reality with a whole spectrum of phenomena (implicit understanding, cognitive schemes, prejudice and stereotypes). It is obvious that a representation of reality, in this case an elite sports achievement, is differently perceived by representatives of different types of the public and is based solely on intuitive deciding.

The analysed data show that the evaluation subject of the journalists and the evaluation subject of the expert public are two different matters. The more critical evaluation of the journalists could be explained by the fact that the journalists are mostly observers of the events competitions, whereas the expert public is a creator of sports achievement. The latter type of public does not consider an achievement as a unique event that is defined with competition placement, but as a result of a long term methodical training process. It is questionable whether the journalists underestimate sports achievements or their evaluation is an expression of expert objectivity without an emotional component, which is always at hand with the creators of elite sports results. Although some researchers consider an elite result as important as the amount of media attention it receives (Boyle & Haynes, 2000; Godnič, 2005), it can be concluded on the basis of analyses that the media in Slovenia do not have a significant influence on the

formation of public opinion about the value of sports results.

REFERENCES

- Bartoluci, M. (2003). *Ekonomika i menedžment sporta*. Zagreb: Kineziološki fakultet.
- Bednarik, J. (1995). Klasifikacija športnih produktov. *Šport*, 43(3), 17–20.
- Bednarik, J. (1996). Športni trening kot proizvodnja vrhunškega športnega rezultata. *Šport*, 44(2, 3), 10–11.
- Bednarik, J., & Petrovič, K. (1998). Transparentnost funkcije sporta za gledatelje i za aktivno uključene u sportsku rekreaciju (Slučaj Slovenije). *Kineziologija* 30(1), 51–54.
- Bednarik, J., Petrovič, K., & Tušak, M. (2001). The function of sport. In J. Bednarik (Ed.), *Some economic aspects of sport in Slovenia* (pp. 40–48). Ljubljana: Faculty of Sport.
- Bednarik, J., Remih, A., Močnik, R., Simoneti, M., Štiblar F., & Šugman, R. (2000). *Izdatki za šport. Nekateri značilnosti financiranja in organiziranosti slovenskih športnih organizacij*. Ljubljana: Fakulteta za šport.
- (2008). *Competition information: Overall medal standing*. Retrieved 28. 9. 2008 from the World Wide Web: [www.http://results.beijing2008.cn/WRM/ENG/INF/GL/95A/GL0000000.shtml](http://results.beijing2008.cn/WRM/ENG/INF/GL/95A/GL0000000.shtml)
- Boyle, R., & Haynes, J. (2000). *Power play: Sport, the media and popular culture*. Harlow, Essex, Longman: Pearson Education.
- Chelladurai, P. (1992). A classification of sport and physical activity services: Implications for sport management. *Journal of Sport Management*, 6(2), 38–51.
- Chelladurai, P. (2001). *Managing organizations for sport and physical activity: A system perspective*. Scottsdale: Holcomb Hathaway Publishers.
- De Knop, P. (1998). Sport tourism: A state of the art. *European Journal for Sport Management*, 5(2), 5–20.
- Elvin, I. T., & Emery, P. (1997). A role for expert sports management. The XXIII Snickers World Cross Country Championships. *European Journal for Sport Management*, 4(1), 6–25.
- Godnič, V. (2005). *Vloga športa pri oblikovanju nacionalne identitete Slovencev*. Master thesis, University of Ljubljana, Faculty of Sport, Ljubljana.
- Gratton, C., & Taylor, P. (2000). *Economics of sport and recreation*. New York: Spon Press.
- Hong, F. (1997). Commercialism and sport in China: Present situation and future expectations. *Journal of Sport Management*, 11(4), 343–354.

- Kelly, G. (1955). *The psychology of personal constructs*. New York: Norton.
- Kolar, E. (2005). *Model vrednotenja športnih panog v Republiki Sloveniji z vidika vrhunškega športnega rezultata*. Doctoral dissertation, University of Ljubljana, Faculty of Sport, Ljubljana.
- Kolar, E., Bednarik, J., Kovač, M., & Jurak, G. (2007). Vrednotenje športnega dosežka. *Šport*, 55(2), 34–39.
- Kovač, M., Starc, G., & Doupona Topič, M. (2005). *Šport in nacionalna identifikacija Slovencev*. Ljubljana: Fakulteta za šport.
- Kovač, M., Doupona Topič, M., Bednarik, J., Jurak, G., Brenk, K. M., Starc, G., Majerič, M., & Kolar, E. (2003a). *Šport in nacionalna identiteta Slovencev (SN 01 – splošna javnost): Anketni vprašalnik*. Ljubljana: Fakulteta za šport.
- Kovač, M., Doupona Topič, M., Bednarik, J., Jurak, G., Brenk, K. M., Starc, G., Majerič, M., & Kolar, E. (2003b). *Šport in nacionalna identiteta Slovencev (SN 02 – strokovna javnost): Anketni vprašalnik*. Ljubljana: Fakulteta za šport.
- Kovač, M., Doupona Topič, M., Bednarik, J., Jurak, G., Brenk, K. M., Starc, G., Majerič, M., & Kolar, E. (2003c). *Šport in nacionalna identiteta Slovencev (SN 03 – novinarji): Anketni vprašalnik*. Ljubljana: Fakulteta za šport.
- Kovač, M., Doupona Topič, M., Bednarik, J., Jurak, G., Brenk, K. M., Starc, G., Majerič, M., & Kolar, E. (2003d). *Šport in nacionalna identiteta Slovencev (SN 04 – sponzorji): Anketni vprašalnik*. Ljubljana: Fakulteta za šport.
- Košir, M., & Ranfl, R. (1996). *Vzgoja za medije*. Ljubljana: Državna založba Slovenije.
- Larive, J. (1994). The European community and sports. *European Journal for Sport Management*, 1(1), 58–64.
- Musek, J. (1997). *Znanstvena podoba osebnosti*. Ljubljana: EDUCY d.o.o.
- Olimpijski komite Slovenije – združenje športnih zvez. (2004). *Obvestila*, X(37) [SOC, Notices]. Ljubljana: OKS – ZŠZ.
- Sasser, W. E., Olsen, R. P., & Wyckoff, D. D. (1978). *Management of service operations*. Boston: Allyn and Bacon.
- Sruk, V. (1995). *Leksikon: Filozofija*. Ljubljana: Cankarjeva založba.
- Starc, G. (2004). *Power struggle in the black box of sport: Sport as the arena of Slovenian nationalism*. Doctoral dissertation, University of Ljubljana, Faculty of Sport, Ljubljana.
- Starc, G. (2005). Uvod. In M. Kovač & G. Starc (Eds.), *Šport in nacionalna identifikacija Slovencev* (pp. 7–26). Ljubljana: Fakulteta za šport.
- Yahoo! Sports overall medal count. Retrieved 24. 10. 2008 from the World Wide Web: <http://sports.yahoo.com/olympics/beijing/medals>

