LASE JOURNAL OF SPORT SCIENCE
is a Scientific Journal published two times per year in Sport Science
LASE Journal for sport scientists and sport experts/specialists

Published and financially supported by
the Latvian Academy of Sport Education in Riga, Latvia

p-ISSN: 1691-7669
e-ISSN: 1691-9912
ISO 3297

Language: English
Indexed in IndexCopernicus
Evaluation Ministry of Science and Higher Education, Poland

Printed in 100 copies

Executive Editor:
Inta Bula – Biteniece
Ilze Spīķe
Language Editor:
Ieva Rudzinska

Printed and bound: "Printspot" Ltd.
Cover projects: Uve Švāģers - Griezis
Address: 14-36 Salnas Street
Riga, LV1021, Latvia
Phone: +371 26365500
e-mail: info@printspot.lv
website: www.printspot.lv

Editorial Contact Information,
Publisher Contact Information:
Inta Bula-Biteniece
Latvian Academy of Sport Education
Address: 333 Brivibas Street
Riga, LV1006, Latvia
Phone.: +371 67543410
Fax: +371 67543480
E-mail: akademija@lspa.lv

The annual subscription (2 issues) is 35 EUR (20 EUR for one issues).
Order form of LASE Journal of Sport Science Exemplary order form of subscription is accessible in our website: www.lspa.lv/research

Please send the order to:
LASE Journal of Sport Science
Latvijas Sporta pedagoģijas akadēmija
Address; 333 Brivibas Street
Riga, LV1006, Latvia
Phone: +371 67543410
Fax: +371 67543480
E-mail: akademija@lspa.lv

Method of payment:
Please send payments to the account of
Latvijas Sporta pedagoģijas akadēmija
Nr. 90000055243
Account number: LV97TREL9150123000000
Bank: State Treasury
BIC: TRELLV22
Postscript: subscription LASE Journal of Sport Science

Full-text available free of charge at http://journal.lspa.lv/

All papers are review

INTERNATIONAL EDITORIAL BOARD

ISSN 1691-7669 (ISO 3297)
LASE JOURNAL OF SPORT SCIENCE
Vol. 6, (2015) Nr. 1, pp. 2- 110

CONTENTS

Original research papers

PEAK OXYGEN UPTAKE AND MUSCLE POWER CAN BE SIMULTANEOUSLY IMPROVED WITH HYBRID TRAINING
Nilsson J., Fredriksson M. …… 3

INFLUENCE OF EXCHANGED NEUROMUSCULAR REGULATION OF M.GASTROCNEMIUS ON LEG BLOODFLOW REGULATION DURING STATIC VOLUNTARY CONTRACTION OF KNEE FLEXORS
Gavrona U., Paeglītis A., Vārpa N., Galeja Z., Dzērve V., Kukulis I. 16

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND THE OBJECTIVE INDICATORS OF PHYSICAL CAPITAL FOR WOMEN IN FITNESS
Čuprika A., Fernāte A., Čupriks L. ……... 23

MOTIVES OF YOUNG BASKETBALL PLAYERS FOR GOING IN FOR SPORTS
Budreikaitė A., Mačijauskas K. 38

HEALTH IMPROVEMENT OF THE POPULATION BY CREATING A CLUSTER IN BELARUSIAN FITNESS
Sadovnikova V., Polyakova T. …….. 49

Review papers

MANAGEMENT OF VOLUNTEERING HUMAN RESOURCES IN SPORT ORGANISATIONS
Šimkus A., Mikalauskas R., Alekrinskis A., Bulotienė D. …… 64

FAIR PLAY IN THE PHYSICAL EDUCATION CURRICULUM
Miura Y. 79

Short communication

PHYSICAL ACTIVITY, MENTAL HEALTH AND POSITIVE EMOTIONS
Dawood Al Sudani A. A. …… 94

PECULIARITIES OF DEVELOPING VARIOUS TECHNICAL AND TACTICAL INTERACTIONS IN 13-14 YEAR OLD HOCKEY PLAYERS
Ovechkin A., Cherenkov D. …….. 101

CURRENT NEWS..... 106

CONGRATULATION..... 107

GUIDELINES FOR CONTRIBUTORS..... 108

ORIGINAL RESEARCH PAPER

PEAK OXYGEN UPTAKE AND MUSCLE POWER CAN BE SIMULTANEOUSLY IMPROVED WITH HYBRID TRAINING

Johnny Nilsson[1,2], Mårten Fredriksson[2]

[1]University of Dalarna, Falun, Sweden
[2]The Swedish School of Sport and Health Sciences, Stockholm Sweden
Address: 791 88 Falun, University of Dalarna, Sweden
Phone: + 46 23 77 80 00
E-mail: jns@du.se

Abstract

The purpose was to investigate the effects of simultaneous endurance and strength training repeatedly performed in the same training sessions (hybrid training). Twenty-six habitually active female physical-education students took part in the study. They were assigned to a hybrid training group (HT) or one of two control groups (CON1; only endurance training and CON2; maintained their normal training regimen). In a pre- and post-test training design all the subjects were tested before and after the intervention period concerning peak oxygen uptake while pedalling on a cycle ergometer and power output in a progressive cycle ergometer pedalling power/strength test. The HT intervention group and the CON1 group trained three times per week for five weeks, while the CON2 group did not change their normal training regimen. The HT group used a pre-programmed cycle ergometer to pedal at a mean oxygen uptake of 70-75% VO_{2peak} for 30 minutes, but the training time was divided into 60 intermittent work periods (6 seconds) at a very high relative intensity (approximately 190 % of VO_{2peak}) interspersed with low-intensity work periods (24 seconds) at about 45% of VO_{2peak}. The CON1 group trained at the same mean oxygen uptake level as the HT group but during 30 minutes continuous training. The HT group significantly increased VO_{2peak} and muscle power performance. The CON1 group increased VO_{2peak} significantly but not power/strength. The CON2 group did not change significantly in the parameters studied. Thus, it can be concluded that in-session hybrid training allows simultaneous significant improvements of both VO_{2peak} and muscle power performance during cycle ergometer pedalling.

Key words: *Aerobic power, muscle power, concurrent training, cycle ergometer*

Introduction

There has been great scientific interest in concurrent strength-and-endurance training for over thirty years and numerous studies have addressed this issue (e.g. Balabinis et al., 2003; Bell et al., 1991; Dudley & Djamil, 1985; Hickson et al., 1980; Hickson, 1980; Kraemer et al., 1995; Leveritt et al., 2003; Shaw et al., 2009). The interest may relate to the fact that performance in many sports relies on both strength and endurance; and also perhaps to the puzzling issue of how strength and endurance can be trained in combination as they largely represent two different energy systems. Physiologically this is no trivial matter. In strength training, energy from anaerobic (alactacid and lactacid) energy processes is used, while aerobic processes dominate during endurance training. The difference in energy domain relates to a number of training responses. Strength training can result in muscular hypertrophy (Wernblom et al., 2007), but this is not expected as a main result of endurance training. The repeated low-frequency fibre recruitment that occurs during endurance training might interact negatively to explosive strength development, which requires high-frequency recruitment of fast type II muscle fibres (Widrick et al., 1996A; Widrick et al., 1996B). This may be associated with the reduced jumping ability seen after endurance training (Costill, 1967). Strength training shows a small reduction in mitochondrial density in contrast to endurance training which shows an increase here (MacDougall et al. 1979). Aerobic energy production may be hampered by a reduction in mitochondrial density, which may in turn decrease endurance performance level. The above examples indicate possible sites of interference in physiological adaptation during training in these energy systems, at least if maximal performance is sought in both capacities. However, recent studies (Wang et al., 2009; Psilander et al., 2010; Wang et al., 2011) on PGC-1α, a key regulator of mitochondrial biogenesis, shows an increased expression as a result of sprint-like interval training, which may indicate possibilities of concomitant adaptations on micro-cellular level to a given training stimulus. Studies focusing on physiology- and performance-related responses in concurrent strength and endurance training have shown that strength training does not reduce maximum oxygen uptake (Chromiak & Mulvaney, 1990). Some studies indicate an increase in maximum oxygen uptake (Hickson, 1980; Hunter et al., 1987; Sale et al., 1990), some have shown increased performance in endurance tests after concurrent endurance and strength training (e.g. Hickson, 1980; Hortobagyi et al., 1991). Studies on the effect of concurrent training on strength show contradictory results, both a decrease in strength

(e.g. Dudley & Djamil, 1985; IzQuierdo et al., 2005) and an increase (e.g. Bell et al., 1991; Hortobagyi et al., 1991; McCarthy et al., 2002; Shaw et al., 2009). Together these results provide strong indications that combined strength and endurance training in separate training sessions under certain circumstances can increase performance in both capacities.

To our knowledge no-one has studied concurrent training when strength and endurance have been trained in the same exercise of high-volume and in consecutive sessions. In the present training study we were interested to do this. We call the mixed training of the two capacities "hybrid training" (Nilsson, 1998). The reason for this research interest is that two or several capacities are relevant for performance and are utilized simultaneously in many sports. In line with this strength and endurance are important and are used simultaneously in such different sports as soccer, cross-country skiing and middle-distance running. Typical of these sports is that neither strength nor endurance seems to be maximally used: instead there appears to be a balance in development between the two capacities for optimal performance.

The experimental approach in this study of hybrid training has a pre- and post-test design. Strength and endurance are blended into the same exercise in repeated, hybrid interval-training sessions with a combination of work and "rest" periods. This results in an average oxygen uptake level which is expected to allow an increase in maximum oxygen uptake and thereby an improvement in aerobic endurance. Work is performed at very high intensity (>100% VO_{2peak}) in short time intervals and with high resistance. This highly activates the target musculature so as to stimulate muscle power and strength adaptation. Two control groups performing only continuous endurance training or a constant quantity and intensity of training is tested before and after the intervention period to check for training cross-talk and changes in performance that could be related to the test design, respectively.

Thus, the aim of this intervention study was to design hybrid training that improved endurance (here represented by an increase in VO_{2peak}) and muscle power i.e. to overcome a larger braking force of a cycle ergometer at a given pedal rate, which is also an expression of increase in strength. The research hypothesis was that hybrid training in this form can sufficiently stimulate the development of both VO_{2peak} and muscle power. If this is the case, both will increase significantly after five weeks of hybrid training.

Materials and Methods

Participants. Twenty-six habitually active female physical-education students volunteered to participate. Their informed consent was obtained and the study procedures were approved by the regional ethics committee. The participants were assigned to one of three groups, a hybrid strength and endurance training group (HT) and two control groups (CON1 and CON2). The participants were assigned to a hybrid training group (HT) or one of two control groups (CON1 or CON2). The inclusion criteria were:

- Female gender, habitually active at an average of about three training sessions per week.
- No history of systematic and extensive strength or aerobic training several times per week during a long period more recently than three months prior to the study.

In addition the participants in the HT and CON1 groups should be willing to train hybrid training or continuous endurance training three times per week for five weeks, i.e. as their main training during the intervention period. They had to agree to avoid other heavy-resistance and high-intensity endurance training at or above the HT training intensity during the intervention period. The participants in the CON2 group were to maintain their normal training routines. There were no significant differences between the groups in age, height, body mass, peak oxygen uptake or maximal pedalling power before the intervention period. One participant withdraws from the study due to illness.

Table 1

Mean (±sd) anthropometric and other data on participants in the intervention group and the control group (BMI – body mass index)

	N	Age (yrs)	Height (m)	Body mass (kg)	VO_{2peak} ($mLO_2 \cdot kg^{-1} \cdot min^{-1}$)	BMI
Hybrid training group (HT)	12	26.2±5.3	1.68±0.05	62 ± 6	44 ± 4	22.1±1.4
Control group 1 (CON1)	9	25.6±4.7	1.69±0.06	65±7	44±5	22.7±1.7
Control group 2 (CON2)	5	27.8±7.6	1.68±0.03	61 ± 6	45 ± 7	21.7±1.8

Apparatus and experimental design

A pre-and post-training test design was used in which peak oxygen uptake and progressive peak power/force production at a constant cadence on a cycle ergometer were determined. Between the pre- and post-tests the participants were randomly assign to five weeks of hybrid training (HT), or

control groups performing continuous endurance training (CON1) or continue with their normal training (CON2).

Before the pre- and post-test the participants were instructed not to train on the test day, eat a heavy meal or smoke later than two hours before testing.

Peak oxygen uptake was determined for all participants while they pedalled on a cycle ergometer (Monark 839E, Monark AB, Vansbro, Sweden) pre-programmed to start at 100 W and to increase power by 10 W each 30 s. The participants were instructed to maintain the cadence at 90 rpm through the whole test to exhaustion or as long as possible. The participants were allowed to stand up pedalling on the cycle ergometer in the end of the test.

Oxygen uptake was recorded online with an automatic ergo-spirometric device (Oxycon Pro, Jaeger GmbH, Hoechberg, Germany). Respired air was sampled from a mixing chamber for measurement of PO_2 and PCO_2. Ventilation was measured with a low-inertia, low resistance, bi-directional rotating turbine flow sensor. Precision gas mixtures (± 0.5% error variability) were used for calibrating the gas analysers. The turbine flow sensors were automatically calibrated. The time delay between the ventilation and gas-concentration signals was measured and compensated for. In a method study by Foss & Hallén (2005) the validity and stability of the Oxycon Pro system was validated against the Douglas bag method over a large range of ventilation, drift during short (25 minutes) time trials as well as long test periods (approximately three months). The results from the validation study (n=18) showed an overall average oxygen uptake 0.8% lower with Oxycon Pro than with the Douglas bag method. During the short-time trial the oxygen uptake recorded with Oxycon Pro gradually changed from 0.5% to1.0% lower than with the Douglas bag method. Over the long test period the difference in average oxygen uptake changed from 1.1-0.5% lower oxygen uptake with Oxycon Pro. The authors concluded that the Oxycon Pro was accurate for measuring oxygen uptake over a large range of ventilations and during short and long test periods.

Heart rate was recorded with a heart-rate monitor (Accurex, Polar Electro OY, Kampele, Finland) together with the rating of perceived exertion on a rating scale (Borg, 1982) during test of VO_{2peak} and by the HT group during training. It was calibrated using lactate standards before each test.

Criteria for reaching VO_{2peak} were: "leveling off" in oxygen uptake and/or respiratory exchange ratio (RER) > 1.1, perceived exertion according

to the rated perceived exertion scale (Borg, 1982) higher than or equal to "very hard" and rate of increase in ventilation.

Power output in a progressive pedalling power and strength test was performed on the Monark 839E cycle ergometer, pre-programmed to start at 100 W and to increase power output by 100 W stepwise every tenth second. The participants were instructed to remain seated and to pedalling at 90 rpm with increasing power output (i.e. increasing braking force) for as long as possible. The mean duration was designed to be maximally approximately 40 seconds with a relatively low power output the first 20 seconds (100-300W). As the subjects kept a constant pedalling rate the progressively increasing power output in the test will be proportional to an increase in force output. In a *post hoc* method study eight female, habitually active physical-education students performed a test and re-test of the progressive pedalling power and strength test as described above. The average relative difference was less than 0.5%. A paired *t* test (95% confidence interval) revealed no significant difference (p=0.645). The correlation coefficient between the test and re-test results was 0.984.

The training period lasted for five weeks with three sessions per week. Each session consisted of a five-minute sub-maximal warming up period on a cycle ergometer for all subjects in the intervention group. In each training session the CON1 group pedalled on a pre-programmed cycle ergometer (Monark 839E, Monark, Vansbro, Sweden) at 70-75% of VO_{2peak} continuously for 30 minutes. In each training session the HT group pedalled on a pre-programmed cycle ergometer (Monark 839E, Monark, Vansbro, Sweden) at a mean oxygen uptake of (70-75% of VO_{2peak}) for 30 minutes, but the training time was divided into 60 intermittent, six-second work periods at a very high relative intensity (approximately 190% of VO_{2peak}) interspersed with low-intensity work periods (24 seconds) at about 45% VO_{2peak}.

The calculation of work load during hybrid training was based on the linear relationship between oxygen uptake and power during pedalling on a Monark cycle ergometer (Åstrand & Rodahl, 1986). Power with respect to each mL oxygen uptake was calculated to 0.070579 W. The maximum oxygen uptake for each participant in the HT group was recalculated in watts at 45, 190 and 70-75% of VO_{2peak}.

To check that the relative muscular activation level was high enough during the hybrid training, a control study was performed on one participant. In this study the myo-electrical activity in m. vastus lateralis on the right leg was recorded with surface EMG (Type SX230, Biometrics Ltd, Gwent, UK). An electrogoniometer was taped over the right knee to serve as

a kinematic reference to the muscular activation. This allowed the mean EMG activation level during the concentric contraction phase of the right m. vastus lateralis to be determined in each pedalling cycle. Mean EMG was obtained during the high-intensity "strength training" phase (6 s) in the hybrid training (190% VO_{2peak}), during continuous cycling (75% VO_{2peak}) as well as during the maximal power test on the cycle ergometer. In addition, EMG was obtained during squat 1RM as well as 60, 70, 80% 1RM and maximal counter-movement jumps with arm swing (CMJa). This control study indicated that the high-intensity phase in hybrid training activated m. vastus lateralis to a large relative extent (87%) with respect to the squat 1RM. The progressive power test at peak power and CMJa with respect to squat 1RM was 77 and 85 %, respectively. The mean EMG activation level during continuous pedalling at 75% of VO_{2peak} was 62% of squat 1RM activation. The activation level at 60, 70 and 80% of squat 1RM corresponded to 65, 70 and 78% EMG activation level compared to squat 1RM (100%).

After each training session the participants in the intervention group continued to pedal at a low power level for five minutes to cool down. In each training session they recorded power output, heart rate and perceived exertion in ventilation effort and in leg muscles. Every participant also documented training performed in addition to the study and this was checked by the experimenters with no remarks.

Statistics

Conventional statistical methods were used to calculate means, ranges and standard deviations (sd). Differences between the training group and the control group concerning peak oxygen uptake and pedalling power were tested with ANOVA for repeated measures using an alpha level of 0.05 to assume statistical significance. Post hoc comparisons were made using the Tukey procedure. To test differences in peak oxygen uptake and power performance within the HT and Con group pre and post training, a dependent *t* test was used. The threshold for keeping overall risk of type I error equal to 0.05 for two comparisons was here set at 0.03. Effect size (ES) was calculated (Cohen, 1969) for the intervention and control groups by dividing the difference between pre-and post-training period means by the standard deviation (pooled standard deviation). ES >0.8, 0.5 and 0.2 were considered as large, moderate and small, respectively.

Results

There was no significant difference between the HT, CON1 and CON2 groups in peak oxygen uptake or maximal power after the pre-test, i.e. before the training period.

Peak oxygen uptake increased by 7.8 and 10.7% in the HT and CON1 groups, respectively. The increase was significant ($p<0.03$). The CON2 group showed somewhat lower but not significantly different values at the post-test (-2.9 %) compared to the pre-test. Power output in the progressive pedalling power/strength test in the HT and CON1 groups increased by 6.0% and 4.3%, respectively. The increase was significant ($p<0.03$) for the HT group, but not for the CON1 group. The CON2 group showed somewhat lower values at the post-test (-1.5 %) but they were not significantly different from the pre-test (Figure 1).

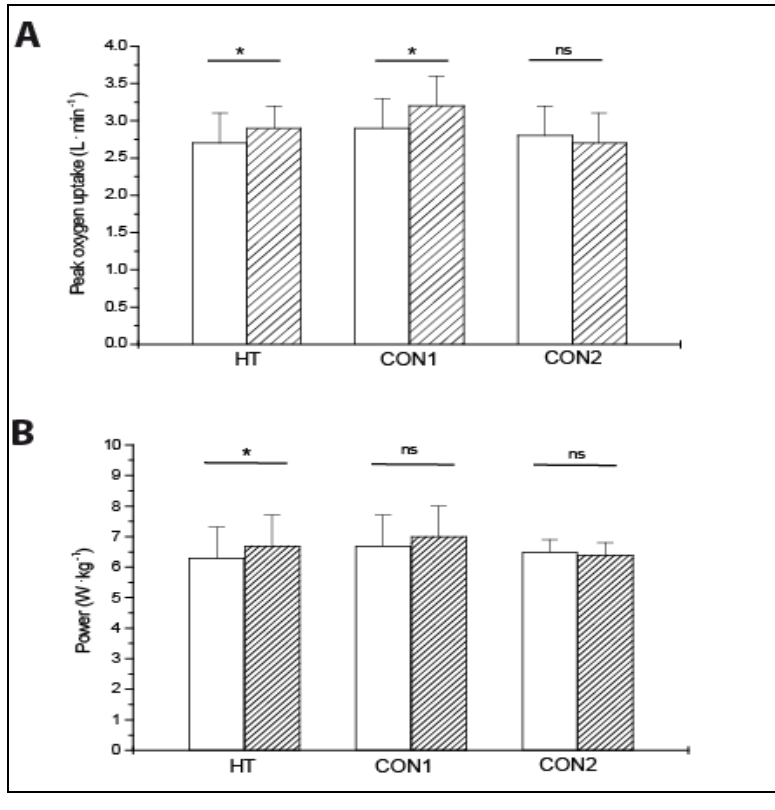


Figure 1. Mean (+sd) peak oxygen uptake (A) and power output in the progressive power/strength test (B) for the hybrid (HT) and control groups CON1 and CON2. White bars denote pre-test and hatched bars denote post training (post-test) values. * and ns denote significant ($P<0.03$) and non-significant differences, respectively.

The effect size for HT group concerning pre-and post-test peak oxygen uptake were 0.6. The effect size for the CON1 and CON2 was 0.8 and -0.3, respectively. The effect size for HT concerning power output in the progressive power pre and post-test was 0.4. The effect size for the CON1 and CON2 group was 0.3 and -0.3, respectively.

Discussion

The novelty in the present results is that muscle power and peak oxygen uptake can improve significantly in the same exercise and training session repeated three times per week for five weeks, which confirm the research hypothesis. Thus, hybrid training allows, at least, two capacities representing essentially two different energy systems to improve significantly as a result of training in the same training exercise in repeated training sessions at least in the present population.

Thus, we conclude that systems that stimulate the development of muscle power and oxygen uptake (aerobic power) can function in parallel over time, which is supported by previous results from concurrent training (e.g. Bell et al., 1991; Hickson, 1980; Hortobagyi et al.. 1991; Hunter et al., 1987; McCarthy et al., 2002; Sale et al., 1990; Shaw et al., 2009).

The populations (HT, CON1 and CON2) in this study consisted of habitually active females with a peak oxygen uptake at about $45mLO_2 \cdot kg^{-1} \cdot min^{-1}$. This is a somewhat higher average peak oxygen uptake than the average woman of the same age has, which is about $40mLO_2 \cdot kg^{-1} \cdot min^{-1}$ (Wilmore & Costill, 1994). However, the average maximal oxygen uptake among elite female athletes in endurance sports is about $60mLO_2 \cdot kg^{-1} \cdot min^{-1}$ (Ibid.), which indicates that the present population more resembled the average woman than the elite endurance female athlete with respect to peak oxygen uptake. No comparison of power performance is available. While the present results show that hybrid training was performed successfully in the present population, it is reasonable to assume that relative training intensity level and training quantity must be specifically adjusted to the fitness level of the population. Future research is needed to further clarify these issues.

Stimuli for improving peak oxygen uptake and strength were obviously present in the hybrid training. The mean relative level of oxygen uptake during training was increased progressively from 70 – 75% during the training period, as controlled and verified by the experimenters. The activation of the leg extensor muscles during short but high-intensity work bouts (6s) in the hybrid training group was obviously high enough to stimulate improvement in muscle power. The control study on one participant showed that the mean EMG activation level of m. vastus lateralis

during the high-intensity work bouts (6s) was 87% of that during 1RM squats. This relative activation level is higher than we found in the control study for the relative loads in squats of approximately 70% of 1RM required for strength development suggested by McDonagh & Davies (1984). This also supports the impression of high relative muscle activation and tension during high-intensity pedalling in the hybrid training group.

The hybrid training with repeated short work bouts of very high intensity may induce fatigue in the quadriceps muscles. Rooney and co-workers (1994) proposed that fatigue contributes as a strength-training stimulus. The ratio between high-intensity work bouts and intensity level with respect to periods of lower work intensity may be adjusted to further boost the development of strength. The results that show an increased expression in the key regulator of mitochondrial biogenesis PGC-1α (Wang et al., 2009; Psilander et al., 2010; Wang et al., 2011) support the results obtained in the present study. Thus, there can be stimulation factors for adaptation that are shared in the hybrid training concept. However, the optimal combination of intensity and duration in training prescription are still under debate and should be in focus for future research (Bishop et al., 2014).

It is thus obvious that the main issue during hybrid training is not how to maximize load to develop a single capacity but to find an exercise and training intensity level that simultaneously stimulates the development of two or more physical capacities i.e. to find intensity and activation levels that allow mutual simultaneous adaptation to training. The ultimate development of two very different capacities like oxygen uptake and power/strength will each contradict the other's function due to built-in morphological and physiological conflicts. One example of this is muscle mass versus mitochondrial density and oxygen diffusion (MacDougall et al., 1979; Wernblom et al., 2007). The objective of maximizing both strength through neural adaptation and hypertrophy and aerobic endurance in terms of maximum oxygen uptake will, at a certain point of large training volumes, inevitably lead to a conflict in training time and time for recovery. In addition, the attempt to maximize strength and endurance simultaneously may be questioned. This is because strength in association with hypertrophied muscles and endurance is not an optimal combination for performance – at least not in endurance sports where the body mass has to be carried by the athlete. This means that there are built-in limitations and conflicts in attempts to maximize these two different capacities for a given athlete during a given period. A critical question about hybrid training is why one should mix the training of two or more physical capacities in a

hybrid training session with the risk of intensity reduction in the stimulation of a single capacity. There are at least three answers to this question. First, hybrid training allows the athlete to gain time. Parts of an endurance training session can be performed at such high intensity and muscular tension/activation that they also allow a strength or power gain. Secondly, an additional adjustment of work intensity and duration, causing a certain muscle fatigue, may further boost the strength gain (Rooney et al., 1994) without decreasing the quantity of endurance training. Thirdly, in numerous sports strength and endurance are used simultaneously during performance of a specific technique, which fits well with the hybrid training concept.

The single capacity conventional training can be combined with hybrid training in separate training sessions. This allows athletes during a training period to mix training sessions focusing on very high intensity levels for single capacities with sessions of hybrid training in which two or more capacities are trained simultaneously but at a somewhat lower average intensity level. In certain training periods, different combinations of training design can be used, emphasizing different types and periodization of training. In the present investigation a training period of only five weeks hybrid training was tested with significant results of improvement. This information can be used by the coach and athlete when designing training in certain sports where at least two physical capacities contribute simultaneously to the end result. Thus, the main focus in hybrid training is to find the right balance in training intensity level in the physical capacities being simultaneously trained, allowing them to reach a relative intensity level that stimulates an increase in development. This is a different view with respect to conventional training that tries to optimize every single capacity in separate sessions.

Conclusions

The results from the present investigation show that peak oxygen uptake and muscle power/strength can be trained successfully with hybrid training. Hybrid training is suitable in complex training forms specific to the target sports, and also allows e.g. maximal oxygen uptake and strength to be trained simultaneously with the sport-specific technique. The combined training of several physical capacities simultaneously allows a considerable gain in training time and thus time for recovery.

References

1. Balabinis, C.P., Psarakis, C.H., Moluccas, M., Vassiliou, M.P., & Behrakis, P.K. (2003). Early phase changes by concurrent endurance and strength training. *J Strength Cond Res* 17:393-401.

2. Bell, G.J., Petersen, S.R., Wessel, J., Bagnall, K., & Quinney, H.A. (1991). Physiological adaptations to concurrent endurance training and low velocity resistance training. *Int. J. Sports Med*. 12: 384-390.
3. Bishop, D.J., Granata, C., & Eynon, N. (2014). Can we optimize the exercise training prescription to maximize improvements in mitochondria function and content? *Bioch Biophys Acta*, 1840, 1266-1275.
4. Borg, G.A. (1982). Psychophysical bases of perceived exertion. *Med Sci Sports Exerc* 14:3 77-381.
5. Cohen, J. (1969). *Statistical power analysis for the behavioural sciences*. New York: Academic Press.
6. Costill, D.L. (1967). The relationship between selected physiological variables and distance running performance. *J Sports Med Phys Fitness* 7:61-66.
7. Chromiak, J.A., & Mulvaney, D.R. (1990). A review: the effects of combined strength and endurance training on strength development. *J Appl Sport Science Res* 4: 55-60.
8. Dudley, G.A., & Djamil, R. (1985). Incompatibility of endurance and strength training modes of exercise. *J Appl Physiol*, 59 (5), 1446-1451.
9. Foss, Ö., & Hallén, J. (2005). Validity and stability of a computerized metabolic system with mixin chamber. *Int J Sports Med*, 26: 569-575.
10. Hickson, R.C., Rosenkoetter, M.A., & Brown, M.M. (1980). Strength training effects on aerobic power and short-term endurance. *Med Sci Sports & Exerc*, 12, 336-339.
11. Hickson, R.C. (1980). Interference of strength development by simultaneously training for strength and endurance. *Eur J Appl Physiol & Occup Physiol*, 45, 255-263.
12. Hortobagyi, T., Katch, F.I., & Lachance, P.F. (1991). Effects of simultaneous training for strength and endurance on upper and lower body strength and running performance. *J Sports Med Phys Fitness* 31: 20-30.
13. Hunter, G., Demment, R., & Miller, D. (1987). Development of strength and maximum oxygen uptake during simultaneous training for strength and endurance. *J Sports Med Phys Fitness* 27: 269-275.
14. Izquierdo, M., Hakkinen, K., Ibanez, J., Kraemer, W.J., & Gorostiaga, E.M. (2005). Effects of combined resistance and cardiovascular training on strength, power, muscle cross-sectional area, and endurance markers in rniddle-aged men. *Eur J Appl Physiol*, 94:70- 75.
15. Kraemer, W.J., Patton, J.F., Gordon, S.E., Harman, E.A., Desehenes, M.R., Reynolds, K., Newton, R.U., Triplett, N.T., & Dziados, J.E. (1995). Compatibility of High-Intensity Strength and Endurance Training on Hormonal and Skeletal-Muscle Adaptations. *J Appl Physiol* 78: 976-989.
16. Leveritt, M., Abernethy, P.J., Barry, B., & Logan, P.A. (2003). Concurrent strength and endurance training: The influence of dependent variable selection. *J Strength Cond Res* 17:503-508.

17. McCarthy, J.P., Pozniak, M.A., & Agre J.C. (2002). Neuromuscular adaptations to concurrent strength and endurance training. *Med Sci Sports Exerc* 34:511-519.
18. McDonagh, M.J.N., & Davies, C.T.M. (1984). Adaptive responses of mammalian skeletal muscle to exercise with high 1oads. *Eur J Appl Physiol*, 52, 139-155.
19. MacDougall, J.D., Sale, D.G., Moroz, J.P., Elder, G.C.B. & Surter, J.R. (1979). Mitochondrial volume density in human skeletal muscle following heavy resistance training. *Med Sci Sports & Exerc*, 11, 164-166.
20. Nilsson, J. (1998). Puls- och laktatbaserad träning. SISU Idrottsböcker & Olympic Support, Stockholm.
21. Psilander, N., Wang, L., Westergren, J., Tonkonogi, M., & Sahlin, K. (2010). Mitochondrial gene expression in elite cyclists: effects of high intensity exercise. *Eur J Appl Physiol*. 110(3): 597-606.
22. Rooney, K.J., Herbert, R.D., & Balnave, R.J. (1994). Fatigue contributes to the strength training stimulus. *Med Sci Sports & Exerc*, Vol. 26, No. 9, 1160-1164.
23. Sale, D.G., MacDougall, J.D., Jacobs, I., & Garner, S. (1990). Interaction between concurrent strength and endurance training. *J Appl Physiol* 68(1): 260-270.
24. Shaw, B.S., Shaw, I., & Brown, G.A. (2009). Comparison of Resistance and Concurrent Resistance and Endurance Training Regimes in the Development of Strength. *J Strength Cond Res* 23:2507-2514.
25. Wang, L., Psilander, N., Tonkonogi, M., Ding, S., & Sahlin, K. (2009). Similar expression of oxidative genes after interval and continous exercise. *Med Sci Sports Exerc.* 41(12):2136-44.
26. Wang, L., Mascher, H., Psilander, N., Blomstrand, E., & Sahlin, K. (2011). Resistance exercise enhances the molecular signaling of mitochondrial biogenesis induced by endurance. *J Appl Physiol.* 111(5):1335-44.
27. Wernbom, M., Augustsson, J., & Thomee, R. (2007). The influence of frequency, intensity, volume and mode of strength training on whole muscle cross-sectional area in humans. *Sport Med* 37:225-264.
28. Widrick, J.J., Trappe, S.W., Diaser, C.A., Costill, D.L., & Fitts, R.H. (1996A). Isometric force and maximal shortening velocity of single muscle fibers from elite master runners. *Am J Physiol* 271:C666-C675.
29. Widrick, J.J., Trappe, S.W., Costill, D.L., & Fitts, R.H. (1996B). Force-velocity and force-power properties of single muscle fibers from elite master runners and sedentary men. *Am J physiol* 271:C676-C683.
30. Wilmore, J.H., & Costill, D.L. (1994). *Physiology of sport and exercise*. Champaign, IL: Human Kinetics.
31. Åstrand, P.-O., & Rodahl, K. (1986). Textbook of work physiology. McGraw-Hill. 3rd edition.

Submitted: March 23, 2015
Accepted: June 12, 2015

ORIGINAL RESEARCH PAPER

INFLUENCE OF EXCHANGED NEUROMUSCULAR REGULATION OF M.GASTROCNEMIUS ON LEG BLOODFLOW REGULATION DURING STATIC VOLUNTARY CONTRACTION OF KNEE FLEXORS

Una Gavrona[1], Alvis Paeglītis[1], Normunds Vārpa[1], Zinta Galeja[1]
Vilnis Dzērve[2], Indulis Kukulis[2]
[1]Latvian Academy of Sport Education,
Adress: 333 Brivibas Street, Riga, LV 1006, Latvia
Phone: +371 29117339
E-mail: Alvis.Paeglitis@lspa.lv
[2]Research Institute of Cardiology of University of Latvia,
Adress: 13 Pilsonu Street, Riga, LV 1002 Latvia
Phone: +371 29243397
E-mail : dzerve@lki.eunet.lv

Abstract

In literature from 1970th are described experimentaly proved concept of muscle local blood flow redistribution to capillaries feeding active muscle fibres, and loss of this synhrone blood flow redistribution with changes of recruited motor units, caused by mechanical, metabolic or neural regulatory disturbances. On the other hand, from theory of applied kinesiology (AK) it is known that different external or internal challenges coud exchenge neuromuscular regulation and muscle could become weak-testing or become hypertonic. The physiological background of these changes is not jet known. The aim of this study is to find out connections between muscle`s neuromuscular regulation and its local blood flow regulation. We investigate blood flow regulation in the leg during static voluntary contraction with contraction force 5% of the knee flexor muscle maximal static voluntary contraction (MVC) in position with knee flexed till 60 deg. In this experiment participate 8 LASE students in age 22-24 with normotonic m. gastrocnemius and 8 LASE students in age 22-26 with weak-tested m. gastrocnemius. Muscle tests were performed according AK testing methode (Frost, 2002.). Leg blood flow was measured with a mercury-in-silastic strain-gauge plethismograph, using the venous-occlusion plethismography Hokanson AI6 (Hokanson, Sumner and Strandness, 1975*). Cycle of leg blood flow measurement was 15 seconds repeated twice in every controled minute. Student paired t-test was used to evaluate diferences in the results of blood flow measurements from strong tested and weak tested leg muscles. We find statistically significant (P>95) differences*

of volume blood flow regulation in muscles triceps surae during static contraction with contracting force of knee flexors 5% MVC. Volume blood flow in leg with exchanged neuromuscular regulation of knee flexors where statisticaly higher neither blood floww in leg with normal neuromuscuular regulation. These differences was observed all the time of the static contraction. Changes of neuromuscular regulation could cause muscles local blood flow regulatory disturbances. Character of muscle local blood flow could be a quantitatively measurable parameter which reflects changes of neuromuscular regulatory processes of studied muscle.

Key words: *Weak-tested muscle, prolonged static contraction, muscle local blood flow.*

Introduction

In literature it is known that different muscle cells have different activity of oxidative phosphorilatin and it is known that during light till sub maximal muscle contractions there are active only definite part of all muscle motor units. Simultaneous activity of all motor units is described in literature during maximal voluntary contractions (Skards, Dzerve, 1971) In addition, it is known that during muscle contraction increases intramuscular pressure which reduce muscle`s blood supply (Skards, Dzerve, 1973[a]). It means that metabolic activity of muscle cells during static voluntary contraction even in one separate muscle differs. If $VO_2$ rate differs between muscle`s motor units, then blood flow through capillaries supplying muscle cells must be regulated according to their metabolic activity. In literature from 1970th are described experimentally proved concept of muscle local blood flow redistribution to capillaries feeding active muscle fibres (Паэглитис, 1986; Skards, Paeglitis, Dzerve, Eglitis, Matisone, 1992; Matisone, Skards, Paeglitis, Dzerve 1996) For example during 10%MVC it was shown that I, VO_2, La and CFC till the cessation of exercise caused by exhaustion which takes 42±1.1min stabilizes on appropriate level not reaching maximal possible values. Tacking in account results of the first part of experiment it could be stated that during prolonged contraction with 10%MVC where contraction force was maintained by appropriate amount and loos of this synchronic blood flow redistribution with changes of recruited motor units, of motor units which during contraction changes recruiting new not fatigued motor units blood flow also was distributed not through all the muscle, but through capillaries feeding active muscle fibres. It is obvious also from dynamics of CFC which characterises the number of opened capillaries and which level during

prolonged contraction stays on steady state level not reaching maximal values..