HODNOCENÍ VRCHOLOVÉHO SPORTOVNÍHO VÝSLEDKU Z POHLEDU RŮZNÝCH TYPŮ PUBLIKA (Souhrn anglického textu)

Sportovní výsledek splňuje svůj pravý účel tehdy, je-li zaznamenán veřejností a podle příslušné odezvy nabývá případně dalších významných dimenzí. Význam sportovního výsledku je nejčastěji hodnocen intuitivně a na základě emocionálních reakcí a názorů na jeho důležitost v národním, nikoliv celosvětovém měřítku. Analýza hodnocení vrcholového sportovního výsledku dosaženého na nejvýznamnějších soutěžích odhaluje, že různé typy obecnosti hodnotí sportovní výsledky různě. Sportovní výsledek z podstatné části více uznává široká a odborná veřejnost, zatímco novináři jej oceňují nejméně. Posledně jmenovaní se snaží zůstat objektivní, když referují např. o jednorázové velké sportovní akci; nicméně novináři nedostatečně chápou to, že významný sportovní úspěch je výsledkem dlouhodobého tréninkového procesu. Odborná veřejnost si sportovních výsledků cení více než novináři; toto je zřejmě dáno tím, že odborníci chápou, jaký má předchozí trénink význam pro dosažený výsledek. Široká veřejnost sportovní výsledek oceňuje nejvíce, což ukazuje na dvě věci – za prvé, média sice mohou tvořit veřejné mínění, ale na širokou veřejnost mají malý vliv; za druhé, výsledky jsou hodnoceny zejména na emocionální bázi, zahrnující cestu k úspěchu, ne pouze okamžik dosažení výsledku. Lidé očividně touží po „velkých příbězích“ a jejich „hrdinech“, avšak média nejsou schopna tyto příběhy lidem prezentovat.

Klíčová slova: vrcholový sportovní výsledek, různé typy obecnosti, hodnocení.

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Comparative analysis of selected biomechanic characteristics between support backward swing and support swing for the 1 1/4 straddle-piked forward salto on the parallel bars. *Sport. Biomech.*, 1(1), 69–78.

Kolar, E., Kovač, M., & Bednarik, J. (2005). Evaluation of sports disciplines from the general public's point of view. *Acta Univ. Carol. Kinesiol.*, 41(1), 63–76.

Kolar, E., Bednarik, J., Jurak, G., Bubanj, R., & Kovač, M. (2008). Discovering differences between Olympic and non Olympic sports disciplines, based on the top sports results. *Kinesiol. Slov.*, 14(3), 15–25.

THE VERIFICATION OF THE USABILITY OF THE ONLINE INDARES.COM SYSTEM IN COLLECTING DATA ON PHYSICAL ACTIVITY - PILOT STUDY

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In order to reduce the increase of obesity and an inactive healthy lifestyle in the population, we are seeking means which would enhance a change in physical activity behavior worldwide. Information technologies, especially the internet, are among these means. Research has shown internet intervention to be effective in enhancing health in the population. The aim of the pilot study is to verify the usability of the online Indares.com system in collecting data on physical activity (PA) and at the same time to analyze a possible use of the system for intervention programs. The verification of the Indares.com system was carried out in the spring term (from January to May 2008) in a sample of 114 students at Valdosta State University who recorded their PA regularly into the system. The study analyzed the data from the first 12 weeks of the semester. The results show that the Indares.com system is an effective tool for the online collection of data on PA in its users and that the recorded data can be used for research purposes. Furthermore, the obtained information suggests that the Indares.com system can be used in internet intervention programs.

Keywords: Internet research, tailored feedback, intervention, monitoring of physical activity.