It is also shown that loss of this synchronic blood flow redistribution could be caused with changes of number of recruited motor units (Паэглитис, 1986; Paeglitis, Kukulis, Eglitis, Galeja, 2014). Increasing static voluntary contraction force only for 5% it is to 15%MVC all examined parameters during exercise till exhaustion which takes 12±0.8 min, increases and at moment of cessation of exercise reaches their maximal values. It means that during fatiguing one portion of motor units are switched off and recruits next portion of motor units and the blood flow through capillaries feeding this part of motor unit's remains opened and in addition there are opened new capillaries feeding newly recruited motor units. In the end of contraction there are opened all capillaries and blood flow through the muscle reaches its maximal values. In spite of increasing VO_2 there is activated anaerobic glycolisis which characterises with increasing delivery of La. Increasing of blood supply and VO_2 during 15% MVC did not provide prolonged forearm contraction and exhaustion occurs more than 3 times quicker neither during 10%MVC. Loos of this synchronic blood flow redistribution with continuously increasing of local blood flow during contraction could be observed in situations linked with mechanical, metabolic or neural regulatory disturbances (Skards, Paeglitis, 1985; Паэглитис, 1986). On the other hand, from theory of applied kinesiology (AK) (Walther, 2000; Frost, 2002; Rosner, Cuthbert, 2012) it is known that different external or internal challenges could exchange neuromuscular regulation and muscle could become weak-testing or become hypertonic. The physiological background of these changes is not jet known. We consider that any exchanges of neuromuscular regulation would be connected with changes of functional state of any organ or system of the body. The aim of this study is to find out connections between muscle`s neuromuscular regulation and its local blood flow regulation. It gives the opportunity to approve the qualitatively results of AK tests with quantitatively measured values.

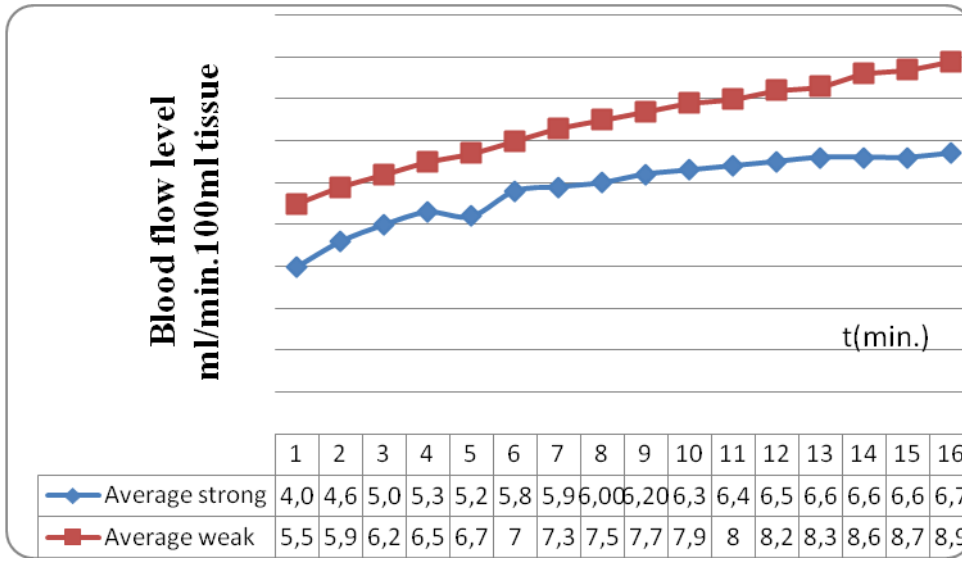
Material and methods

We investigate blood flow regulation in the leg during static voluntary contraction with contraction force 5% of the knee flexor muscle maximal static voluntary contraction (MVC) in position with knee flexed till 60 deg. All participants were examined in prone position. In this experiment participate 8 LASE students in age 22-24 with normotonic m. gastrocnemius and 8 LASE students in age 22-26 with weak-tested m. gastrocnemius. Muscle tests were performed according AK testing methode (Frost 2002;

Ramšak, Gerz, 2005) in prone position. MVC was measured with electrical dynamometer Lafayette Instrument (model 01165 Manual Muscle Tester). Angle of knee flexion was measured by goniometer Basoline AcuAngle Inclinometer Japan. Leg blood flow was measured with a mercury-in-silastic strain-gauge plethismograph, using the venous-occlusion plethismography Hokanson AI6 (Hokanson, Sumner, Strandness, 1975). Leg blood flow (ml/min per 100ml of leg volume) was calculated from the rate of the increase in leg volume, whereas venous return from the leg was prevented by inflation of a cuff on the thigh. The pressure in the venous – occlusion or congesting cuff was 40mmHg. Circulation to the foot was arrested by inflating to the 160mmHg a cuff placed around the lover part of the leg. A mercury-in-silastic strain-gauge was placed around the widest part of the leg around the belly of gastrocnemius to measure changes in leg volume resulting from changes in blood flow. Cycle of leg blood flow measurement was 15s repeated twice in every controled minute. Student paired t-test was used to evaluate diferences in the results of blood flow measurements from strong tested and weak tested leg muscles. A level of $\alpha \leq 0.05$ was selected to indicate statistical significance.

Results

We find statistically significant (P> 95) differences of volume blood flow regulation in muscles triceps surae with and without exchanged neuromuscular regulation during static contraction with contracting force of knee flexors 5%MVC. Volume blood flow in leg with exchanged neuromuscular regulation of knee flexors where statistically higher neither blood flow in leg with normal neuromuscular regulation. These statistically significant differences were observed all the time of the static contraction. Analysing character of blood flow curves it is obvious that dynamics of blood flow changes in functionally normal triceps surae muscles during static voluntary contraction of knee flexors shows steady-state on the blood flow level 6.5ml/min.100ml tissue, but in triceps surae muscles with exchanged neuromuscular regulation blood flow dynamics during static voluntary contraction of knee flexors increases continuously during all the time of static contraction.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Average strong	4,0	4,6	5,0	5,3	5,2	5,8	5,9	6,00	6,20	6,3	6,4	6,5	6,6	6,6	6,6	6,7
Average weak	5,5	5,9	6,2	6,5	6,7	7	7,3	7,5	7,7	7,9	8	8,2	8,3	8,6	8,7	8,9

Figure 1. Dynamics of volume blood flow in m. triceps surae during 16min static contraction of knee flexors with ( ) and without ( ) exchanged neuromuscular regulation

Discussion

Comparing obtained results with such published in literature the values of volume blood flow are similar (Skards, Dzerve, 1973[b]; Паэглитис, 1986). It means that blood flow realises through small part of all capillaries because all capillary dilatation gives volume blood flow approximately 30ml/min/100ml. In functionally normal triceps surae stabilisation of volume blood flow during prolonged static contraction is in conformity with theory of blood flow redistribution through capillaries feeding active muscle fibres (Паэглитис, 1986). In literature is discussed role of vegetative nervous system providing local muscle blood flow regulation (Saito, Kagaya, Ogita Shinohara, 1992). Inability to stabilise blood flow during prolonged static contraction in literature is explained as uncoordination between regulatory processes of somatic and vegetative nervous systems (Skards, Paeglitis, 1985; Паэглитис, 1986). Anyway, exchanged neuromuscular regulation is connected with disturbances in regulatory possibilities of vegetative nervous system and as it is so, then such a situation is also connected with inability to stabilise muscles local blood flow.

Conclusions

Changes of neuromuscular regulation could cause muscles local blood flow regulatory disturbances. Character of muscle local blood flow could be a quantitatively measurable parameter which reflects changes of neuromuscular regulatory processes of studied muscle.

References

1. Frost, R. (2002). *Applied Kinesiology*. North Atlantic Books. 272p.
2. Hokanson, D.E., Sumner, D.S., & Strandness, Jr.D.E. (1975). An electrically calibrated plethysmograph for direct measurement of limb blood flow. *I.E.E.E. Trans. Biomed. Eng.* 22, 25-29.
3. Matisone, D., Skards, J., Paeglitis, A., & Dzerve, V. (1996). Phosphocreatine as an energy store and energy shuttle in human skeletal muscles. In: Physiology and pathophysiology of exercise tolerance. Ed. by J. M. Steinacker and S. A. Ward. Plenum Press, N-Y.75-80.
4. Paeglitis, A., Kukulis, I., Eglitis, E., & Galeja, Z. (2014). Muscle blood supply during prolonged static voluntary contractions. *LASE J.of Sport Sci.* 5(1), 9-13.
5. Ramšak, I., & Gerz, W. (2005). *AK muscle tests at a glance*. West Sussex: AKSE. 158p.
6. Rosner, A., & Cuthbert, S.C. (2012). Applied kinesiology: Distinctions in its definition and interpretion. *Journal of Bodywork and Movement Therapies*, 16, 464-487.
7. Saito, M., Kagaya, A., Ogita, F., & Shinohara, M. (1992). Changes in musclesympathetic nerve activity and calf blood flow during combined leg and forearm exercise. *Acta Physiol. Scand.*, 146, 449-456.
8. Skards, J.V., & Dzerve, V.J., (1971). Relationship between forearm static contraction force and progression of fatique. *News of Latv.SSR Academ. Sci.* (2), 107-112 [In Russian].
9. Skards, J.V., & Dzerve, V.J. (1973[a]). Mechanical influence of contracting forearm and leg muscles to their vascular system. *News of Latv.SSR Academ. Sci.* (1), 66-72 [In Russian].
10. Skards, J.V., & Dzerve, V.J., (1973[b]). The blood supply of forearm and leg muscles during static contraction. *News of Latv.SSR Academ. Sci*. (5), 83- 87 [In Russian].
11. Skards, J.V., & Paeglitis, A.O. (1985). Factors hindering redistribution of blood flow in skeletal muscles. In: Regulatory mechanisms of blood flow in skeletal muscles. Riga, „Zinatne"., 108-113 [In Russian].
12. Skards, J., Paeglitis, A., Dzerve, V., Eglitis, E., & Matisone, D. (1992). Blood supply and energetic of skeletal muscle of forearm during voluntary static contraction. *Clin. Physiol.*,(12), 345-346.

13. Walther, D.S. (2000). *Applied Kinesiology.* USA: ICAK. 615p.

Z. Galeja, A.Paeglītis article has been developed by ESF support within the project "Support for Sport Science" Nr. 2009/0155/1DP/1.1.2.1.2/09/IPIA/VIAA/010 work programme „Human resources and Employment" 1.1.2.1.2. Sub-activity „Support to Implementation of Doctoral Study Programme"

INVESTING IN YOUR FUTURE

ESF EIROPAS SOCIĀLAIS FONDS

Latvijas Sporta pedagoģijas akadēmija

Submitted: April 7, 2015
Accepted: June 12, 2015

ORIGINAL RESEARCH PAPER

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND THE OBJECTIVE INDICATORS OF PHYSICAL CAPITAL FOR WOMEN IN FITNESS

Aleksandra Čuprika, Andra Fernāte, Leonīds Čupriks

Latvian Academy of Sport Education
Address: 333 Brivibas Street, Riga, LV-1006, Latvia
E-mail: Aleksandra.cuprika@lspa.lv

Abstract

As it is mentioned in the action direction Healthy and Workable Individual of the National Development Plan of Latvia 2012 –2020: 30% of all the dead in Latvia have lost their life at the age of being able to work. The main causes of death rate are different diseases (cardio-vascular a.o.), as well as outer death causes (injuries) (Pudule et al, 2012; Štale et al, 2013). Only 8% of the EU and 6% of the Latvian population regularly perform moderate and very difficult physical activity (PA) (Eurobarometer, 2013). Therefore it is necessary to implement purposeful and effective health promoting and risk limiting events to develop the physical capital of one. The understanding of the impact of physical activity on one's physical capital is not well explored in the previous studies (Hutson, 2012; Maguire, 2008; Goldenberg, 2003; Hedblom, 2009). Therefore, the aim of the study is to determine the relationship between PA and the objective indicators of physical capital for women in fitness. In the study voluntarily participated 33 women (30±4.1 years) from 2 fitness clubs in Riga. In order to determine the respondents' objective indicators of physical capital were applied: bioimpedance method (TANITA SC330, Japan, 89/336/EC), heart rate variability analysis data processing software 'Omega', complex load test with expiratory gas analysis (VIASYS Healthcare GMBH, Germany) and Eirofit tests for adults. In order to determine the level of PA the IPAQ (Craig et al, 2003) short version in Latvian (Kaupuzs & Larins, 2010) was used. Descriptive and inferential statistics were made (SPSS ver.18.0). Several moderately close ($0.5<|r_s|<0.69$; $p<0.01$) and close correlations ($0.7<|r_s|<0.99$; $p<0.01$) are determined between the level of PA and indicators of body composition, physical work capacity, physical fitness and functional state of the body. The level of PA has a positive impact on the objective indicators of physical capital. The more physically active the

respondent is, the better physical fitness, higher work capacity, better the indicators of his body composition are and better functional state.

Keywords: *physical activity, physical capital, women in fitness*

Introduction

Nowadays sedentary lifestyle is becoming more and more frequent all over the world, and it causes very big physical and mental health problems (World Health Organization, 2014). Based on 'National Development Plan of Latvia 2012 –2020' 30% of all the dead in Latvia have lost their life at the age of being able to work (National Developmental Plan of Latvia, 2012). The main causes of death rate are different diseases (cardio-vascular, oncologic, mental, loco-motor, a.o.), outer death causes (injuries, accidents, suicides, murders), which often cause the loss of work ability (Pudule et al, 2013; Štāle et al, 2013). As well obesity is one of the most widespread problems. About 25% of children and 40 – 60% of adults in all developed countries suffer from the excess weight which causes physiological and psychological changes of the body and serious health problems (Lobstein, et al., 2004; Brach, et al., 2004; Hills et al., 2013; Ara, et al., 2006). At any age sedentary lifestyle and inappropriate diet increases health problems (Tuyckom et al., 2010). Only 8% of the EU and 6% of the Latvian population regularly perform moderate and very difficult physical activity (PA). 33% in Europe and 25% in Latvia do it with some regularity, 42% in Europe and 39% in Latvia never do physical activities. If we compare genders doing PA, we can see, that 55% of European men and 63% of European women never or seldom do PA. Even worse situation is in Latvia – 66% of men and 71% of women never or seldom do PA (Eurobarometer, 2013).

Therefore it is necessary to implement purposeful and effective health promoting and risk limiting events to strengthen healthy and active lifestyle habit in society by developing health promotion cooperation nets: of healthy diet, active lifestyle and the facilitation of mental health (World Health Organization, 2014). Fitness includes various PA, health improvement programs, innovative technologies, diet programs, whose main principle is health improvement and the development of physical capital.

Shilling (1991) defines physical capital as a social formation of bodies through sport, leisure and other activities. According to Bourdieu, Hutson (2012) defines physical capital as the value assigned to particular modes of embodiment, uses of the body, investment in the body, and interpretations of the body that may be appropriated, exchanged, or

reinvested for additional profit or status in the social group. The term physical capital is characterized by human entity, physical ability and appearance as an attitude towards their own health, which shows each person's knowledge and morality (Hutson, 2013, Jutel & Buetow, 2007; Hamermesh, 2011). Physical ability is defined as the ability to satisfactorily perform physical work. Physical ability is attributable to muscle work needs for employees in their daily work and leisure time (Eurofit for adults – Assessment of health related fitness, 1995). Nowadays, as a result of technology development muscle work is very minimal and does not require much effort, which can lead to a critical level of physical ability. In the study attention is paid not only to physical ability as the physical capital characteristics, but to physical fitness in general. Physical fitness can be judged both as solely the body's physical ability, which is necessary for physical activity performance, and as a health-influencing criterion. As a health-influencing criterion physical fitness is the body's morphological and functional property aggregate (Caspersen et al., 1995), which includes cardiorespiratory work capacity, motor readiness as muscle system's manifestations (strength, muscle endurance, speedy strength), movement coordination, reaction time, flexibility and as an additional indicator of body composition. To be well physically fit means to be healthy. Health-influencing physical fitness is the ability to perform daily activities with effort and skill and to participate in leisure activities without excessive fatigue, as well as to be able to overcome increased physical load caused by emergency situations and to show the ability that reduces early development of diseases caused by immobility (Vanhees et al, 2005; Pate, 1988).

Several studies show correlation between PA, physical fitness (Sloan et al., 2009; Kaupuzs & Larins, 2010; Mammen & Faulkner, 2013; Napolitano et al., 2011 u.c.) and functional ability (Vecenāne & Fernāte, 2013; Edward et al., 2006). PA helps to improve not only the physical components, but also the social and spiritual ones (Mammen & Faulkner, 2013). PA may be defined as any body movement, performed with the help of skeletal muscle, which requires energy consumption (Caspersen et.al, 1995). The term health-enhancing physical activity is frequently used in relation to the health benefits gained from physical activity. It should be understood as any form of physical activity that benefits health and functional capacity without undue harm or risk (HEPA Europe, 2005).

Nowadays, women have to invest more in their bodies than men, which is due to competition in both the labour market, and in everyday life, where a woman strives to be equal to a man (Adelman & Knijnik, 2013; Crossley, 2006). The optimum activity of functional systems of the

women's body is between the ages of 15-25 years (Ory et al., 2003; Vanhees et al, 2005). After reaching this age the aging processes begin to activate in the functional systems, homeostasis is lost. By improving physical fitness as an indicator of physical capital, including cardiorespiratory system's work capacity and body composition, it is possible to increase functional ability and to extend the life of their social activity.

Therefore, the aim of the study is to determine the relationship between PA and the objective indicators of physical capital for women in fitness.

Materials and Methods

In the study voluntarily participated 33 women (in the average age of 29.31 ±1.3 years) from 2 fitness clubs in Riga. In order to solve the study's goal the following methods were applied: bioimpedance method, testing (Eirofit tests and complex load test), heart rate variability method (HRV), International Physical Activity Questionnaire (IPAQ) short version in Latvian, descriptive and inferential statistics methods.

In order to determine the objective indicators of physical capital for women in fitness the following methods were used: testing (Eirofit tests and complex load test), bioimpedance method, and heart rate variability method (HRV).

Motor readiness ability was determined with testing method, with standardized Eirofit tests for adults (Eurofit for adults – Assessment of health related fitness, 1995), which consist of 9 sections, such as: body balance determination test – the flamingo balance test; hand movement speed determination test – the plate tapping test; flexibility determination test – sit-and-reach test; shoulder joint flexibility determination test – shoulder abduction; hip joint flexibility determination test – hip abduction; explosive strength determination test – vertical jump; static strength determination test – the handgrip test; the body strength determination test – sit-ups test and functional strength determination test – the bent arm hang.

Cardiorespiratory system's work capacity was determined with testing method with complex load test with expiratory gas analysis on cardiopulmonary diagnostic device 'Master Screen CPX' (VIASYS Healthcare GMBH, Germany). During this functional diagnostic test complexly established and measured was cardio-vascular and respiratory system's activity during rest, load and recovery time after the load. In addition, during the test the work capacity presented by women was recorder. The load tests were conducted on the spot in the laboratory (physical health, sports medicine and rehabilitation centre), in a specially

equipped room in order to provide emergency aid rendering. The load test was performed under the supervision of a sports doctor and it consists of several phases, the duration of which is determined by the sports doctor, taking into account the person's state of health and physical fitness level. The test contained 4 phases: 1. rest phase; 2. warm-up phase; 3. load phase – gradually increasing physical load; 4. recovery phase. During the load phase each woman performed a gradually increasing load on a veloergometer until exhaustion or the moment of another troublesome reason's emergence. The load intensity starting from the load phase was determined individually as well, which was later increased every one minute by 10 W. The duration of the load phase was dependent on women's physical fitness level.

Indicators of body composition such as muscle mass, the total amount of water, the total amount of water %, bone mass, metabolic age, amount of visceral fat, body mass index, ideal body weight, the degree of obesity, desired amount of body fat and physical activity level were determined with bioimpedance method, body composition analyzer TANITA SC330 (Japan, 89/336/EC).

Functional state was determined with heart rate variability (HRV) analysis data processing software 'Omega'. HRV analysis is based on electrocardiogram RR time interval analysis and feature dynamics, which are visually marked in the cardio interval gram or rhythmogram (see fig.1).

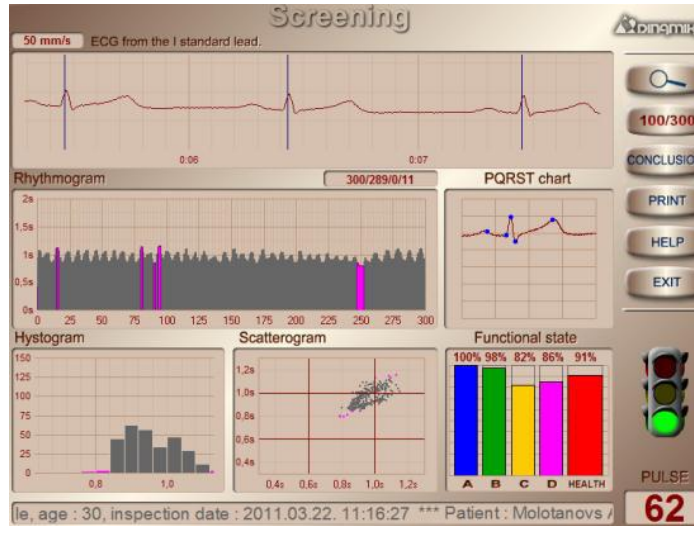


Figure 1. HRV analysis – screening diagnostics
(Научно-исследовательская лаборатория „Динамика", 2002)

Any changes in the body are reflected in heart rate, where in response to the central nervous system impulse reflects the whole body's rhythm. Consequently, on the basis of heart rate dynamics protocol it is possible to determine the functional state of the whole body (Баевский, Иванов & Рыбыкина, 1999; Чуян, Бирюкова & Раваева, 2008). For this study we selected the main indicators of functional state that the data processing software 'Omega' analyzes automatically: 1) (A) parameter (blue) – cardiovascular system's adaptation to the load; 2) (B) parameter (green) – heart training indicator (autonomous regulation of the vegetative system); 3) (C) parameter (yellow) – power supply level of physical loads; 4) (D) parameter (pink) – psycho-emotional state; 5) (C) parameter (red) – physical health indicator, functional state index (see fig.1).

For physical activity amount determination the International Physical Activity Questionnaire's (IPAQ) short version (Craig et.al., 2003) in Latvian (Kaupuzs & Larins, 2010) was used. Respondents marked how much of very difficult or moderately intensive physical activity they have performed over the last 7 days, how much time they spent sitting or walking.

For data analysis SPSS ver.18.0 data processing programme was used. Where descriptive statistics was carried out (frequencies, mode, mean), Kolmogorov-Smirnov criterion and Spearman's rank correlation coefficient was determined.

Results

By summarizing the data, it can be concluded that all respondent's IPAQ questionnaires were valid for data processing. By evaluating the obtained Spearman's rank correlation coefficients (one-tailed), it can be concluded that for each objective indicator of physical capital there are significant relationships with PA.

Several moderately close ($0.4<r_s<0.7$) (Dravnieks, 2012) relationships between PA and motor readiness ability have been determined:

1. Between very difficult PA and motor readiness ability: the more often the respondent performs very difficult PA, the better the balance is (r_s= -.445, $p<0.01$), the better the hip joint flexibility (r_s = .474, $p<0.01$). The longer the respondent performs very difficult PA, the better the hand agility (r_s = -.17, $p<0.01$), flexibility sitting, with arms extending to the feet (r_s = .503, $p<0.01$) and the better the static strength (r_s = .437, $p<0.01$) (fig.2).

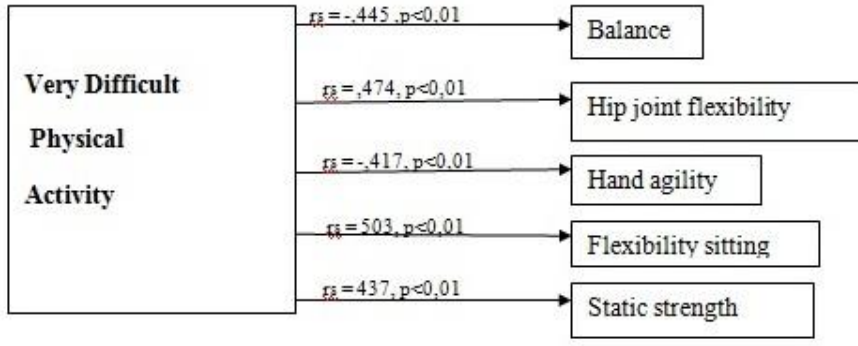


Fig 2. Relationship between very difficult PA and motor readiness ability

2. Between moderate PA and motor readiness ability: the more often the respondent performs moderate PA, the better the functional strength in hang (r_s = .544, p<0.01). The longer the respondent performs moderate PA, the better the balance (r_s = .519, p<0.01).

3. Between walking and motor readiness ability: the more the respondent walks, the better the functional strength (r_s = .500, p<0.01).

4. Between how much time the respondent spends sitting and overall physical fitness: the more time the respondent spends sitting, the worse the hip joint flexibility (r_s = -.541, p<0.01) and the worse the explosive strength in vertical jump (r_s = -.478, p<0.01).

Several moderately close ($0.4<r_s<0.7$) relationships between PA and the respondent's cardiorespiratory system's work capacity have been determined (fig.3):

1. Between moderate PA and physical work capacity: the more often the respondent performs moderate PA, the higher her work capacity is (r_s = .504, p<0.01).

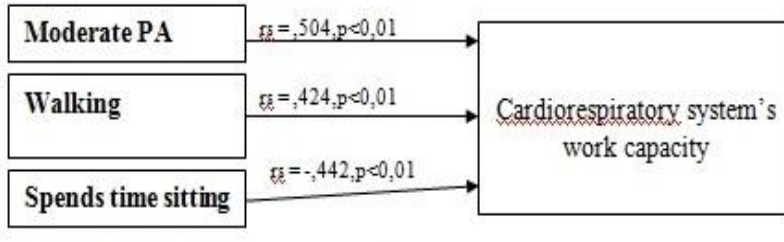


Fig.3. Relationship between PA and cardiorespiratory system's work capacity

2. Between walking and physical work capacity: the more the respondent walks, the better the cardiorespiratory system's work capacity is (r_s = .424, p<0.01).

3. Between the time the respondent spends sitting and cardiorespiratory system's work capacity: the more time the respondent spends sitting, the lower her cardiorespiratory system's work capacity is (r_s = -.442, p<0.01).

Several moderately close (0.4<r_s<0.7) significant relationships between PA and indicators of body composition have been determined:

1. Between walking and indicators of body composition: the longer and more frequently the respondent walks, the lower the body weight (r_s = -.456, p<0.01), the lower the percentage composition of fat (r_s = -.637, p<0.01), the lower the metabolic age (r_s = -542, p<0.01), the lower the visceral fat coefficient (r_s = -700, p<0.01), the higher the water percentage in the body (r_s = .565, p<0.01), the lower the percentage of obesity (r_s = -.548, p<0.01) (fig.4).

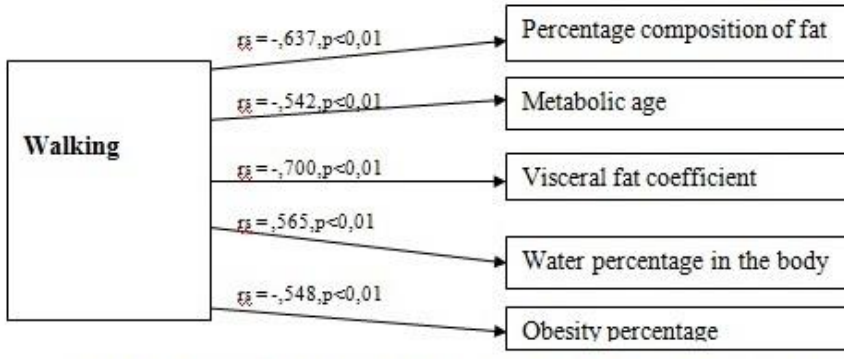


Fig.4. Relationship between PA walking and indicators of body composition

1. Between moderate PA and indicators of body composition: the more often the respondent performs moderate PA, the lower the metabolic age (r_s= -.470, p<0.01), the lower the visceral fat coefficient (r_s = -.431, p<0.01), the lower the obesity percentage is (r_s = -.434, p<0.01).

2. Between very difficult PA and indicators of body composition: the longer the respondent performs very difficult PA, the lower the water percentage in the body (r_s = -.435, p<0.01), the greater the muscle mass (r_s = .554, p<0.01), and, however, then there is a greater body weight (r_s = .550, p<0.01).

Several moderately close and close (r_s>0.7) (Dravnieks, 2012) relationships between PA and functional state have been determined:

1. Between very difficult PA and functional state: the more often the respondent performs very difficult PA, the better the heart training indicator (r_s = .723, p<0.01), physical load power supply level (r_s = .723, p<0.01), the

better psycho-emotional state (r_s = .690, p<0.01), the better physical health indicator (r_s = .729, p<0.01) and the greater the functional state index (r_s = .719, p<0.01).

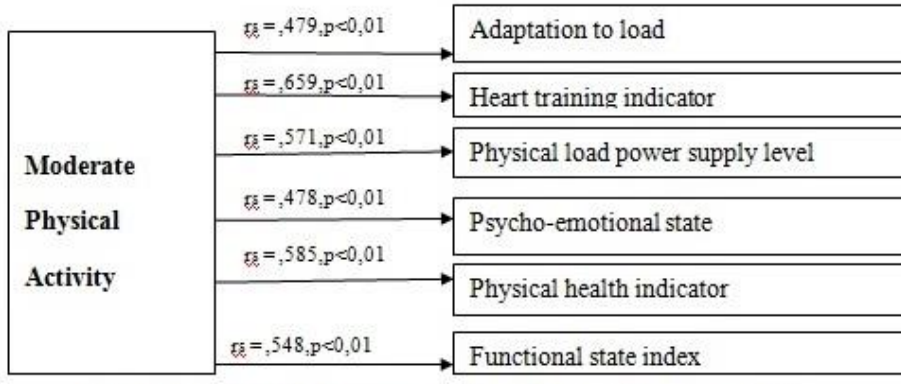


Fig. 5. Relationship between moderate PA and functional state

2. Between moderate PA and functional state: the more the respondent performs moderate PA, the better the adaptation to load (r_s = .479, p<0.01), the better the heart training indicator (r_s = .659, p<0.01), the better the physical load power supply level is (r_s = .571, p<0.01), the better the psycho-emotional state (r_s = .478, p<0.01), the better the physical health indicator (r_s = .585, p<0.01) and a better functional state index (r_s = .548, p<0.01) (fig.5).

Based on the obtained results, it can be concluded that PA has significant relationships with each of objective indicators of physical capital. Several moderately close (0.4<r_s<0.7) significant relationships between PA and indicators of body composition, physical work capacity and motor readiness ability have been determined. Between PA and respondents' functional state moderately close (0.4<r_s<0.7) and close (r_s>0.7) significant relationships were determined. Due to the obtained results we form an understanding of the way how PA influences the objective indicators of physical capital.

Discussion

The study is aimed to determine the relationship between PA and the objective indicators of physical capital. By studying the scientific literature in this field we can conclude that mostly physical capital is viewed as a social aspect. In scientific studies physical capital is characterized indivisibly, as the body's interpretation type, investment in the body, exchange values in social life (Hutson, 2012, 2013) or as the body's social forming through sports and leisure activities (Shilling, 1991), but it is not

precisely described in what way physical capital accumulation takes place. Based on the theory, it can be concluded that one of the measurable indicators that characterize the physical capital is physical ability (Hutson, 2013, Jutel & Buetow, 2007; Hamermesh, 2011). In our study we use a broader concept as the objective indicator of physical capital, physical fitness in general. A number of studies have determined the relationship between a person's PA and physical fitness (Sloan et al., 2009; Kaupuzs & Larins, 2010; Mammen & Faulkner, 2013; Napolitano et al., 2011; Stewart et al, 2003), indicators of body composition (Brach, et al., 2004; Hills et al., 2013; Ara, et al., 2006), functional state (Vecenāne & Fernāte, 2013; Edward et al., 2006). Our study also showed a significant relationship between PA and motor readiness ability, cardiorespiratory system's work capacity, body composition and functional state as the objective indicators of physical capital.

The term physical capital is characterized as a person's attitudes towards their own health, indicator of a person's knowledge and morality (Hutson, 2012, 2013; Shilling, 1991; Hamermesh, 2011). Based on the data obtained during the study, we can hypothetically assume that by performing PA it is possible to influence the physical capital. Taking into account the results obtained during the study, it can be assumed that by measuring the performed PA it is possible to measure a person's investment in the body and the way how the person's body changing process occurs, taking into account the changes of the objective indicators of the person's physical capital.

It has been scientifically proven that physical capital is a symbol of how much time, resources and energy has been invested in each person's body in order to increase their status in the society or to transform it into other types of capital, for instance, economic or cultural (Giddens, 1991; Saguy & Riley, 2005; Bourdieu, 1984). In this study a significant relationship between PA and the objective indicators of physical capital was determined and further all aspects of physical capital accumulation will be explored which will enable the opportunity to analyze the transformation of physical capital into other capitals.

Conclusions

The data obtained during the study show that physical activity has significant relationships with the objective indicators of physical capital, such as physical fitness, including motor readiness ability, cardiorespiratory system's work capacity, body composition and functional state.

Based on the obtained results, it can be concluded that moderate PA has a significant relationship with all objective indicators of physical capital, for instance, the more often the respondent performs moderate PA, the better the functional strength in hang and balance, the higher her cardiorespiratory system's work capacity is, the lower the metabolic age, visceral fat coefficient and obesity percentage is. Moderate PA has a significant relationship with functional ability as well, for example, the more often the respondent performs moderate PA the better the adaptation to the load, the better the indicator of heart training, the better the level of physical load energy supply, the better the psycho-emotional state, the better the physical health indicator and the better the functional state index is.

Furthermore, during the study a significant relationship between walking and physical fitness indicators was determined, for instance, the more the respondent walks, the better the functional strength is, the better the cardiorespiratory system's work capacity, the lower the body weight is, the lower the fat percentage composition, the lower the metabolic age, the lower the visceral fat coefficient, the higher the water percentage in the body and the lower the obesity percentage.

For very difficult PA a significant relationship with physical fitness and functional state has been determined, for example, the more often the respondent performs very difficult PA, the better the balance is, the better the hip joint flexibility, the better the hand agility, flexibility while sitting, with arms extending to the feet and the better the static strength is; the more often the respondent performs very difficult PA, the better the heart training indicator is, the level of physical load energy supply, the better the psycho-emotional state, the better the physical health indicator and the higher the functional state index is. However, during the study it is determined that the longer the respondent performs very difficult PA, the smaller the water percentage in the body is and the greater the body weight is.

The time that the respondent spends sitting has a significant relationship with physical fitness, for example, the longer the respondent sits, the worse the hip joint flexibility is, the worse the explosive strength in vertical jump is and the lower her cardiorespiratory system's work capacity is.

Moderate PA has a significant moderately close relationship with all objective indicators of physical capital. Walking has the largest number of significant moderately close relationships with body composition indicators. Very difficult PA has a closer (r_s>0.7) relationship with functional ability than moderate PA and walking. On the other hand, sedentary lifestyle is related to lower physical fitness indicators.

References

1. Adelman, M., & Knijnik, J. (2013). Gender and Equestrian Sport. Riding Around the World. DOI 10.1007/978-94-007-6824-6_1, Springer Science + Business Media Dordrecht
2. Ara, I., Vicente-Rosdriguez, G., Perez-Gomez, P., Jimenez-Ramirez, J., Serrano-Sanchez, J., Dorado, C., & Calbet, J. (2006). Influence of extracurricular sport activities on body composition and physical fitness in boys: a 3-year longitudinal study. *International Journal of Obesity*, 30, 1062–1071.
3. Bourdieu, P. (1984). Distinction: A social critique of the judgement of taste. Cambridge, MA: *Harvard University Press*.
4. Brach, J., Simonsic, E., Kritchevsky, S., Yaffe, K., & Newman, A. (2004). The Association between Physical Function and Lifestyle Activity and Exercise in the Health, Aging and Body Composition Study. *Journal of the American Geriatrics Society*, 52(4), 502-509.
5. Caspersen, C., Powell, K., & Christenson, G. (1995). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep*, 100(126), 31.
6. Craig, C., Marshall, A., Sjostrom, M., Bauman, A., Booth, M., Ainsworth, B., Pratt, M., Ekelund U., Yngve, A., Sallis J.F., & Oja, P. (2003). International Physical Activity Questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*, 35, 1381-1395.
7. Crossley, N. (2006). Reflexive Embodiment in Contemporary Society: The Body in Late Modern Society. *Open University Press*. ISBN-13: 978-0335216987
8. Dravnieks, J. (2012). MsExcel pievienojumprogramma STATISTIKA 3.1. *Mācību līdzeklis LSPA studentiem*. [MsExcel additional programme STATISTIKA 3.1] Retrieved from: http://runcis.lspa.lv/statistika.pdf
9. Edward, M., James, F., Konopack, E., Katherine, S., Morris, B., & Karl, R. (2006). Physical activity and quality of life in older adults: Influence of health status and self-efficacy. *Annals of Behavioral Medicine*, 31(1), 99-103.
10. Eurobarometer, Sport and physical activities report. (2013). Retrieved from: http://ec.europa.eu/public_opinion/archives/ebs/ebs_412_en.pdf
11. Eurofit for adults – Assessment of health related fitness (1995) ISBN 92-871-2765-4
12. Giddens, A. (1991). Modernity and self-identity: Self and society in the late modern age. Stanford, CA: *Stanford University Press*.
13. Goldenberg, M. (2003). The Body as Capital: Understanding Brazilian Culture. *Vibrant*, 7(1), 220-238. Retrieved from: http://www.vibrant.org.br/issues/v7n1/mirian-goldenberg-the-body-as-capital/
14. Hamermesh, D. S. (2011). Beauty pays: Why attractive people are more successful. Princeton, NJ: *Princeton University Press*.