INTRODUCTION

The results of a study carried out on a sample of the population aged 15–69 years show that only 39.7% of the inhabitants of the Czech Republic meet the requirements of “healthy people 2010” concerning the amount of performed physical activity (PA) (Frömel et al., 2006). In order to reduce the increase of obesity and an inactive healthy lifestyle in the population, we are seeking means which would enhance a change in physical activity behavior worldwide and motivate people to a healthy and physically active lifestyle. In developed countries, there is a growing trend of the use of modern information technologies, especially the internet, in applying intervention aimed at behavioral changes. The annual increase of internet users provides reasons for using it for intervention purposes. This also applies to the Czech Republic where the number of households with internet access has risen from 14.8% in 2003 to 32% in 2007 (Český statistický úřad, 2007). Present experience tends to confirm the efficiency of internet intervention. Among the advantages is the possibility of addressing a large number of people while keeping costs low (Lewis et al., in press; Spittaels, De Bourdeaudhuij, & Vandelanotte, 2007). Using internet applications, we can deliver information tailored to users (Fotheringham, Owies, Leslie, & Owen, 2000) and provide them with privacy and anonymity. Moreover, users can access the

applications at times and places that suit them best (Moyer & Finney, 2004/2005). The studies discussing internet based intervention that have been published so far concerned public health with a focus on PA (Marshall, Leslie, Bauman, Marcus, & Owen, 2003) (see also below), healthy nutrition (Irvine, Ary, Grove, & Gilfillan-Morton, 2004), weight adjustment (Wing, Tate, Gorin, Raynor, & Fava, 2006), diabetes (Glasgow, Boles, McKay, Feil, & Barrera, 2003), reduction of substance abuse – tobacco (Strecher, Shiffman, & West, 2005) and alcohol (Bewick et al., 2008), and safe sexual behavior (Kiene & Barta, 2006), etc. Successful intervention has been so far confirmed in cases of intervention aimed at the improvement of nutrition, reduction of substance abuse and increase in safe sexual behavior (Portnoy, Scott-Sheldon, Johnson, & Carey, 2008). In cases of internet based intervention aimed at PA, the control of diabetes and weight adjustment, according to Portnoy et al. (2008) higher efficiency has not been found. To the contrary, other authors have confirmed the efficiency of internet based intervention focused on PA (Hurling et al., 2007; Napolitano et al., 2003; Rovniak, Hovell, Wojcik, Winett, & Martinez-Donate, 2005; Spittaels et al., 2007; van den Berg, Schoones, & Vlieland, 2007; Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004). In order for intervention aimed at increasing PA to be the most effective, it is important to consider how its users assess the given webpage or the applications

used within the intervention program. It seems that users assess very positively such internet webpages as enable them to keep individual records on their PA, set their own goals and to receive individual feedback on their PA (Lewis et al., in press).

The system Indares.com which is being verified provides all these possibilities and is based on immediate individual feedback in graphic form. The web application is available at www.indares.com. After free registration when the user creates his/her personal account, the person can freely use the system. At present, the Indares.com system is accessible in four languages – Czech, English, Polish, and Slovakian. At the moment, it is not known to what extent the Indares.com system can be applied in wider PA monitoring and intervention programs. Therefore, it is important to test its use and acceptability by its users in natural settings, preferably in all language areas.

The main aim of the study was to verify the practical use of the Indares.com system for data collection on PA and at the same time to analyze the usability of the system for intervention programs.

METHODS

The research sample consisted of 114 students (44 males, 70 females) aged 20.5 ± 1.7 from Valdosta State

University (Valdosta, GA, USA) enrolled on physical fitness class. The data of 73 students (19 males, 54 females) who recorded their PA regularly into the online database and had more than one registered PA during the monitoring period were used in this study.

PA monitoring was carried out during spring semester (from January to May 2008). The data from the first 12 weeks of monitoring were analyzed in this study (1/28/2008–4/20/2008). There was one week of spring break (3/10/2008–3/14/2008) during the monitored period. The data from the last two weeks of the semester were not included in the analysis due to the low number of students recording their data into the system.

To record the data on PA in students, we used the online system Indares.com (International Database for Research and Education Support), which is freely accessible. Upon registration, it allows its users to record data on their PA and to compare them with health recommendations, their own goals, the average results of a group, etc.

The students entered information on their PA into the system by themselves and no checking of this data's objectiveness has been performed; the level of objectivity of such information therefore equals any regular questionnaire survey.

Using Indares.com system requires only Internet Explorer. PA data recording into the system follows this procedure – the user logs in, goes to the page on

Fig. 1

Form for data entry used on Indares.com to record information on performed physical activities

Physical activities

Data entry | Charts | Statistics | Settings | Goals | Info

Year 2009

January

Week 3

Sun 11

Mon 12

Tue 13

Wed 14

Thu 15

Fri 16

Sat 17

Week 3

My activities

Activity has been added successfully.

Rank	Activity	Time	Intensity	kcal	
1	Running	40	Moderate	205	UPD DEL
Sum				205	

Add new activity

Type: [Other activities](#)

Duration: minutes

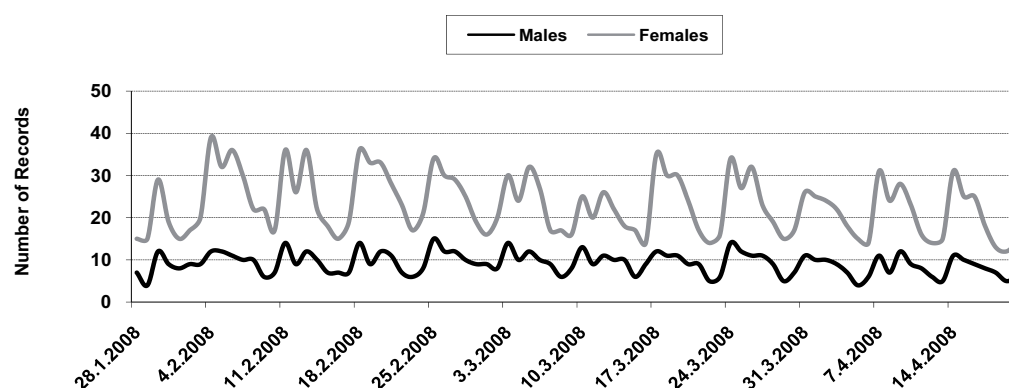
Intensity:

Note:

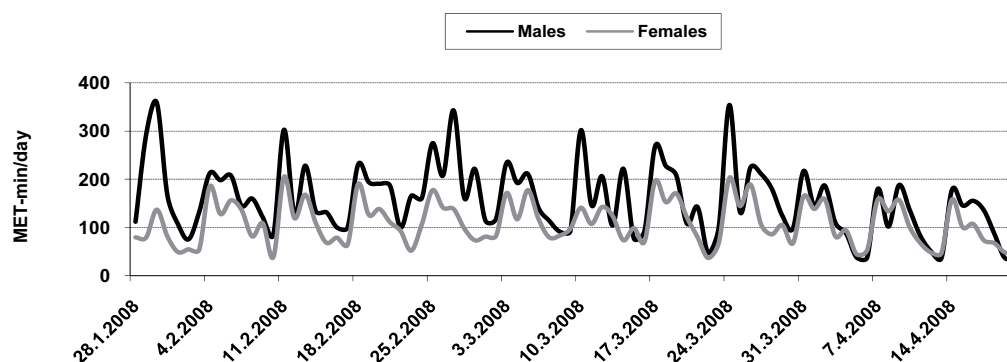
kcal:

Fig. 2

Number of daily records of PA into the Indares.com system during the observed period of 12 weeks

**Fig. 3**

Average daily PA of students during the observed period of 12 weeks



PA recording, and chooses the date for which he/she wants to record the PA data, he/she chooses the type of PA performed, records its duration in minutes, chooses the intensity of the PA performed, and saves the entire record.

The procedure can be easily understood from a screenshot of the page serving for data entry (Fig. 1). The system currently contains 75 different types of PAs that can be chosen. For each activity, there are preset appropriate levels of intensity that can be selected. The system uses three levels of intensity (low, moderate, and vigorous) and depending on the type of activity chosen, it displays, with a short description, what a particular intensity represents. This way the user is enabled to enter the most suitable level of intensity for the PA performed.

The system itself calculates additional information (e.g. energy expenditure [kcal] and the amount of PA considering its intensity and time of duration [MET-min]). The Indares.com system provides its users with detailed feedback on the PA performed in graphic form.

The data from the Indares.com system were transferred into the Statistica 6.0 program. It was not possible to differentiate days on which students did not really perform any PA and days on which they did not record the data to the system. Yet, the system enables the users to record data even backwards (to an earlier date) and the students could fill in the missing data; all of which were then interpreted as if no PA had been performed. In statistical analysis, basic descriptive statistics were used; the Wilcoxon match pair test and ANOVA for repeated measures. The level of statistical significance was set at $p < 0.05$. The effective size for the results of the Wilcoxon match pair test was assessed based on the d coefficient. Its levels are stated as being $d = 0.2$, low effect, $d = 0.5$, medium effect, and $d = 0.8$ high effect (Cortina & Nouri, 2000). We consider as logically significant the difference in PA performed at the rate of 280 MET-min/week, which is 40 MET-min/week higher than stated by Frömel et al. (2006). After calculating 280 MET-min for an average day in a week, we will obtain the equivalent of 10 min/day of a moderate PA (40 MET-min/day).

RESULTS

Students recorded PA into the Indares.com system regularly. The number of records for the individual days was rather stable during the monitored period. The highest number of PA records appeared on those days when students participated in organized PA – physical fitness classes – from Monday to Thursday; the least PA was recorded at weekends (Fig. 2).

Regarding the intensity and duration of PA, students performed the least PA at weekends and, on the other hand, the most PA on those days when they participated in organized PA (Fig. 3) during the monitored period.

The comparison of average week and average weekend days has shown that female students ($Z = 5.70$; $p < 0.001$; $d = 1.55$) and male students ($Z = 3.38$;

$p < 0.001$; $d = 1.55$) were significantly more physically active on weekdays than on weekend days (Fig. 4). These differences were significant both statistically and logically. On average, both men and women performed the highest amount of PA on Mondays and Wednesdays, further on Tuesdays and Thursdays, during the monitored period. These were the days when physical fitness classes took place. In men, the level of PA on Fridays was similar to PA on Tuesdays, Thursdays and Sundays (no statistically significant differences were found). Men were the least active on Saturdays, when the level of PA was comparable with Sunday values. In women, PA on Fridays was identical to PA on Saturdays and Sundays (no statistically significant differences were found), and women performed the least PA on these three days of the week (Fig. 5).

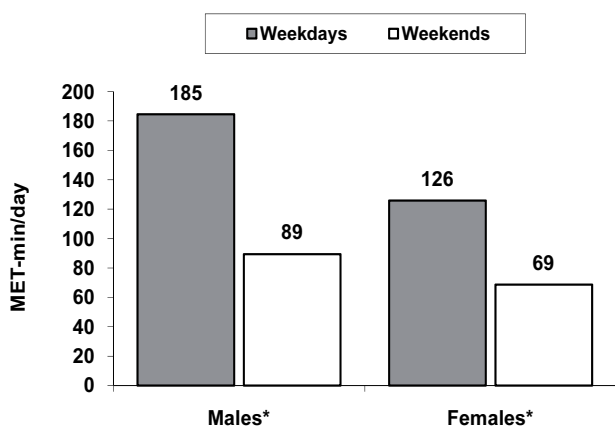
The amount of PA performed on average on weekdays was rather stable in both men and women during the monitored period of 12 weeks. Men were more physically active on weekdays in the fifth and ninth weeks of monitoring but only in comparison to the tenth, eleventh and twelfth weeks. Women performed the least PA on weekdays during the first week of monitoring (Fig. 6). Spring break, which took place in the seventh week of monitoring, did not have any apparent effect on the PA in students.