15. Hedblom, C. (2009). The Body is Made to Move. Stockholm: *Stockholm University.*

16. HEPA Europe (2005). European Network for the Promotion of Health-Enhancing Physical Activity. *Copenhagen, WHO Regional Office for Europe*, Retrieved from: http://www.euro.who.int/hepa/20050708_5.
17. Hills, A., Byrne, N., Lindstrom, R., & Hill, J. (2013). 'Small Changes' to Diet and Physical Activity Behaviors for Weight Management. *The European Journal of Obesity*, 6, 228–238.
18. Hutson, D. (2013). Your body is your business card: Bodily capital and health authority in the fitness industry. *Social Science & Medicine*, 90. p. 63-71. Retrieved from: http://dx.doi.org/10.1016/j.socscimed.2013.05.003
19. Hutson, D. (2012). Training Bodies, Building Status: Health, Physical Capital, and the Negotiation of Difference in the U.S. Fitness Industry. *University of Michigan*, 167.
20. Jutel, A., & Buetow, S. (2007). A picture of health? Unmasking the role of appearance in health. *Perspectives in Biology and Medicine*, 50, 421-434.
21. Kaupuzs A., & Larins V. (2010). Pilot test of International Physical Activity Questionnaire for cultural adaptation in Latvia. *Pedagogical Technologies in Socialization and Resocialization of Society*, 1, 21-27.
22. Kaupužs, A., & Lāriņš, V. (2010). Rēzeknes augstskolas pirmā kursa studentu fiziskā aktivitāte. Sporta izglītības aktualitātes, zinātnisko rakstu krājums, Liepājas Universitāte, Liepāja, 38.-44.lpp.
23. Lobstein, T, Baur, L., & Uauy, R. (2004). Obesity in children and young people. *Obes Rev*, 5, 4–85.
24. Maguire, S. J. (2008). Fit for consumption: Sociology and the business of fitness. New York, *NY: Routledge Taylor Francis Group*.
25. Mammen, G., & Faulkner, G. (2013). Physical activity and the prevention of depression: A systematic review of prospective studies. American Journal of Preventive Medicine, 45(5), 649-657.
26. Napolitano, M., Papandonatos, G., Borradaile, K., Whiteley, J., & Marcus, B. (2011). Effects of weight status and barriers on physical activity adoption among previously inactive women. *Obesity*. 19(11), 2183-2189.
27. National Developmental Plan of Latvia, 2012-2020. (2012). Retrieved from: http://www.nap.lv/images/NAP2020%20dokumenti/20121220_NAP2020_Saeim%C4%81_apstiprin%C4%81ts.pdf
28. Ory, M., Hoffman, M.K., Hawkins, M., Sanner, B., & Mockenhaupt, R. (2003). Challenging aging stereotypes: Strategies for creating a more active society. *American Journal of Preventive Medicine*, Vol.25, 164–171.
29. Pate, R. (1988). The Evolving Definition of Physical Fitness. *Quest.*, 40(3), 174 -179.
30. Pudule, I., Grīnberga, D., Velika, B., Gavare, I., & Villeruša, A. (2013). Health Behaviour among Latvian Adult Population. *Centre for Disease Prevention and Control of Latvia*

31. Saguy, A. C., & Riley, K. W. (2005). Weighing both sides: morality, mortality, and framing contests over obesity. *Journal of Health Politics, Policy, and Law*, 30, 869-921.
32. Shilling, C. (1991). Educating the body: Physical capital and the production of social inequalities. *Sociology*, 25(4). 653-672.
33. Sloan, R., Sawada, S., Martin, C., Church, T., & Blair, S. (2009). Associations between Cardiorespiratory Fitness and Health-Related Quality of Life Health. *Quality Life Outcomes*, 7, 47.
34. Štāle, M., Skrule, J., Liepiņa, E., Pulmanis, T., Šulca, L., Mārtiņsone, U., Pūgule, I., Perevoschikov, Y., Lucenko, I., & Pildava, S. (2013). Health of the population of Latvia, 2002-2012. *Centre for Disease Prevention and Control of Latvia.*
35. Stewart, K., Turner, K., De Regis, J., Sung, J., Tayback, M., & Ouyang, P. (2003). Are Fitness, Activity, and Fatness Associated With Health-related Quality of Life and Mood in Older Persons? *Journal of Cardiopulmonary Rehabilitation*, 23(2), 115-121
36. Tuyckom, C. V., Scheerder, J., & Bracke, P. (2010) Gender and age inequalities in regular sports participation: A cross-national study of 25 European countries. Journal of Sports Sciences 28:10, 1077-1084. Retrieved from http://dx.doi.org/10.1080/02640414.2010.492229
37. Vanhees, L., Lefevre, J., Philippaerts, R., Martens, M., Huygens, W., Troosters, T., & Beunen, G. (2005). How to assess physical activity? How to assess physical fitness? [online]. *European Journal Of Cardiovascular Prevention And Rehabilitation: Official Journal Of The European Society Of Cardiology, Working Groups On Epidemiology & Prevention And Cardiac Rehabilitation And Exercise Physiology*, Vol.12(2), 102-114. Retrieved from: http://www.andrew.cmu.edu/user/kmandyam/Good%20Papers/Good%20papers/paper3.pdf.
38. Vecenāne, H., & Fernāte, A. (2013). Relationship between the students' functional status of organism, body composition and the health self-assessment. *Proceeding of the Internation Conference 'Society, Integration, Education,*Vol.2., 613-623. Retrieved from: http://www.ru.lv/ckfinder/userfiles/RAweb/Saturs/zinatne/zinatniskie_instituti/personas_socializacijas_petijumu_instituts/izdevumi/2013/II%20da%C4%BCa.pdf
39. World Health Organization. (2014). World Health Statistics. Retrieved from: http://apps.who.int/iris/bitstream/10665/112739/1/WHO_HIS_HSI_14.1_eng.pdf?ua=1
40. Баевский, Р.М., Иванов, Г.Г., & Рыбыкина, Г.В. (1999). Современное состояние исследований по вариабельности сердечного ритма. [Current status of research on heart rate variability] *Россия, Вестник Аритмологии*, №14, с.71-75. Retrieved from: //www.vestar.ru/article.jsp?id=2311

41. Научно-исследовательская лаборатория „Динамика” (2002). Вариабельность сердечного ритма: теоретицеские аспекты и возможности клинического приминения. Санкт-Петербург. 13-15.
42. Чуян, Е.Н., Бирюкова, Е.А., & Раваева, М.Ю. (2008). Комплексный подход к оценке функционального состояния организма студентов. [An integrated approach to assessing the functional state of the students] *Учёные записки Тавричевского нациогального университета им. В.И.Вернадскогоб Серия Биологии, химия Том 21* (60), № 1, с.123-139, УДК 612.014

A. Čuprika, A. Fernāte article has been developed by ESF support within the project “Support for Sport Science” Nr. 2009/0155/1DP/1.1.2.1.2/09/IPIA/VIAA/010 work programme „Human resources and Employment” 1.1.2.1.2. sub-activity „Support to Implementation of Doctoral Study Programme”

INVESTING IN YOUR FUTURE

ESF EIROPAS SOCIĀLAIS FONDS

Latvijas Sporta pedagoģijas akadēmija

Submitted: April 20, 2015
Accepted: June 12, 2015

ORIGINAL RESEARCH PAPER

MOTIVES OF YOUNG BASKETBALL PLAYERS FOR GOING IN FOR SPORTS

Asta Budreikaitė, Kęstutis Mačijauskas

Klaipėda University, Faculty of Pedagogy
Department of Physical Education
Address: 5 S. Nėries Street, Klaipėda LT 92227, Lithuania,
Phone: +370 61220711
E-mail: asta.budreikaite@gmail.com

Abstract

The aim of the research is to analyze the motives for going in for sports among young basketball players within the age group of 9-16 years. Research methods are as follows: analysis of relevant scientific research, questionnaire, and statistical analysis. Data was collected by cooperating with Silute Sports School upon receipt of consent; questionnaires were handed out to the pupils of the sports school. The research sample was composed of 100 respondents between the ages of 9 – 16 years attending Silute Sports School. The results of the present research identified and named the most common and significant motives encouraging the young basketball players to engage in sports across all age groups (interval of 10—16 years), which are the improvement of health and the possibility of making own sport-related achievements public. Considering different age groups, results demonstrate that boys at the age of 9 – 10 consider the following motives fundamental: to improve health and to express emotions. They believe that emotional enrichment when emotions experienced in sports come along with pleasure in doing such sports and appreciation of own achievements is highly significant. When it comes to the adolescents falling into the group of 11 – 12 year olds, willingness to compete, fight, and control oneself are the central motives, while to the adolescents at the age of 13 – 14 years it was to experience pleasure in sports, however, the group of 15 – 16 year olds name a possibility to become famous for sport-related achievements as the most significant motive.

Key words: *young basketball players, motives, go in for sports.*

Introduction

Childhood, adolescence, and youth periods are characterized by fast biological, social, intellectual, and sports-related personal maturity influencing thinking, behavior, self-expression, and the choice of values. It is considered to be the most favorable period when the search for talents and expression of individual competencies are concerned. During these periods a choice of sports and developmental process are highly influenced by age, gender, individual skills, excellence in sports, social environment, and moral values (Barkauskaitė, 2001).

Motives for engaging in sports form the fastest during the youth period which, in its turn, influences a further sports-related activity. Young adolescents, engaged in sports, are influenced by supportive factors, such as conditions of training workouts, relationships with a coach, and relationships with teammates as well as by activity and motivating factors, such as an opportunity for improvement, achievements, and recognition. Both of these two motivational groups are vital for younger athletes in order to realize themselves and to satisfy their needs (Miškinis, 2002).

A human is in a need for motives in order to engage in a direct activity. School learners usually start exercising with one motive in mind, however, a number of motives increases with time and motivation develops to engage not only in sports. In order to find answers to a question what influences a decision to engage in sports, the choice of one or another sport, it is of high importance to know what the primary motives originate from and where the motives to be proactive come from. The motive is considered to be a core of biological, cognitive, and social regulation (Ryan, Deci, 2000). However, increasingly more often research has been focusing on physical activity and sporting motives of youth at different age periods; which attempts to identify the sources of such motives. Motivation to engage in sports was researched by a number of researchers (Ebbeck, Gibbons, 1995; Gibson, Fosters, 2002; Malinauskas, 1998, 2003, 2008; Žilinskienė et al., 2007; Sabaliauskas, Poteliūnienė, 2010; Bo et al., 2010), however, relevance of research pertaining to motivation to engage in sports is determined by an ongoing search for theories of such motivation and identification of motives to engage in different sports.

Scientific research problem. In all fields of life, and especially in sports, a question often rises as to why one young athlete is more successful than another. Why do some achieve good results at ease, while others need a lot of will, persistence and efforts, however, still fail to achieve desired results in sports? On the other hand, we notice that such young person lacks motivation and inspiration to achieve high results or neglects sports when

faced by difficulties or failure in such activity. For this reason, factors motivating to regularly engage in sports and achieve high results remain a relevant research problem. Up until now, there has been no universal classification of motives which influence sports-related activity and which allow to define the influence of all motivational factors in pursuing high results in sports. For this reason, the unsolved question is what influences the motivation of young basketball players to go in for sports and pursue good results.

The research aim is to analyze the motives for going in for sports among young basketball players (of Silute Sports School) within the age group of 9 – 16 years.

Material and Methods

The method of scientific literature analysis was used to analyze research articles, course books, monographs, and databases. The motives of young basketball players to go in for sports and factors influencing such were identified. Using the method of scientific literature analysis the research aim and tasks were identified and research methodology was developed.

Questionnaire was used to identify the motives for going in for sports among young basketball players of Silute Sports School. The current research used the adapted questionnaire, designed by Miškinis and Skyrius (2005). The questionnaire was composed of 30 questions in total (see Annex 1). Responses to all statements were rated on a 3-point rating scale**:** from 1 (not important), 2 (moderately important) to 3 (very important). Respondents were asked to choose only one answer to each question provided (by personally evaluating the points ranging from completely wrong to completely true). In order to find out about the age of the respondents, an additional question was included which divided the respondents into four age groups: a) up to 10 years; b) 11 – 12 years; c) 13 – 14 years; d) 15 – 16 years.

Mathematical method of statistics was used to calculate percentage frequencies, statistical significance among the age groups is identified when $p<0.05$. Spearman's rank correlation coefficient (r) was used to identify statistically important relations between variables (age and motives) and the strength of these relations. Results were entered and processed using the SPSS 20 statistical software.

Research sample and organization of the research

Data was collected by cooperating with Silute Sports School upon receipt of consent; questionnaires were handed out to the pupils of the sports school. The research sample was composed of 100 respondents between the

ages of 9 – 16 years attending Silute Sports School. During the course of research, in total 112 questionnaires were handed out at Silute Sports School. Total number of properly filled out questionnaires equaled to a 100. Close cooperation was held with a coach who agreed to have the questionnaires handed out before the activity. The questionnaires were handed out to pupils considering currently organized activities which are held three times per week. The research was conducted during the year 2014 from February 1 to April 11. The research sample consisted of young basketball players at the age of 9 – 16 years, who were divided into four age groups.

Results

The largest group of the research sample consisted of young adolescents within the age group of 11 – 14 years (58.0%), youngsters in the age group of up to 10 years took a share of 19.0%. Young athletes from 15 to 16 years formed 23.0% of the entire research sample. This data demonstrates that the research sample mainly consists of adolescents within the age group of 11 – 16 years.

Survey pertaining to motives of young basketball players to go in for sports was conducted after the workouts. The research aimed at identifying why school learners engage in sports-related activity. Such survey will allow toidentify the motives encouraging engaging in sports not only for a specific group of learners, but also to analyze common factors motivating Lithuanian learners.

Health-related motives encouraging in sports. The research revealed that a motive to improve health is more important to young basketball players at the age of 11 – 12 (Fig. 1).

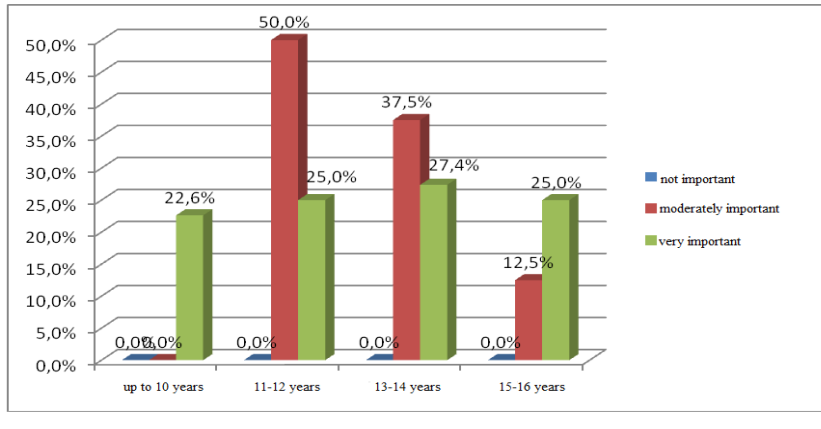


Figure 1. Respondents on willingness to improve health

The motive to improve health to adolescents at the age of 13 – 14 is very important only to 27.4%, moderately important to 37.5% of the respondents (n=29), while for the adolescents at the age of 15 – 16 this motive is very important to 25.0% of the respondents (n=23). It was established that there is a statistically significant relationship among the age groups (r=0.243 p=0.015). Having analyzed the data obtained from the health-related motives, it was established that results of our research are consistent with the results obtained from other research (Garuckienė et al., 2014), which prove that a majority of respondents agree with a statement that they are willing to be healthy and physically active. It may be concluded that respondents are motivated to engage in sports in a pursuit of health.

Self-expression motives encouraging engagement in sports. Research participants were provided a question on self-control, asking whether they agree with the statement that a decision to engage in sports is influenced by willingness to learn self-control and overcome oneself.

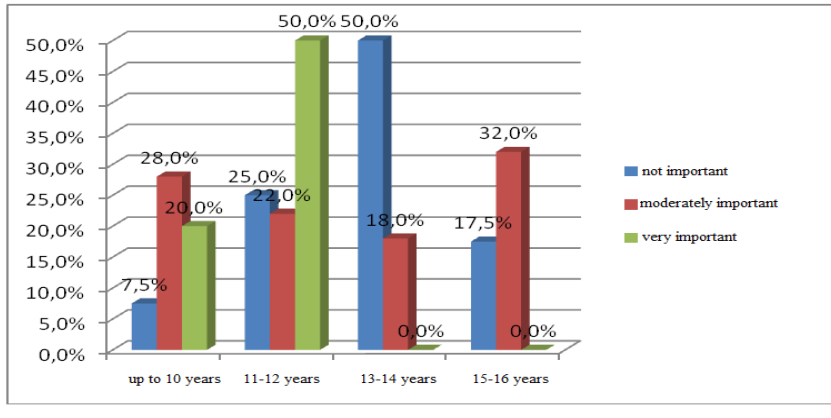


Figure 2. Research participants on willingness to learn self-control

Half of the respondents at the age of 11 – 12 believed that willingness to master self-control and overcome oneself is one of the main reasons influencing a choice of a sport. 50.0% of the respondents falling in this group believed that learning self-control and how to overcome oneself is a highly significant motive. The same percentage (50.0%) of the respondents from a different age group (13 – 14 years), i.e. older adolescents, claimed the contrary, that is, such a motive is absolutely unimportant. Willingness to master self-control and overcome oneself at the age of 15 – 16 is a moderately important motive only to 32.0% of the respondents (n=23). It was established that there is a statistically significant

relationship between different age groups (r=-0.236; p=0.018). It may be presumed that the older the respondents are, the less influential this motive becomes.

In order to learn whether the young basketball players consider emotions experienced during a game or a match important and, if important, to what degree, a statement was given asking whether they are willing to express their emotions during the game. Distribution of responses based on the age groups allows to conclude that possibility to express emotions is important only to 23.7% of adolescents within the age group of up to 10, while 18.5% of respondents believe that such motive is only partially important (n=19). Possibility to express emotions in sports is not important to 42.5% of the respondents within the age group of 11 – 12, i.e., partially important to 29.6% and very important only to 21.1% of the respondents (n=29). Only 26.3% of respondents within the age group of 13 – 14 years favor the possibility to express emotions in sports. Such possibility was partially important only to 29.6% and absolutely not important for more than a third of the respondents (37.5%) (n=29). Different results were observed with adolescents at the age of 15 – 16, as almost a third (28.9%) of the respondents favor the possibility to express emotions in sports and 22.2% of respondents considered it as moderately important (n=23).

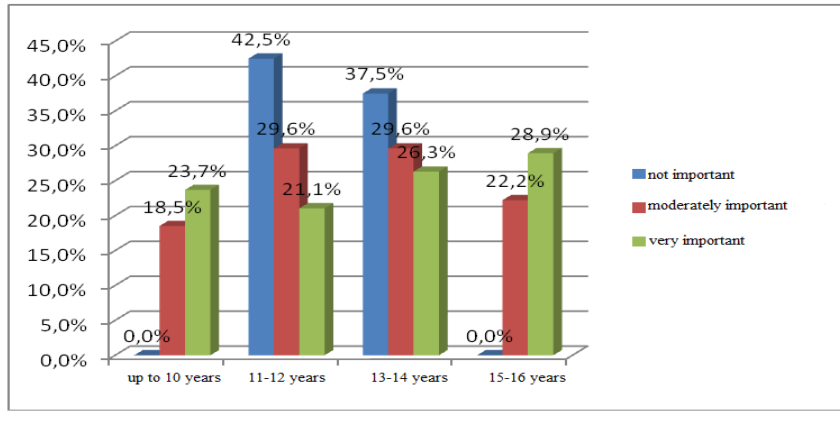


Figure 3. Respondents on possibilities to express emotions

Authors who analyze motives encouraging engagement in sports note that most often children start exercising in order to engage in a competitive experience (Siegenthaler, Gonzalez, 1997; Martens, 1999). Responses to a statement allow proposing that possibility to express emotions in sports is a significant element of sports, which the young basketball players focus on during the sports-related activity, however, no

statistically significant relationship (r=0.064; p=0.527) was identified among different age groups. Results of this research are consistent with the results obtained from other research (Garuckienė et al., 2014), demonstrating that joy experienced during the game is one of the most significant motives encouraging the respondents to engage in sports.

Hedonistic and other motives encouraging engagement in sports. In order to learn whether the young basketball players consider the willingness to compete and fight in sports important and, if important, to what degree, a statement "I am willing to compete and fight" was given, which aimed at identifying whether competition and willingness to fight motivate adolescents to engage in sports.

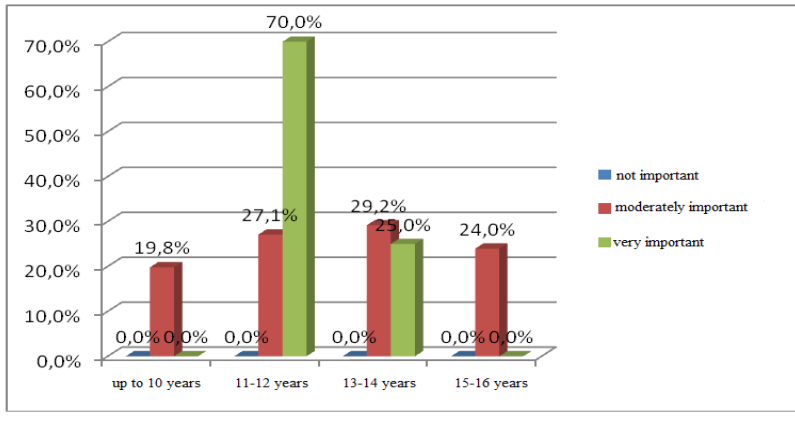


Figure 4. Respondents on willingness to compete and fight

Distribution of responses based on the age groups demonstrates that willingness to compete and fight among adolescents until the age of 10 is moderately important to 19.8% of respondents. For adolescents at the age of 11 – 12 this motive is dominant as 70% of the respondents claimed that such motive is very important, while it was moderately important to 27.1% of the respondents (n=29). This motive encouraging to engage in sports is of a lesser importance to adolescents within the age group of 13 – 16 years. 25.0 % of adolescents within the age interval of 13-14 years completely agreed with the statement and 29.2% of the respondents (n=29) partially agreed with it. However, none of the adolescents falling into the age group of 15 – 16 years named willingness to compete and fight as an important motive encouraging to engage in sports or as an influential factor in choosing a sport. Such motive was only partially important to 24.0% of the respondents

(n=23). It was identified that no statistically significant relationship is present among different age groups (r=-0.047; p=0.642).

Distribution of results based on the age groups allows proposing that willingness to compete and fight acts as a motive encouraging engagement in sports mainly for adolescents falling into the age category of 11 – 12 years. Judging from the distribution of responses, such motive is not dominant in other age groups.

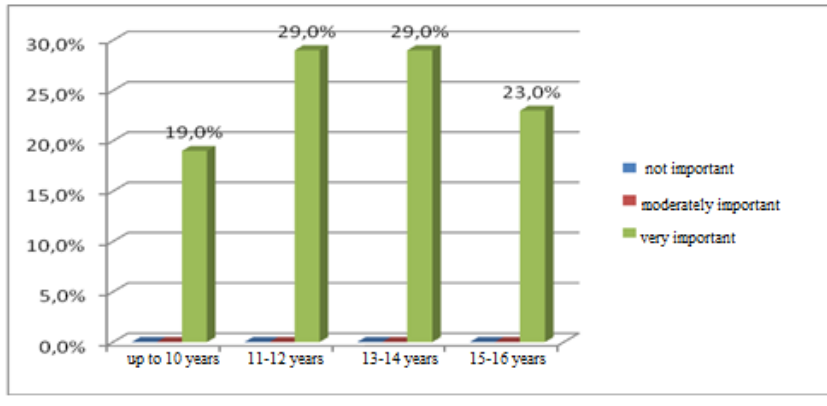


Figure 5. Respondents on pleasure experienced in sport

Sense of satisfaction is one of the motives encouraging engagement in sports (Weinberg et al., 2011). When a person engages in sports and experiences joy and pleasure due to efforts made by him, such motive to engage in sport is repeatedly reinforced.

Adolescents' choice of a sport is often related to a pure satisfaction obtained when being involved in sports, thus during the survey a statement "I feel a great pleasure when engaged in sports" was presented to the adolescents. Such statement aimed at confirming a defined theoretical statement that adolescents engage in sports because they feel a pleasure in moving, being a team member, and appreciate achieved results or an opportunity to express oneself.

Distribution of adolescents' responses from all age groups demonstrates that adolescents need to experience a pleasure in playing. However, it was established that no statistically significant relationship (r=0.002; p=0.987) is present among different age groups.

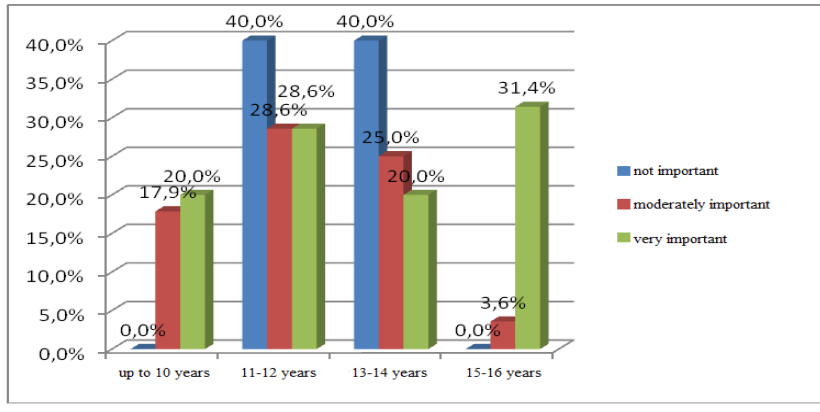


Figure 6. Respondents on willingness to become famous for sports-related achievements

Disscusion

Motivation to win grants an opportunity to achieve a set goal even when the external conditions are not in favor (Malinauskas, 2008). During the survey, the young basketball players were provided with a statement, which aimed at identifying whether the adolescents engage in sports-related activity for a reason to become famous for their sports-related achievements. In order to obtain such information, respondents were asked to rate a statement "I wish to become famous for sports-related achievements". Distribution of results among the adolescents based on the age groups suggests that this motive is important to 20% of the respondents within the age group of up to 10 years, to 20.0% of the respondents within the 13 – 14 years of age group, and for the adolescents at the age of 11 – 12 the wish to become famous for sports-related achievements was also not a dominant motive influencing a choice to play basketball. In this age group only 28.6% of the respondents named this motive as very important, 28.6% believe that this motive is moderately important and as many as 40% listed this motive as not important when engagement in sports is concerned (n=29). It was established that no statistically significant relationship (r=0.095; p=0.347) is present among different age groups.

Distribution of adolescents' responses to the statement based on the age groups suggests that adolescents falling into the group of 9 – 13 years of age relate their engagement in sports and a choice of a sport with pleasure in being active, wish to belong to a team, however, not with a wish to achieve high sports-related results. While for adolescents within the group of 15 – 16 years of age a wish to become famous for their sports-related

achievements is dominant as they focus on excellence and pursuit of recognition.

Conclusions

The present research identified and named the most common and significant motives encouraging the young basketball players of Silute Sports School to engage in sports across all age groups (interval of 10 – 16 years), which are improvement of health and possibility of making own sports-related achievements public.

Considering different age groups of young basketball players of Silute Sports School, results demonstrate that boys at the age of 9 – 10 consider the following motives fundamental: to improve health and to express emotions. They believe that emotional enrichment when emotions experienced in sports come along with pleasure in doing such sport and appreciation of own achievements is highly significant. When it comes to the adolescents falling into the group of 11 – 12 year olds, willingness to compete, fight, and control oneself are the central motives, while to the adolescents at the age of 13 – 14 years the dominant motive is to experience a pleasure in sport; however, the group of 15 – 16 year olds identify a possibility to become famous for sports-related achievements as the most significant motive.

References

1. Barkauskaitė, M. (2001). *Adolescents: socio-pedagogical dynamics: monograph*. Vilnius: Vilnius Pedagogical University Press [in Lithuania].
2. Bo, S., Robert K. W., Weidong, L., Haichun, S., & Rukavina, P. (2010). A motivation model in physical education. *Journal of Teaching in Physical Education*, 29(1), 72–84.
3. Ebbeck, V., & Gibbons, J. (1995). Reason for adult participation in physical activity: An interactional approach. *International Journal of Sport Psychology*, 26 (2), 262–275.
4. Garuckienė, I., Karbočienė, E., & Grajauskas, L. (2014). Activity among women and men. *Young Scientists works*, 1 (41), 8–11 [in Lithuania].
5. Gibson, S., & Fosters, T. (2002). The path to excellence. *Olympic Coach*, 12, 6–7.
6. Malinauskas, R. (1998). The peculiarities of motivation among males engaged in boxing. *Sport science*, 3(12), 20–23 [in Lithuania].
7. Malinauskas, R. (2003). The peculiarities of motivation of high performance duel sport athletes and future professional. *Sport science*, 1(31), 19–23 [in Lithuania].

8. Malinauskas, R. (2008). The peculiarities of motivation for sports activity among students playing basketball. *Journal Education. Physical Training. Sport*, 4 (71), 57-62.
9. Martens, R. (1999). *Coaches guide to sport psychology*. Vilnius: LSIC [in Lithuania].
10. Miškinis, K., & Skyrius, E. (2005). *Optimization of coach's activity*. Vilnius: LSIC [in Lithuania].
11. Miškinis, K. (2002). *Principles of sport pedagogy*: course book to students of physical education and sport. Kaunas: LKKA [in Lithuania].
12. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78.
13. Sabaliauskas, S., & Poteliūnienė, S. (2010). Peculiarities of the motivation to do sports in athletes of different levels of excellence. *Sport science*, 2(60), 13–18 [in Lithuania].
14. Siegenthaler, K. L., & Gonzalez, G. L. (1997). Youth sports as serious leisure: A critique. *Journal of Sport & Social Issues*, 21 (3), 298-315.
15. Weinberg, R., Butt, J., & Claytor, R. (2011). Adolescent physical activity participation and motivational determinants across gendre, age and race. *Journal of Health and Physical Activity*. No. 8. P. 1074-1083.
16. Žilinskienė, N., Tubelis, L., & Radžiukynas, D. (2007). Social and sport factors motivating track & field athletes for training. *Sport science*, 3(49), 52–60 [in Lithuania].

Submitted: December 5, 2015
Accepted: June 12, 2015

ORIGINAL RESEARCH PAPER

HEALTH IMPROVEMENT OF THE POPULATION BY CREATING A CLUSTER IN BELARUSIAN FITNESS

Veronika Sadovnikova, Tatiana Polyakova

Belarusian State University of Physical Culture
Address: 223012 17-56 Molodezhnaya str., Machulishchi, Minsk region, Belarus
Phone: +375 297563325
E-mail: sadovnikova@tut.by, nir@sport.edu.by

Abstract

World experience shows that the means of physical culture and sports have a universal ability of a complex approach to solving problems of people's health improving and formation of a sound psychological climate in labor collectives and in the community as a whole. Physical culture and sports is a preventive tool for health maintaining, promotion and prevention of various noninfectious diseases (cardiovascular, coronary heart disease, diabetes, osteoporosis, obesity, etc.) and bad habits (drinking, smoking, toxicomania, etc.). Moreover, as it is noted by American and European experts, the use of physical activity and sport in order to prevent morbidity requires very slight additional costs from the state. Currently, in Belarus there is an urgent need in drastic measures aimed at improving the quality of public health, formation of new guideline values in the youth, and in fitness culture development. Encompassing various forms of motor activity, fitness meets the needs of different social groups in sports and recreational activities at the expense of fitness programs diversity, their accessibility and emotionality. It promotes not only the motor, but also the general culture of the people involved. Possessing significant adaptation and integrative capabilities, fitness is a phenomenon of modern physical culture with a multifunctional impact on various spheres of public life. This favors its integration into all kinds of physical activities. Because of differences in the approaches of American, European and Belarusian practices in the use of fitness we propose improvement of public health by creating a cluster in fitness of Belarus.

Key words: *physical culture, sport, fitness, improvement of public health, management, physical activity, sport for all, cluster.*

Introduction

Most authors emphasize that the word “fitness” exists in all languages of the world without translation. It comes from the English verb «be fit» – to be in shape, feel good or be healthy. Theoretical analysis of interpretation of the term fitness in the former Soviet Union has confirmed that over the last 20 years the meaning of the word “fitness” often changed. In one case, the term is interpreted by scholars and practitioners as a new social phenomenon or physical state of a person, in the other case – as a set of means and techniques to achieve physical preparedness, figure correction, or as a format of a mass physical culture or as comprehensive health programs based on means and methods of bodybuilding.

According to Saykina (2015) this is because the phenomena identified by the term "fitness" in the United States and the countries of the former Soviet Union are not identical. According to Howley & Frenks (1998) in the American society "fitness" is considered much wider and in different contexts it can replace the concepts "physical culture", "physical training", "health", etc. In the Russian language the word "fitness" has acquired multiple meanings. Firstly, this term implies a set of measures providing versatile physical development of a person, improvement and formation of his/her health; according to Saykina (2009) fitness is a socio-cultural phenomenon. Secondly, according to Somkin (2002) fitness is a kind of sport which has been recently introduced in the framework of competitive bodybuilding. Also in our literature there is a division of fitness on general, physical and sports-oriented; according to Aftimichuk (2009) general fitness is one of the first areas of health improving physical culture, and a specialist working in the field of health improving physical culture is the very specialist in health and fitness, the product of whose activities are fitness programs.

Without an official proclamation, in contrast to the practice of European countries, starting from the mid 90s fitness industry in Belarus has been formed gradually and lives its own life – production and promotion of health and fitness technologies, marketing programs, equipment, specialized food, facilities and appliances, video, audio support, manuals. The age of today's fitness instructors in Belarus is from 18 (for example, students receiving education in secondary specialized educational institutions, institutions of higher education) up to 50 years old and more (people having more than one specialty and extensive experience in different fields of activity). The vast majority of successful and popular fitness instructors in Belarus due to their high competitiveness and having

no sports pedagogic education are moving rapidly up the career ladder and set the bar high in the labor market.

At present there is not a single mention in the regulations of the industry "Physical culture, sport and tourism" concerning fitness either as a form of mass physical culture, or its role and status. There is only one document that was created at the dawn of fitness in Belarus, which taking into account an acquired experience requires explicit corrections and additions. It is an order of the Ministry of Sports and Tourism of the Republic of Belarus on June 30, 1997 № 832 "On organization and provision of paid health and fitness services to the public by means of physical culture and sports". However, this process is nor organized, nor provided with legal support for purposeful and progressive development of "mass sports" or its actual manifestation – fitness. At present all paid services in our sphere have a recognizable and purchasable by the consumer name – "fitness services".

In our opinion, this situation should be considered as a precedent for development a center of scientific, methodological, and practical support to all sports organizations engaged in paid services to the population of Belarus through various forms of mass physical culture, and in fact, recognized by the consumer as fitness. The purpose of the study is consolidation of industry experts, including sports management and marketing, in order to take mass sports (as a reserve for professional sport) in the Republic of Belarus to a new level of development, advocacy of scientific and practical interests of the industry from the perspective of international standards for services provision by means of physical culture and sports, i.e. legitimacy of the fitness industry as a kind of sports economy will be created.

As a result of our study for the first time in the theory and methodology of physical culture of Belarus a concept of fitness as a modern format of mass physical culture and sports industry will be presented. Health improving prospects of the population will be substantiated by means of fitness clustering in Belarus. In particular, based on the proposed concept the definition of the term fitness as a social phenomenon and a pedagogical knowledge based on the theory of health improving physical culture will be given; regularities influencing the industry of "Physical culture, sport and tourism" as a priority area of the state and public interests in the new socio-economic conditions of activity, profitable, attractive for investments both for the state and commercial structures will be revealed.

Material and Methods

The following methods of empirical research are used: observation, social study, comparison and description. Were developed protocols of survey, interview and questionnaire survey of three target groups of respondents on the research topic to identify the actual mechanisms of functioning of the fitness industry. This group: consumers of fitness services (fitness services) by place of residence; producers – managers of sports organizations, structures (Directors and their deputies) providing health and fitness services (fitness services) by place of residence; trainers of fitness services (fitness services) by place of residence. Currently being collected questionnaire data from all three groups. The analysis of the survey and interviews mentioned categories of respondents. Consultating on the research vision and strategy with key industry leaders in the PE and S in the Republic of Belarus. In particular with the heads of structural subdivisions of the Ministry of sports and tourism of the Republic of Belarus, Deputy Director of the Republican training and methodological center of physical education, Director of the Republican scientific-practical center of sports, Directors of physical fitness centers in the districts of Minsk, the owners of commercial fitness organizations of Minsk. Cooperation with overseas colleagues, specialists of physical education from Budapest (Hungary), from Macolin, Berne (Switzerland), from Athens (Greece).

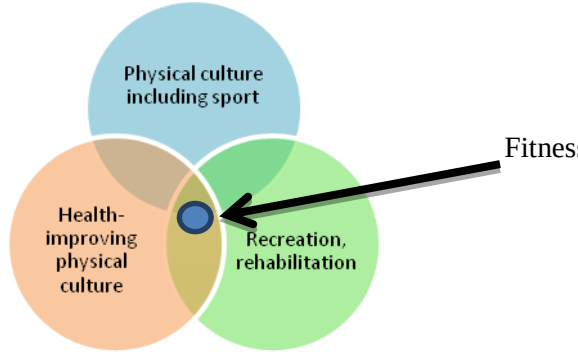
Results

Formation and development of scientific and innovative sphere of the Republic of Belarus indicate the necessity for joint efforts of all participants of the process in the most effective and promising directions of the state scientific-and- technical and innovation policy realization. The world practice shows that the high level of competitiveness and sustainable economic growth are determined by the factors that promote the spread of new technologies, in particular, the use of the cluster approach. We believe that clustering as a method is currently one of the most promising for the sphere of sport and fitness. Belarusian market of fitness services exists for nearly 20 years. Taking into account an economic situation of the Belarusian market of services and a positive trend to increasing revenues in the public sector of the economy observed in recent years, experts have expressed optimistic forecasts for the development of fitness. According to the assessment given by Grigorjev (2007) a branch-wise clustering (Eng. cluster – aggregate, alliance) is a logical continuation of evolution providing concentration of all types of resources, the use of original and highly effective health promoting and training technologies, modern fitness and

sports equipment. The world practice shows that a synergistic effect achieved on the basis of clustering principles provides a technological breakthrough and dramatically increases the competitive ability of fitness.

Sport in the modern world is not only an industry, not only an important social service rendered by the state in the frames of the social policy for the health of the nation, but also the broadest consumer market producing as mass sports services in the form of sports events and physical training services, improving the quality of life of the population of Belarus, as well as a variety of sports material products including science intensive and high-technology ones (Supikov et al. 2005).