The level of PA performed in men at weekends was the lowest in the last 3 weeks of monitoring. In women, an increase in PA at weekends during the first six weeks of monitoring was recorded, however, the increase was neither statistically nor logically significant (Fig. 7).

Regarding the type of PA, men performed weight lifting, walking and running most frequently. Women performed walking, conditioning exercises and aerobics most frequently. The list of the top ten PAs performed by men and women most frequently during the twelfth weeks of monitoring is below (TABLE 1).

Fig. 4

Comparison of average PA on weekdays and at weekends



Legend:

* $p < 0.001$

Fig. 5

Amount of PA realized during the average week (calculated from the 12 observed weeks)

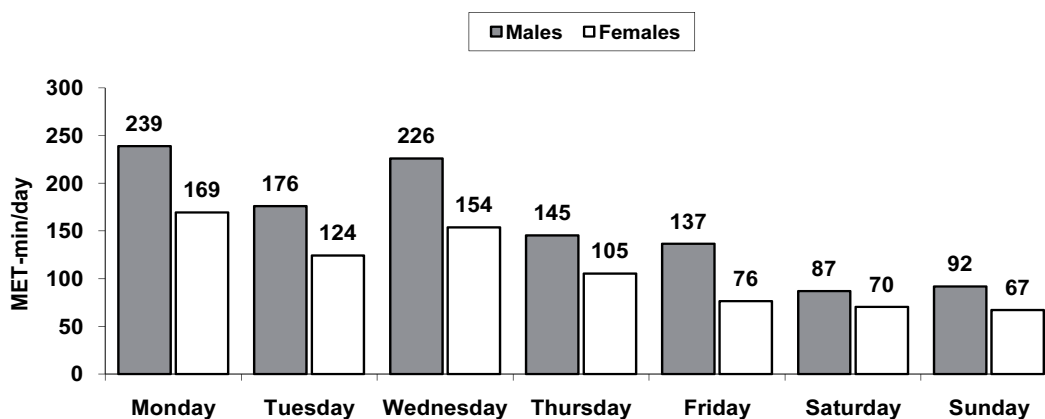
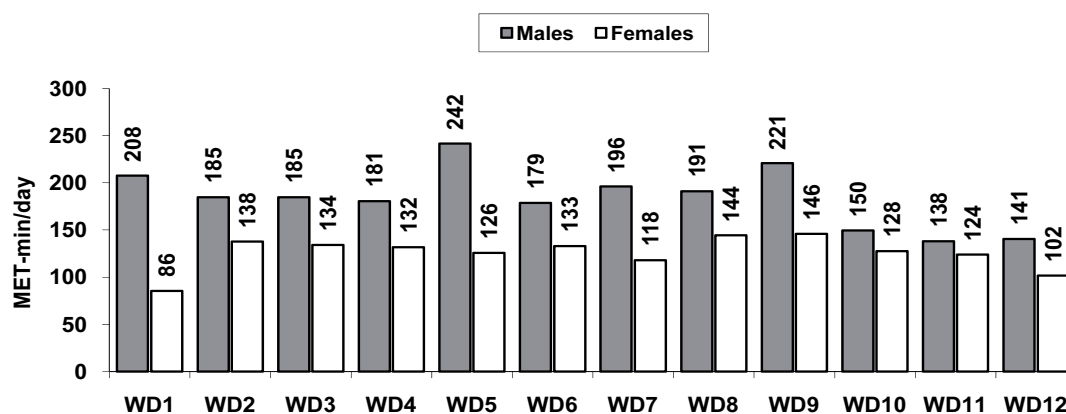


Fig. 6

Average weekday PA of students during the observed period of 12 weeks

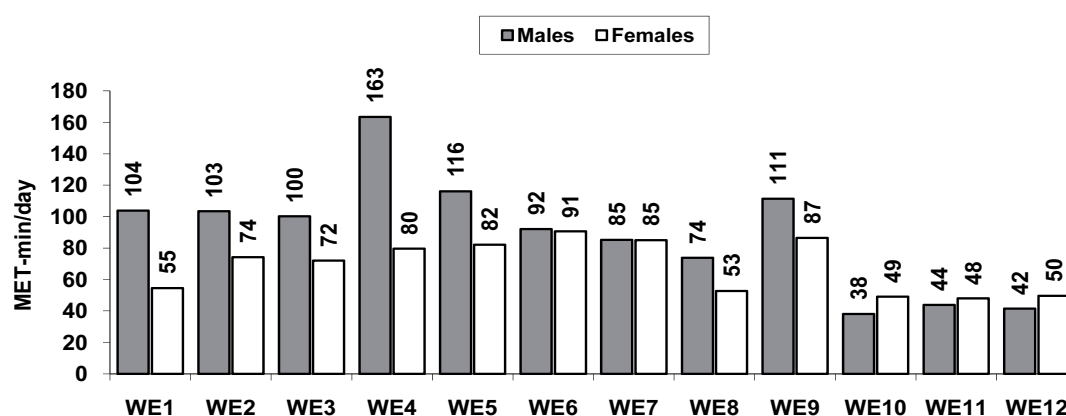


Legend:

WD = weekday

Fig. 7

Average weekend day PA of students during the observed period of 12 weeks



Legend:

WE = weekend

TABLE 1

The most frequently performed PAs during the observed period of 12 weeks

Order	Males	Females
1	Weightlifting	Walking
2	Walking	Conditioning exercise
3	Running	Aerobics
4	Basketball	Dance
5	Bicycling	Running
6	Conditioning exercise	Volleyball
7	Dance	Basketball
8	Aerobics	Bicycling
9	Bowling	Games
10	Football	Swimming

DISCUSSION

The information recorded into the Indares.com system during the experiment shows the frequency, intensity, duration and type of PA performed by the users of the system. These types of PA characteristics are sufficient in order to provide feedback to the users and to compare their PA to PA recommendations. The information could be, moreover, used in research. Since we did not encounter any difficulties in using the Indares.com system on the part of users nor with the amount of information which we gathered in the pilot study, we believe that the Indares.com is a suitable tool for use in online data collection on PA.

The design of this study did not allow us to fully test the use of the Indares.com system for intervention purposes. The main reasons were the absence of a control group and missing information on PA in students before they used the system. The comparison of the Indares.com system and its functions to the internet applications described in published intervention studies (Lewis et al., in press; Portnoy et al., 2008; Spittaels et al., 2007) suggests that the system could be used in intervention programs. This assumption can be partially supported by the observed increase of PA in female students at weekends, although it was not statistically significant, during the first six weeks of the experiment.

The students understood the use of the Indares.com system as a part of their homework assignments in physical fitness classes. This fact is proved by the high number of students using the system (64% of the registered students), further by the decreasing number of PA records in the last two weeks of the semester. After the semester finished, the students completely finished recording PA data into the system.

The Indares.com system was more used by women than men in this study. This finding coincides with the results published in intervention studies aimed at PA (Lewis et al., in press; Napolitano et al., 2003). We can, therefore, assume that when the Indares.com system will be applied in intervention programs, women will use this tool more willingly and frequently than men. Further studies need to show how users assess the system. Despite the fact that the Indares.com system includes the recommended features (Lewis et al., in press), it is necessary to verify whether the form and the properties of the system are efficient for the users. It is not possible to generalize the information obtained and it needs to be verified in other studies. It is essential to analyze the reasons which make the users of the Indares.com system use the system on a long term basis or, on the other hand, what will make them stop using the system. This information will be significant in case the Indares.com system will be used in intervention studies and it can be reflected in its efficiency.

CONCLUSIONS

Based on the results of the pilot study, the Indares.com system is a suitable tool for online data collection on PA in its users. User interface and the way the system is used did not cause any difficulties to the users.

The obtained information suggests that the Indares.com system can be used in internet intervention programs. However, this presumption needs to be confirmed by other experiments.

REFERENCES

- Bewick, B. M., Trusler, K., Barkham, M., Hill, A. J., Cahill, J., & Mulhern, B. (2008). The effectiveness of web based interventions designed to decrease alcohol consumption: A systematic review. *Preventive Medicine*, 47(1), 17–26.
- Cortina, J. M., & Nouri, H. (2000). *Effect size for ANOVA designs*. Thousand Oaks, CA: Sage.
- Český statistický úřad. (2007). *Využívání informačních a komunikačních technologií v domácnostech a mezi jednotlivci v roce 2007*. Retrieved 17. 9. 2008 from the World Wide Web: <http://www.czso.cz/csu/2007edicniplan.nsf/p/9701-07>
- Fotheringham, M. J., Owies, D., Leslie, E., & Owen, N. (2000). Interactive health communication in preventive medicine: Internet based strategies in teaching and research. *American Journal of Preventive Medicine*, 19(2), 113–120.
- Frömel, K., Bauman, A., Bláha, L., Feltlová, D., Fojtik, I., Hájek, J. et al. (2006). Intenzita a objem pohybové aktivity 15–69leté populace České republiky. *Česká kinantropologie*, 10(1), 13–27.
- Glasgow, R. E., Boles, S. M., McKay, H. G., Feil, E. G., & Barrera, M. (2003). The D-Net diabetes self management program: Long term implementation, outcomes, and generalization results. *Preventive Medicine*, 36(4), 410–419.
- Hurling, R., Catt, M., De Boni, M., Fairley, B. W., Hurst, T., Murray, P. et al. (2007). Using internet and mobile phone technology to deliver an automated physical activity program: Randomized controlled trial. *Journal of Medical Internet Research*, 9(2), e7.
- Irvine, A. B., Ary, D. V., Grove, D. A., & Gilfillan-Morton, L. (2004). The effectiveness of an interactive multimedia program to influence eating habits. *Health Education Research*, 19(3), 290–305.
- Lewis, B., Williams, D., Dunsiger, S., Sciamanna, C., Whiteley, J., Napolitano, M. et al. (in press). User attitudes towards physical activity websites in a randomized controlled trial. *Preventive Medicine* (accepted manuscript).
- Marshall, A. L., Leslie, E. R., Bauman, A. E., Marcus, B. H., & Owen, N. (2003). Print versus website physical activity programs: A randomized trial. *American Journal of Preventive Medicine*, 25(2), 88–94.
- Moyer, A., & Finney, J. W. (2004/2005). Brief interventions for alcohol problems: Factors that facilitate implementation. *Alcohol Research and Health*, 28(1), 44–50.
- Napolitano, M. A., Fotheringham, M., Tate, D., Leslie, E., Bauman, A., & Marcus, B. (2003). Evaluation of an internet based physical activity intervention:

A preliminary investigation. *Annals of Behavioral Medicine*, 25(2), 92–99.