Socio-cultural inquiry identified the need for development and dissemination of innovations in the field of physical culture. A person's position in health improvement, his/her attitude to social, psychological, and physical health is now accepted as a decisive factor. This implies the essence of the concept of values and motivational attitudes formation of a personality with a healthy lifestyle orientation, which becomes the foundation of a modern society. New notions about human vital activities direct a person towards physical and spiritual development, feeling of well-being, mental and physical health. At the same time the emergence of innovative types of physical culture in Belarus is due to the rapid development of sports and recreation activities and first of all with the origin and growth of the fitness industry, where new fitness areas and a variety of fitness technologies with their own specific characters are being created.



We hold the opinion of the scientists Ponomarchuk (2005) and Saykina (2009) and ascertain that in Belarus fitness is also expressed as a sociocultural phenomenon which allows to use the potential of physical culture and sports in promoting health and physical capacity, improvement of physical status of healthy people and people in a state of pre-disease and/or with risk factors, their potential and social experience of physical

(somatic and functional) perfection of a person and a healthy lifestyle organization.

The scientific community should pay attention to the peculiarities of interpretation of the terms "physical culture" and "fitness" and their correlation with the concepts "physical culture" and "physical education" in the countries of the former Soviet Union and abroad.

In Belarus all the forms and their content in the educational process are approved and therefore are permissible to introduction in the process of physical education. Let us refer to the table "The place of fitness in physical culture of the population of Belarus" (Tab. 1).

Table 1

The place of fitness in physical culture of the population of Belarus

<table>
<tr><th colspan="2">Age period
phenomenon</th><th>Preschoolers</th><th>Pupils and students</th><th>Adult working population</th><th>Elderly</th><th>Motives factors</th></tr>
<tr><td colspan="2">Physical culture</td><td colspan="5">One of the aspects of a society's culture, reflecting its potential and social experience in physical (semantic and functional) perfection of a person and a healthy lifestyle organization</td></tr>
<tr><td rowspan="2">Physical education</td><td>Form</td><td colspan="2">As a process in an educational institution – in a form of lessons</td><td>–</td><td>–</td><td rowspan="2">External and internal</td></tr>
<tr><td>Normative basis</td><td colspan="4">The Law on Physical Culture and Sport, The State Physical Culture and Health Improving Complex – a program and normative basis of physical education of the population of the Republic of Belarus</td></tr>
<tr><td colspan="2">Health improving physical culture</td><td colspan="5">An aspect of culture that allows to use the potential of physical culture in promoting health and physical capacity, improvement of physical status of healthy people and people in a state of pre-disease and/or with risk factors</td></tr>
<tr><td rowspan="2">Fitness</td><td>Form</td><td colspan="2">Extracurricular forms – additional groups, circles, non-budget forms</td><td>Forms of health improving activities, more than 200</td><td>–</td><td rowspan="2">Internal</td></tr>
<tr><td>Normative basis</td><td colspan="2">–</td><td>–</td><td>–</td></tr>
</table>

Disscusion

It should be noted that abroad there is no such a concept as "physical culture", and the notion that we imply in it reflects the concept "physical education". In Belarus the concept "physical education" has a quite narrow and specific interpretation – it is a part of an educational process aimed at formation of motor skills, development of physical abilities and acquisition of knowledge in the field of physical culture and sports. Bailey and Dismore (2004) surveyed more than fifty countries in order to generate a "functional definition" of Physical Education (that is a description of what happens rather than an analytical account), as follows "those structured, supervised physical activities that take place at school and during the school day". Or in the words of the Department for Education and Employment (2000), "…physical education' is a statutory area of the school curriculum, concerned with developing pupils' physical competence and confidence, and their ability to use these to perform in a range of activities… "(p. 129).

Today a scientific and practical contradiction is revealed – with the current needs for development of specific areas of the industry "Physical culture, sport and tourism" in Belarus, such as "sport for all", "fitness", adequate management mechanisms as a whole and on the regional and local levels are not developed. According to Saykina, A.Čuprika, A.Fernāte (2014) to date, the term "fitness", widely spread in the world, in the countries of the former Soviet Union have very different interpretations, leading to terminological and methodological confusion Accordingly, this hinders its adoption by a certain part of the scientific community and the process of professional communication of practitioners in the field of physical culture.

The variety of definitions of the notion "fitness" proposed by the fitness founders on the post-Soviet territory, Russian scientists, practitioners Saykina, Lisitskaya & Sidneva (2002) and others are well known. In a market economy where fitness has come to us from and in isolation from the market the concept of fitness does not exist. To date no one has managed to present a well-designed scheme of justification and definition of the notion "fitness" for the market conditions in Belarus. Therefore there is no recognition of the phenomena and the consequent recognition of the reality of effectively functioning fitness industry and legitimate activities of fitness instructors. It is worth paying attention to the experience of bringing attention to this issue by Russian colleagues, particularly by Saikina (2015), "…analyzing the so motley and ambiguous picture inherent in nowadays activities in the field of sports and educational services, including in the field of fitness, one can assign all of its shortcomings to a lack of well

thought-out general normative legal basis that takes into account the interests of all parties (the state, founders, employers, administration, staff, and of course, consumers of different types of fitness services)… "(p. 5).

During the interviews and surveys of producers of fitness services in Belarus – managers of sports organizations, instructors and methodologists in the sphere of sports and recreation activities – in order to identify the actual mechanisms of the fitness industry functioning, it was revealed that these services are provided by them and are used by the population despite the lack of regulation and classification of such a range of services in the field of their activities. Understanding and sharing opinion concerning the leading role of the state and local authorities in development of mass sports and its recreational forms in overcoming a demographic crisis, prevention of addictive behavior of young people, changes in attitudes towards the environment, and improvement the quality of life of the population was noted as well.

The "mission" of the activities aimed at improvement of public health was also indicated by the respondents: to raise the percentage of participants in physical activities to the European level. In accordance with the global trend the problems of development of physical culture in our country becomes a key focus of social policy. Concern for physical culture development is an essential component of social policy of the state that ensures implementation of humanistic ideals, values and norms, which gives wide scope of people's abilities detection, their interests and needs gratification, the human factor activation. However, at present only 16 – 25 % of the population in the country is engaged in physical activities, whereas in the economically developed countries this index reaches 40 – 60 %. In the analyzed array of legal documents concerning management mechanisms of health improvement of the population in the sphere of physical culture and sport not involved in the system of sports education – most often it is an adult, able-bodied population – there is no mention about fitness, including really existing, profitable, but not actually recognized. In our view there are sufficient quantities of physical culture programs of different levels and orientation, in particular for the specified segment of the population. The Decree of the Ministry of Sports and Tourism of the Republic of Belarus of 24.06.2008 N 17 adopted the State Sports Health-Improving Complex of the Republic of Belarus, the purpose of which is mass sports movement development in the Republic of Belarus aimed at health-improvement, general physical education, moral and patriotic education, promotion of healthy lifestyle of the nation by means of physical culture. It is worth paying attention that traditionally management of a "sport system" implies

also control of the processes of health-improvement of the population. But the realities of today demonstrated the impossibility of equal management of two different phenomena – sports and health-improvement.

In confirmation of Belarus desire to meet international standards in sports and rehabilitation management there is the Decree of the President of the Republic of Belarus dated 24.11.2008 № 638 "On Accession of the Republic of Belarus to the Enlarged Partial Agreement on Sport" established by the resolution of the Committee of Ministers of the Council of Europe CM/Res (2007) of May11, 2007 (EPAS), operating under the Council of Europe. It provides for close coordination of the efforts of states in order to promote "the development of sport for all". Partial agreement is a flexible form of work in the frames of the Council of Europe. Some partial agreements provide an opportunity to the states non-members of the Council of Europe and international organizations as well to work together with the member states of the Council of Europe in order to achieve common objectives of mutual interest. The task of EPAS is to contribute to sports development in Europe, to popularize engagement in sports, and to exchange positive experiences in this area.

In order to determine the place of fitness as a social and cultural phenomenon in the process of health improvement of the population of Belarus one should pay attention to the essence of such historically proven systems of physical activity management of public organizations and movements as "Sport for All" and the World Health Organization (WHO). Today the "Sport for All" presents a general concept implying active recreation, sports development, programs involving a large mass of people, and cultural and recreational activities for the purpose of recreation and health improvement of all social groups adherent to this movement. This applies to any kind of sport which involves ordinary people without any serious professional loads typical of elite sport; therefore elimination nature of sporting events, based on competition, in this case is a secondary factor.

WHO (2010) developed "Global Recommendations on Physical Activity for Health" with the overall goal of presenting a guidance for policy-makers at the national and regional levels concerning relationships based on dependence "dose –response", between the frequency, duration, intensity, type, and total amount of physical activity necessary for prevention of noncommunicable diseases. The recommendations stated in this document are intended for three age groups: 5 – 17, 18 – 64, and people aged 65 years and older.

In our opinion, today, in the absence of references to fitness in the regulatory documents of the branch "Physical culture, sport and tourism" of

the Republic of Belarus, it should be offered to the scientific community to draw its attention to the opportunities and potentialities of fitness as a socio-cultural phenomenon for health improvement of the nation by means of clustering. In our opinion, this situation should be viewed as a precedent to create a cluster of fitness, carrying out a function of a center of scientific, methodological and practical support to all sports organizations engaged in paid services to the population of Belarus through various forms of mass physical culture, and in fact, recognized by the consumer as fitness.

The results of our sociological study confirm the findings of Russian colleagues Somkin (2009) and Saykina (2009, 2015) concerning the presence of a social demand associated with an increase in sickness rate in post-Soviet countries, including Belarus, a general decline in the health status of the population, change in society demands for the level of physical and mental health of the population; increased human needs for self-actualization, self-identity, and self-knowledge. Economic expediency is in the same row: an intensive development of fitness industry and promoting fitness in the country, introduction of modern fitness technologies, demand for a large number of fitness services in different kinds of physical culture – education, sports, recreation, rehabilitation, in the form of extra services; expansion of the labor market, prestige and decent wages for specialists of the fitness industry. Since the priority of human health forms the basis of the ideology of fitness and goal setting, so the created fitness technologies are mainly of a recreational nature.

Based on the analysis of potential implementation of the cluster approach in Belarus including fitness, the following guidelines proposed by Smirnov (2007) are of the first priority:

– extension of the system of indices of innovation policy in the field of sport, their harmonization with the European statistics, improvement of methods of statistical survey of innovations;

– promotion of regional innovation policy, creation of regional development strategies, involving local authorities, universities, and business organizations, allocation of up to 20% of the funds of regional scientific and technical programs on "soft" support of health improvement of the population (elaboration of region development strategies);

– identification of sources for financial support of innovative infrastructure at the national and local levels, stimulation of inter-regional programs of innovative cooperation, using the resources of state and scientific-and-technical programs on health improvement of the population;

– promotion of consultations with associations of scientists, industry regulatory structures for selection of priorities for regional scientific-

technical and innovation development of control over the process of health improvement of the population by means of fitness;

– ensuring the transparency of information on the progress of applied research in sport and rehabilitation in Belarus; distribution of regions experience of European countries;

– promotion of fitness culture, a positive image of an entrepreneur by means of mass media; conduct of a national competition of fitness projects involving sponsors, that will enable to create "success stories" in fitness;

– assistance to international cooperation in the field of fitness, "soft support" to innovation activities using the capabilities of EU programs.

In the opinion of Mitenev & Kirik (2006) at present three standard approaches to formation of regional innovation clusters are widely used. The first involves the creation of extended working group on the basis of experts of a regional administration. Representatives of various regional organizations interested in creating a cluster and able to render actual help can be drawn in on the role of experts (participants).

The second involves cooperation of the authorities and management structures with existing regional research organizations, consulting firms, higher educational institutions, etc. Cooperation with such organizations is based on service contracts.

The third approach is relatively new for the post-Soviet countries. Its essence is in creation of a specialized organization that is "Economic Development Agency". Regional authorities may be one of the founders, transferring for instance real estate objects and other property as a contribution to the authorized capital.

The procedure of clusters creating has its principles and terms. Clusters should be created gradually. At the first stage (preparatory) the urgency and general economic feasibility are found out, elaboration and testing of mechanisms for creation and development of clusters is carried out, and the decision on full-scale work on the project is made. At the main stage organizational and legal issues related to clusters formation are settled. The final stage involves the adjustment of the "portfolio" of priority clusters, forms and methods of state support on the basis of monitoring and analyzing the results of cluster formation and development of organizational documents, technical-technological and economic justifications Mitenev & Kirik (2006).

As a result in the field of "Physical culture, sport and tourism" of the Republic of Belarus, in the terms of the Ministry of Sport and Tourism activities such as "health improvement of the population" the following issues will be carried out:

– a general conceptual scheme of the theory and methodology of fitness based on health improving physical training as a social phenomenon enhancing the quality of life through physical and psychological status of a person (pedagogical aspect) will be developed;

– regularities of formation of value orientations and a lifestyle contributing to manifestation of fitness culture in representatives of all age groups of the population of Belarus (culturological aspect) will be revealed;

– marketing strategies of fitness will be developed, mechanisms of interaction of sports organizations with their environment in the market conditions of Belarus (economic aspect) will be described;

– general provisions of the methodology of the sphere of fitness activities management, as an industry of personnel and services, in accordance with international standards of market activities and competitiveness (administrative aspect) will be developed;

– specified problem-solving mechanisms for health improvement of the nation through fitness as an economically real sector of services in the field of physical culture and sport without expenditure of budget funds will be presented for application.

Practical implementation of the cluster development and creation should include the following activities:

Regional executive authorities in the field of cluster policy should encourage and support cluster initiatives. To do this they must carry out the following functions: information and analytical support of cluster policy; designing of a general strategy including motives, goals, objectives and directions of development policies of clusters; use of the existing tools and measures of economic policy for realization of cluster initiatives; financial support of regional initiatives on clusters development; assistance to international cooperation development in the sphere of cluster policy.

For of cluster initiatives financing the following budgetary funds can be raised:

– means of investment funds;
– means of innovative funds;
– funds allocated for free economic zones creation;
– funds for basic researches;
– means of small business development programs;
– funds allocated for regional scientific and technical programs;
– own funds of enterprises used on researches and development.

Despite the highest importance for national economy of innovative clusters formation and the highest interest of the state in innovative

development of region's economy, at present there are no state mechanisms of direct action aimed at territorial innovative clusters development.

Considering specifics of the Belarusian model of economic development where the high role of the state in management of economy and formation of priorities of economic development is inherent, it is expedient to create a tool which is urged to realize in practice the mechanism of carrying out a state policy of health improvement of the population of Belarus on problems of fitness clusters formation. Such a tool at the level of the republican regions and Minsk city could be the Republican Scientific and Practical Center of Physical Training of the Population, the Republican Scientific and Practical Center of Sport which tasks will also include organization and coordination of activities on creation of a cluster at all stages. For instance, all regional methodological centers of physical education of the population and sports clinics could become local branch offices.

The analysis of primary sources of the theory and practice of clusters formation allows to draw a conclusion that the most effective organizational form of creation of a cluster is a voluntary association of independent producers of services and goods for fitness, scientific and information products for health improvement. Business competition in the market of services serves as a stimulus for the presented activities of cluster participants. Under conditions of severe state regulation incentive motives for achievement of any results is control of planned performance realization by a higher authority. Thus each of a cluster participant is limited in his/her leeway. Such model is very effective in extreme, crisis conditions when the purpose is absolutely clear and it is known that its achievement is possible only at a full tension of all forces. But in conditions of free competition it suppresses the participants' initiative which is absolutely necessary for innovative activities. It follows from this that the most expedient is the organizational and legal form of a potential cluster as a voluntary association of independent producers on the terms of direct economic contracts without formation of a new juridical entity. According to Alyokhin (2014) at a starting stage of a cluster creation this form doesn't exclude existence of some mechanism providing coordination and organizational support of the process.

Conclusions

In industrial and post-industrial societies sport as a sociocultural phenomenon has a civilization transformation, joins in the general system of international cooperation, communicative and information exchange in conditions of globalization. Health improving and sports activities of

foreign countries are characterized by an organic combination of conditions created by the state, its government, public, and private organizations and establishments. Analysis of the Belarusian sports and health improving system shows some features of its own. Their organizational structures depend on the state's purposes and extent of its participation in systems functioning. In our opinion creation of a cluster in fitness of Belarus will promote consolidation of specialists of the branch, including sports management and marketing, for the purpose of taking a mass sport (as a reserve for professional sport) in the Republic of Belarus to a new level of development, advocacy of scientific and practical interests of the branch from positions of international standards of rendering services by means of physical culture and sport, i.e. legitimacy of the fitness industry will be created as one of the types of sports economics. We consider that development of mass sport, sport for all, and fitness as a means of health improvement through local authorities, sports organizations and establishments at this level is a prerogative of the state and, of course, the population. Consequently there are sufficient conditions for creation and realization of a cluster in fitness of Belarus aimed at health improvement of the population.

References

1. Aftimchuk, O. (2009). Theory and methodology of fitness. *Theory and methodology of recreational physical culture: a course of lectures for students.* Kishinev, Vaiinex SA.
2. Alyokhin, D. (2009). Territorial innovative clusters in Belarus: possibilities of formation. *Information and analytical magazine "News of science and technologies"*, №3 (12) 2009, from http://www.belisa.org.by/ru/izd/stnewsmag/3_2009/art3_12_2009.html
3. Bailey, R. & Dismore, H. (2004). The Role of Physical Education and Sport in Education. *Athens: 4th International Conference of Ministers and Senior Officials Responsible for Physical Education and Sport*.
4. Čuprika, A., & Fernāte, A. (2014). Fitness in the sport structure of Latvia. *Lase journal of sport science* 2014/5/1:59-69 from http:// journal.lspa.lv/files/2014/1_LASE_Journal_2014_5.pdf
5. Department for Education and Employment. (2000). *Physical education: the National Curriculum for England and Wales.* London, DfEE/Qualifications and Curriculum Authority from http://api.ning.com/ pdf
6. Grigorjev, V. (2014). Identification and development of the All-Russian cluster of fitness culture. Fitness: theory and practice. Saint Petersburg, Herzen´s University from http://fitness.esrae.ru/pdf/2014/2/2.doc
7. Howley, E., & Frenks, B. (1998). Health fitness. Instructors Handbook. *Human Kinetik books champaing*, Illinois.