- Portnoy, D. B., Scott-Sheldon, L. A. J., Johnson, B. T., & Carey, M. P. (2008). Computer delivered interventions for health promotion and behavioral risk reduction: A meta-analysis of 75 randomized controlled trials, 1988–2007. *Preventive Medicine*, 47(1), 3–16.
- Rovniak, L. S., Hovell, M. F., Wojcik, J. R., Winett, R. A., & Martinez-Donate, A. P. (2005). Enhancing theoretical fidelity: An e-mail based walking program demonstration. *American Journal of Health Promotion*, 20(2), 85–95.
- Spittaels, H., De Bourdeaudhuij, I., & Vandelanotte, C. (2007). Evaluation of a website delivered computer tailored intervention for increasing physical activity in the general population. *Preventive Medicine*, 44(3), 209–217.
- Strecher, V. J., Shiffman, S., & West, R. (2005). Randomized controlled trial of a web based computer tailored smoking cessation program as a supplement to nicotine patch therapy. *Addiction*, 100(5), 682–688.
- van den Berg, M. H., Schoones, J. W., & Vliet Vlieland, T. P. M. (2007). Internet based physical activity interventions: A systematic review of the literature. *Journal of Medical Internet Research*, 9(3), e26.
- Wantland, D. J., Portillo, C. J., Holzemer, W. L., Slaughter, R., & McGhee, E. M. (2004). The effectiveness of web based vs. non web based interventions: A meta-analysis of behavioral change outcomes. *Journal of Medical Internet Research*, 6(4), e40.

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OVĚŘENÍ VYUŽITELNOSTI ONLINE SYSTÉMU INDARES.COM PRO SBĚR DAT O POHYBOVÉ AKTIVITĚ – PILOTNÍ STUDIE

(Souhrn anglického textu)

Ve snaze zmírnit trend nárůstu obezity a inaktivního způsobu života populace jsou celosvětově hledány prostředky, které by přispěly k žádoucí změně pohybového chování lidí. Mezi tyto prostředky patří moderní informační technologie, zejména internet. Dosavadní výzkumy spíše potvrzují efektivnost internetových intervencí zacílených na zdraví populace. Cílem této pilotní

studie bylo ověřit praktickou využitelnost internetové aplikace Indares.com ke sběru dat o pohybové aktivitě (PA) a současně analyzovat možnosti využití systému pro intervenční programy. Ověřování systému Indares.com bylo uskutečněno během jarního semestru (leden až květen 2008) na 114 studentech Valdosta State University, kteří svou PA pravidelně zapisovali do systému. V této studii byla vyhodnocena data z prvních 12 týdnů semestru. Z výsledků vyplývá, že systém Indares.com je vhodným nástrojem pro online sběr dat o PA uživatelů a zaznamenaná data jsou využitelná pro výzkumné účely. Získané informace dále naznačují, že systém Indares.com bude využitelný v internetových intervenčních programech.

Klíčová slova: internetový výzkum, osobní zpětná vazba, intervence, monitoring pohybové aktivity.

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Chmelík, F., Frömel, K., Mitáš, J., Sigmund, E., Pelclová, J., & Vašíčková, J. (2008). Different correlates of walking in adult inhabitants of the Czech Republic on weekdays and at weekends [Abstract]. In *1st Annual Conference of HEPA Europe: Programme & Abstracts* (p. 118). Glasgow, Great Britain: University of Strathclyde.

Chmelík, F., Frömel, K., & Sigmundová, D. (2008). Physical activity in youth in the Czech Republic: Correlates of walking [Abstract]. In *2nd International*

Congress on Physical Activity and Public Health (p. 225). Amsterdam, Netherlands: VU University Media Center.

Chmelík, F., Frömel, K., & Svozil, Z. (2007). Student teacher ability to apply progressive intervention in both their majors during teaching practice. *Acta Universitatis Palackianae Olomucensis. Gymnica*, 37(4), 31–36.

Chmelík, F., Frömel, K., & Svozil, Z. (2008). Metodologická specifika volby jednotky statistické analýzy v kinantropologickém výzkumu. *Tělesná kultura*, 31(1), 7–19.

AUTHOR GUIDELINES

FOCUS AND SCOPE

The journal "Acta Universitatis Palackianae Olomucensis. Gymnica" focuses on presenting results of research studies and theoretical studies from the field of kinanthropology. The scope of the journal covers topics related to biomechanics, exercise physiology, physiotherapy, somatometry, sports psychology, sports training, physical education, public health, etc. The journal also welcomes submissions that present results of interdisciplinary research.

WEB-BASED MANUSCRIPT SUBMISSION

The journal uses an online submission and manuscript tracking system. To submit your article, you have to be registered as an author with the journal (www.gymnica.upol.cz). Registration and login are required to submit articles online and to check the status of current submissions. Registered author is guided through the submission process from his/her author home page. Upon submission, author receives an automatic email acknowledging receipt of his/her article. The system allows the author to check the status of his/her manuscript at any time. The journal does not accept articles submitted by email. It is necessary to follow carefully instructions in ensuring a blind review.

SUBMISSION FORMATTING

Bibliographic and Formatting Standards

"Acta Universitatis Palackianae Olomucensis. Gymnica" journal bibliographic and formatting standards are based on *Publication Manual of the American Psychological Association* (APA), 5th edition, 2001. (see www.apastyle.org)

Language

The main language of the journal is English. Article title, abstract, and keywords are published also in Czech. All texts submitted to the journal must be in English. Czech speaking authors must provide article metadata both in English and Czech. In Non-Czech speaking authors, the Czech version of article metadata will be completed by the journal.

Text Formatting

The submission file must be in Microsoft Word (.doc) document file format. The text is single-spaced, left justified, uses 12-point Times New Roman font, and all illustrations, figures, and tables are placed at separate pages, rather than within the text. The maximum length of a submission allowed is 15 pages in total.

Abstract and Keywords

The recommended length of an abstract is 400 words and it must not exceed 500 words. Where applicable, the abstract must be structured in following sections: BACKGROUND, OBJECTIVE, METHODS, RESULTS (including relevant statistics), and CONCLUSIONS. Authors are required to provide 3 to 10 keywords (not used in the title).

Submission Structure

Typical article must be structured as follows: INTRODUCTION, METHODS, RESULTS, DISCUSSION, CONCLUSIONS, and REFERENCES. The titles of the chapters must be capitalized and left justified.

Tables and Figures

Tables and figures are placed at separate pages, rather than within the text. In addition, illustrative figures (if possible in high resolution; e.g., uncompressed TIFF) should also be uploaded as supplementary files with the submission and their file names should contain the number of the figure (e.g., figure01.jpg, figure02.tiff). In the text, place an identification above each table and figure. The identification is left justified and consists of a label (e.g., TABLE 1, Fig. 1) on the first line and a title of the table or figure starting on the next line.

References

References are placed at the end of the submission in alphabetical order and must comply with the APA style (see examples on www.gymnica.upol.cz). Footnotes can never be used for references. Carefully check references to assure they are correct and included only when they are cited in the text. Only references which have been published or accepted for publication can be included. Where available, URLs for the references must be provided.

We look forward to our further cooperation!

Doc. MUDr. Pavel Stejskal, CSc., Editor in Chief
Doc. PhDr. Vlastimila Karásková, CSc., Managing Editor

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POKYNY PRO PŘÍPRAVU RUKOPISU

ZAMĚŘENÍ A ZÁBĚR

Časopis „Acta Universitatis Palackianae Olomucensis. Gymnica“ je zaměřen na publikaci výsledků výzkumných studií a teoretických studií z oblasti kinantropologie. Zaměření časopisu pokrývá témata související s biomechanikou, zátěžovou fyziologií, fyzioterapií, somatometrií, sportovní psychologií, sportovním tréninkem, tělesnou výchovou, veřejným zdravotnictvím atd. Redakce časopisu také vítá příspěvky, které prezentují výsledky interdisciplinárního výzkumu.

ZASÍLÁNÍ PŘÍSPĚVKŮ PŘES WEBOVÉ STRÁNKY

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FORMÁT PŘÍSPĚVKU

Publikační styl

Standard časopisu „Acta Universitatis Palackianae Olomucensis. Gymnica“ je založen na publikačním stylu Americké psychologické asociace – *Publication Manual of the American Psychological Association* (APA), 5th edition, 2001. (viz www.apastyle.org)

Jazyk

Hlavním jazykem časopisu je angličtina. Název článku, abstrakt a klíčová slova jsou publikovány také v češtině. Všechny texty zasláné do časopisu musí být v angličtině. Česky mluvící autoři musí poskytnout metadata článku v angličtině i v češtině. Za autory, kteří nemluví česky, doplní českou verzi metadata redakce.

Formátování textu

Soubor příspěvku musí být ve formátu souboru Microsoft Word (.doc). Text má jednoduché řádkování, je zarovnaný doleva, používá dvanáctibodový font Times New Roman a všechny ilustrace, obrázky a tabulky jsou umístěny na samostatné stránky. Maximální povolená délka příspěvku je 15 stran celkem.

Abstrakt a klíčová slova

Doporučená délka abstraktu je 400 slov a nesmí přesáhnout 500 slov. Pokud je to možné, musí být abstrakt strukturován do následujících částí: VÝCHODISKA, CÍLE, METODIKA, VÝSLEDKY (včetně relevantní statistiky) a ZÁVĚRY. Autoři musí uvést 3 až 10 klíčových slov (nepoužitých v názvu příspěvku).

Struktura příspěvku

Typický článek musí být strukturován následujícím způsobem: ÚVOD, METODIKA, VÝSLEDKY, DISKUZE, ZÁVĚRY, a REFERENČNÍ SEZNAM. Názvy kapitol musí být napsány velkými písmeny a zarovnány doleva.

Tabulky a obrázky

Tabulky a obrázky budou umístěny na samostatných stránkách. Obrázky a ilustrace (pokud možno ve vysokém rozlišení; např.: nekomprimovaný TIFF) by měly být nahrány spolu s příspěvkem jako doplňkové soubory a názvy těchto souborů by měly obsahovat číslo obrázku (např.: figure01.jpg, figure02.tiff). V textu umístěte nad každou tabulku a obrázek identifikaci. Identifikace je zarovnaná doleva a sestává z popisku (např.: TABLE 1, Fig. 1) na prvním řádku a názvu tabulky nebo obrázku začínajícím na dalším řádku.

Referenční seznam

Reference jsou umístěny na konci příspěvku v abecedním pořadí a musí být v souladu s APA publikačním stylem (viz příklady na www.gymnica.upol.cz). Pro reference nelze nikdy použít poznámky pod čarou. Pečlivě překontrolujte reference, abyste se ujistili, že jsou správně a zařazeny pouze v případě, že jsou citovány v textu. Uvedeny mohou být pouze reference, které byly publikovány nebo jsou přijaty k publikování. Kde je to možné, musí být uvedena URL adresa odkazující na referenci.

Těšíme se na další spolupráci!

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