8. Lisitskaya, T. & Sidneva, L. (2002). *Aerobics. Theory and methods volume 1*. Moscow, Federation of aerobics of Russia.
9. Mitenev, V. & Kiri, O. (2006). Cluster as a factor of economy development. *Economic and social changes in the region: facts, trends, forecast,* Vol. 34. Vologda: VNKTS.
10. Saykina, E. (2009). *To a problem of fitness development in Russia: problems, tendencies, and ways.* Fitness: theory and practice № 3 2015 from http://fitness.esrae.ru/pdf/2015/3/2.doc
11. Saykina, E. (2009). *Fitness in the system of preschool and school sports education* (Doctoral dissertation). Saint Petersburg, Herzen´s University.
12. Smirnov, E. (2007). Innovative vector of industrial policy of the European Union. *International Economics*, Nr 2.
13. Somkin, A. (2002). *Classification of exercises and the basic components of preparation of highly skilled gymnasts in sports aerobics*. (Doctoral dissertation). Saint Petersburg, Herzen´s University.
14. Supikov, V. & Ponomarchuk, V. (2005). *Sport as services sector: economy, law, management.* Minsk: LLC "WinForm".
15. World Health Organization. (2010). *Global recommendations about physical activity for health*, from http://www.who.int/dietphysicalactivity/factsheet_recommendations/ru

Submitted: April 12, 2015
Accepted: June 12, 2015

REVIEW PAPER

MANAGEMENT OF VOLUNTEERING HUMAN RESOURCES IN SPORT ORGANISATIONS

Audrius Šimkus, Rimantas Mikalauskas, Aleksandras Alekrinskis, Daiva Bulotienė

Lithuanian Sports University
Address: Perkūno ave. 3A, 44221 Kaunas, Lithuania
Phone: +370 37 302662
e-mail: audrius.simkus@lsu.lt, rimantas.mikalauskas@lsu.lt, aleksandras.alekrinskis@lsu.lt, daiva.bulotiene@lsu.lt

Abstract

Management of volunteer human resources in sport organisations is an extended, interdisciplinary area covering various empiric researches. In Lithuania managing aspect of volunteer human resources in sport organisations is an uninvestigated phenomenon. Scarce fragmental research related to volunteers' motivation could be found, however, this research was performed by researchers of social work, psychology issues etc. Subject analysis from managerial aspect is timely, relevant from scientific and practical standpoints. Problematic issue is concerned – what managerial activities of human resources are identified in sport organizations and how these activities should be controlled. Scientific problem – what problems of volunteer human resources management are identified in sport organisations and how they could be solved from managerial position. Research object: management of volunteer human resources in sport organisations. Research aim is to research the factors impacting management of human resources in sport organizations and prepare the model for human resources management in sport organizations. Research objectives: To review researchers' attitude to volunteering as to an object of scientific research, revealing the variety of them. To reveal inter dependence aspects of volunteering and sport organizations. Having analyzed theoretical aspects, produce theoretical model for management of volunteer human resources in sport organisations. To make and describe empiric research logics and instrument for volunteer human resources management in sport organisations. To research the appliance of theoretic model for management volunteer human resources in sport organisations in Lithuania.

Key words: *volunteering, human resources, sport organisations*

Introduction

Scientific problem and relevance of the subject. Volunteering as a global phenomenon is obtaining increasing acceleration. Modern volunteering does not have any boundaries, it is a definite and a measurable expression, creating additive value and contributing to general national product. Today's sport organisations (SO) initiate competition struggle over volunteers, thus, it is essential to possess a strategy to maintain current volunteers, provide leadership and management of volunteering activities. Scientists have been applying different systems and methods of analysis for volunteers' management research and definition of volunteering phenomenon. Though single persons, involved in volunteering and providing permanent assistance to people, exist – volunteering generally appears in the context of sport organisations (Penner, 2002). Volunteering does not only contribute to country's economics but also provides the necessary services, such as health care and education of a society. Managers, public sector and voluntary sport organisations attracting volunteers should target to maximize all volunteers' potential and succeed to maintain them in their organisations. Inappropriate leadership would end in failures, financial disadvantages and the most significant – loss of volunteers (Moynes, 1966; Johnson, 1981; Twelvetrees, 1991). As volunteering evolves in the time length, the demands of volunteers become the crucial management issue (Brudney, 1995). Only a small part of people pay attention to the existence of organisations coordinating volunteering (Hager, Brudney, 2008). Growing number of volunteer participation and their effective performance have become significant argumentation in democratic management (Brudney, 1990; Vigoda, 2002). Various factors impact volunteers demand and supply. They imply demographic (the elderly, the youth), political awareness, social and cultural aspects (Meliski, Holzer, 2007; Mele, 2008). Virtual volunteering has recently appeared as an absolutely innovative field of volunteering. R. Cohen (2008) alleges that more and more people will join this innovative volunteering model in the future. Researchers (Ellis, 1996; Hager, Brudney, 2005) proved that benefits of volunteering are rather significant and mostly obtained as a value (tangible and non tangible) that volunteers provide to an organization. However, only looking forward when volunteers will join an organisation and passive support of voluntary organisation status does not guarantee additive value to an organisation. This depends on how organisation

succeeds to attract volunteers and maintain them (Brudney, 1990, 1995; Rehnborg, DeSpain, 2003; Hager, Brudney, 2008). Researches of volunteering (Sundeen, 1990; Brudney, 1990, 1995; Safrit, Schmiesing, 2004; Gazley, Brudney, 2005; Gerber et. all., 2005; Hager, Brudney, 2008) distinguished the basic disadvantage growing into an obstacle for participation in volunteering – skills of an organisation to properly manage volunteering human resources. Most volunteers give the priority to sport organisations, especially religious ones. Volunteers consider them as distinctive, valuable activity of sport section (Cohen, 2008). In spite of giving priority to religious organisations, volunteers also participate in other sport and governmental organisations (Ellis, 1998), but these organisations have to obtain trust of a society, have perfect reputation, be distinctive and specific. Governmental organisations are substantial when providing volunteering services, such as police, fire brigade assistants, civil security, country defense solders volunteers and other (Duncombe, 1985; Sundeen, 1990; Brudney, 1990, 1995; Cuthill, Warburton, 2005). However, volunteering activities are rather episodic in these organisations. Taking Lithuanian organisations, this could be explained by the society's distrust in governmental organisations, such as Lithuanian Police Department which for a number of years takes first positions among the organisations people do not trust at all. Thus, people do not see any point to devote their free time for such institutions. Practical problems obviously appear in sport organisations. Lack of knowledge on management of human resources and practice could lead organizations to complicated situations. In case new volunteers are not properly trained and do not perform their duties professionally, an organisation itself remains responsible for this and its public image worsens. Thus, it is essential for sport organisations to manage human resources, such as volunteers' accountancy, planning, recruiting, adaptation, evaluation, development etc. It is important to mention that an appropriate management of human resources could reduce organisation financial expenses. Volunteers have to be recruited, selected, adapted, trained, motivated and these activities cost. It should be defined what employees of an organisation could do and how much assistance they need from free volunteers working force.

Management of volunteer human resources in sport organisations is an extended, interdisciplinary area covering various empiric researches. In Lithuania managing aspect of volunteer human resources in sport organisations is an uninvestigated phenomenon. Scarce fragmental research related to volunteers' motivation could be found, however, this research was performed by researchers of social work, psychology issues

etc. Subject analysis from managerial aspect is timely, relevant from scientific and practical standpoints. Problematic issue is concerned – what managerial activities of human resources are identified in sport organizations and how these activities should be controlled. Scientific problem – what problems of volunteer human resources management are identified in sport organisations and how they could be solved from managerial position. *Research object* – management of volunteer human resources in sport organisations.

Research aim is to research the factors impacting management of human resources in sport organizations and prepare the model for human resources management in sport organizations.

Research objectives:

1. To review researchers' attitude to volunteering as to an object of scientific research, revealing the variety of them.
2. To reveal inter dependence aspects of volunteering and sport organizations.
3. After analyzing theoretical aspects, to conclude theoretical model for management of volunteer human resources in sport organisations.
4. To make and describe empiric research logics and instrument for volunteer human resources management in sport organisations.
5. To research the appliance of theoretic model for management volunteer human resources in sport organisations in Lithuania.

Material and methods

Problem research level. Volunteering contribution to the labour market is substantial in all developed countries; it depends on social and economic conditions, appropriate culture, which is supported by democratic traditions and values. J. E. Bartlett, J. W. Kotrlik, Ch. C. Higgins (2001), A. L. B. Ulseth (2004), J. R. Šinkūnienė (2006), A. Petrauskienė (2007) research volunteering social integration issues in scientific literature; A. Kinzel, J. Nanson (2000), A. D. Strig, E. N. Jackson (2003) research demographic profile of sports volunteers, structure of inner motivation; D. Remenyi, B. Williams, A. Money, E. Swartz (1998), B. Enjolr (2002) focus on connection between paid and voluntary work; B. Enjolr (2003), L. E. Davies (2004) investigate economic significance of volunteering; S. C. Haas (2000), P. Downward (2005), I. Jonutytė (2006), A. Kucikas (2007) works are on volunteers expectations and motivation; L. Nausėdaitė (2002), A. Parish (2003), S. Meier, A. Stutzer (2004) analyse the ratio of human welfare when volunteering and refusing volunteering; L. Smith, D. Smith (1998), S. J.

Ellis (2002) analyse volunteering types and activities; W. G. Cochran (1977), P. Taylor (2003) go inside the nature of volunteering.

Scientific work relevance. Volunteering did not appear as an object of scientific discussions for a long time. Only by the end of the 20th century volunteering has become a subject of interest. However, volunteering in Lithuania is hardly researched, focusing attention on social aid to single groups – lonely children, the elderly, lonely mothers, the disabled (Jonutytė, 2006). Motivation is mostly investigated in volunteering, encouraging people to join volunteering activities, but not enough attention is devoted for overcoming all volunteering obstacles, encouragement, development of volunteering experience and skills, needs of a volunteer and an employer when they are already in organisation, and finally for investigation of potential volunteering programs development. (Haas, 2000; Downward, 2005; Jonutytė, 2006; Kucikas, 2007). As far as volunteers do not receive financial benefits for volunteering, they do not consider these activities as means of providing their living. (Enjolr, 2003; Davies, 2004). Thus, different reasons encouraging these activities should exist. For the purpose to maintain volunteers in an organization, it is vitally important to establish reasons why a volunteer desires to continue volunteering activities in an organisation. Fulfillment of needs, expectations and motives in volunteering activities contribute to satisfaction of work and encourage volunteers to pursue these activities (Nausėdaitė, 2002; Parish, 2003; Meier, Stutzer, 2004). Besides, three provisions of working activities are usually distinguished – work satisfaction, involvement in work and obligations to an organisation affect volunteer's behaviour. Scientific literature (Smith, Smith, 1998; Ellis, 2002; Taylor, 2003) analyses such problems: how social integration develops in voluntary sports clubs, comparing them with commercial sports centers and how this development could be explained; how sports volunteers demographic profile and of their inner motivation structure could be described; what connections appear on the level of volunteer organisation commercialization and individual contribution (voluntary activities); what is the significance of volunteering activities; how volunteers' motivation and expectations differ in the context of different genders; to what extent and how volunteering increases human welfare; what types of people are appropriate for volunteering; what is the nature of volunteering, its essence and problems; how and what support is provided to volunteers and their leaders. We should note that researchers of social work, psychology, educology and other sciences have mostly contributed to the research of volunteering; however, we lack research from

managerial aspect. Research works do not present sufficient analysis on methods of improving management of volunteering human resources, thus, this work is dedicated to that.

Theoretical significance of this work:

- Scientific literature and research on the subject of management of volunteering human resources are systemised.
- Various definitions of management of volunteering human resources are reviewed, considering authors interpretations, conceptions are provided.
- Grounding on scientific resources and empiric research, theoretical model for management of volunteering human resources in sport organisations is structured.

Practical significance of work:

- Appliance of structured model for management of volunteering human resources in sport organisations is tested (in empiric research) in Lithuanian circumstances.
- Analysis of drawbacks in management of volunteering human resources in sport organization is performed.
- Suggestions are submitted how model for management of volunteering human resources could help to improve results of sport organisations performance.

Research methods. Research was performed applying general research methods:

- *Analysis of scientific literature, systemization, concluding and comparison.* Applied for solving of research problems.
- *Qualitative and quantitative methods of research data processing. A questionnaire was* given for qualitative research data collecting. *Descriptive statistic methods* were applied to estimate the data obtained from empiric research. *Pearson and Kendall correlation analysis factorial analysis was performed* (*Kaiser-Meyer-Olkin coefficient* was calculated, *VARIMAX rotation* was performed), *Cronbach-alfa* coefficient value was calculated, *Chi square* criteria was applied. *Logic analysis* was additionally applied for hypothesis approval/deny. *Half structured (standardized) interview questionnaire* was used for qualitative research data collecting. *Qualitative content analysis conceptions* were applied for empiric research data evaluation.

Research limitations. Work object is management of volunteering human resources in sport organisations. Differences in racial, ethnic, psychological, cultural, family, employers, employees and volunteer's

attitudes, their causes and consequences were not analyzed; we limited ourselves only on general review. Correlation of sport organisations structure, size, capital etc. and other parameters was not analysed. Volunteers' movements in delegated positions or career planning, safety of volunteered activities were not researched.

Results

Theoretical model for management of volunteering human resources in sport organisations corrections are made grounding on obtained quantitative and qualitative research results Management of volunteering human resources in sport organisations begins from volunteers'accountability (data bank). (Fig.1).

Volunteers' accountability system has to contain personal data on every volunteer, statistics, internal and external information. Volunteers' accountancy system has to present such data collection mechanism which would ensure internal and external demands. Internal demand is the data on current and potential volunteers (identification data, volunteers desired positions, education, training, other information on knowledge and skills, assessment data, data required by authorities etc.). External needs are determined by the data established in Lithuanian Republic law and other legal acts, these could be: number of volunteers, average number of volunteered hours and other. NGO employee responsible for data collection has to choose an appropriate method for this collection. General data collection methods are various – document analysis, interview, questionnaire. Essential information has to be collected, processed and put into an accountancy system. The later one has to be practical for efficient use of the data. Data renewal in case it changes has also been assured. Volunteers accountancy has to march with volunteers planning and selection activities, exchange information and constantly refresh it. Analysis of volunteers' activities provides information on other activities, such as volunteer planning, recruiting, selection, adapting and training, movement managing, safety assuring and motivation. Two trends are distinguished in analysis of volunteer activities – regulation and evaluation of volunteer positions. Firstly, we have to analyse what voluntary activities are performed in NGO, what positions volunteers are needed for, what exactly a volunteer is intended to do in foreseen positions. Positions, duties regulations are defined considering volunteers' preparation to collect data, the process of collection, analysis of information and activities renewal. Such methods as structural interview, questionnaire, expertise, observation, records analysis etc. could be applied for information collection.

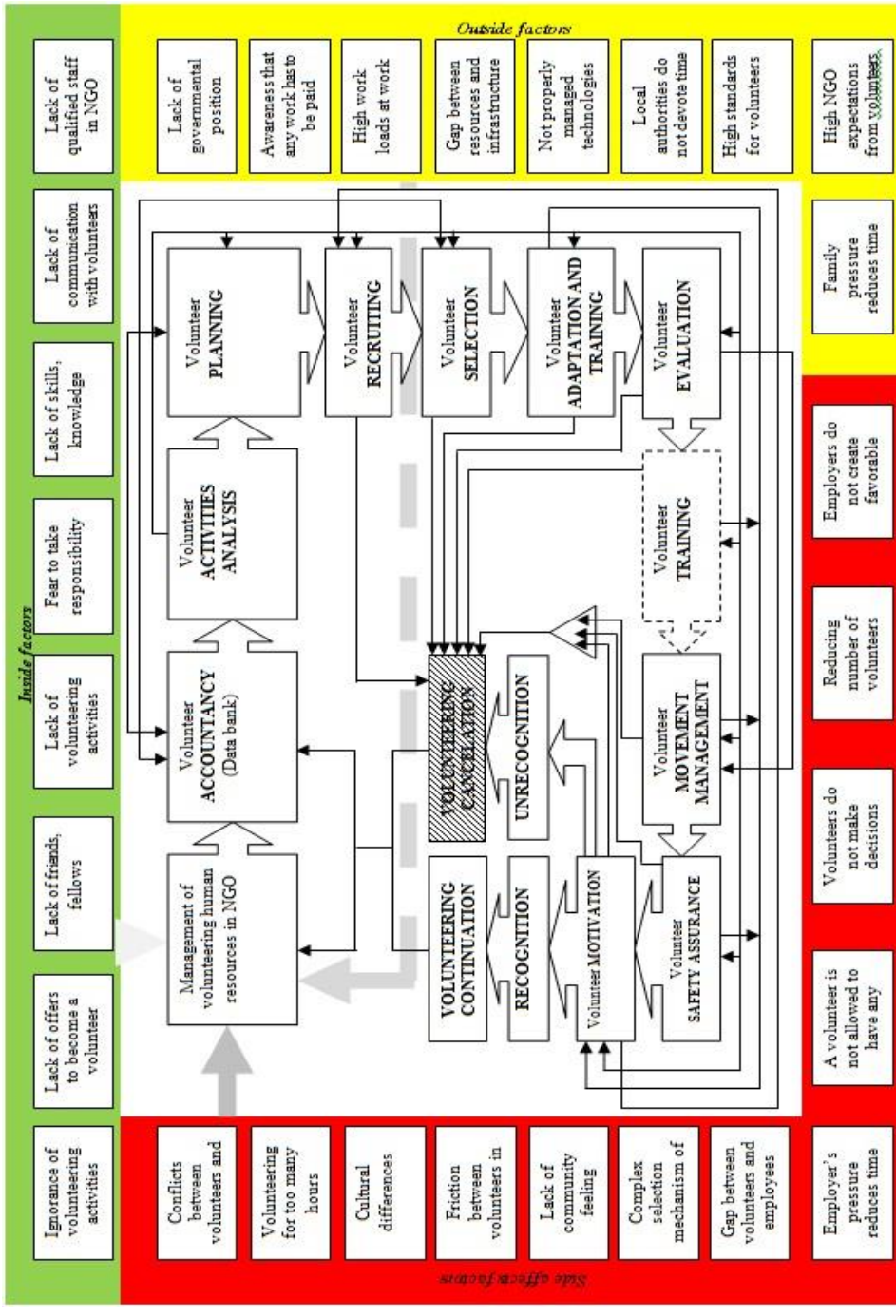


Figure 1. Management of volunteering human resources in sport organizations

Sport organisations have to plan volunteers as constant volunteer movement occurs. Movement is caused by different reasons, it could be age, health problems, pregnancy, emigration (on national and on international levels), various internal, external or even indirect factors, which could be named as irresistible factors, number of volunteers positions reduce or increase and other. Organisation of volunteer activities depends on the size of sport organisation and range of its activities. In case it is a big organisation, volunteer planning could be performed by separately formed volunteers' board in case an organization is small these activities could be performed by volunteers' coordinator. Volunteer planning begins from the establishment of volunteer demand and supply. Firstly an organisation has to establish the demand of volunteers, that is how many and what type of volunteers it needs. The following methods are applied to define the demand – methods relying on analysis of opinions, mathematical personnel demand calculation methods. Volunteer demand comes from two resources – internal and external. Internal resources comprise data bank created by volunteers, external resources could be school, universities, and as it is becoming popular nowadays, employment agencies.

Volunteer recruiting implies finding and recruiting potential volunteers. Volunteer recruiting firstly is supported by thoroughly planned volunteers' motivation policy. Motivation is essential, otherwise an organisation would fail to recruit volunteers, or not sufficiently motivated volunteers could be recruited and later cancel their volunteering.

Volunteer selection begins submitting a list of candidates and ends with volunteer admission. Selection process consists of candidates evaluation up to the information obtained from filled questionnaires, interview, test, recommendations etc. Specialists performing the selection are of vital importance. We should never forget that decisions related to volunteer selection are like a lottery. Responsibility should also be kept in mind though even a selected volunteer can leave an organisation and increase the rate of moved volunteers.

During an adaptation period a volunteer gets to know a sport organisation team, other volunteers, activities specifications, functions performed. Socialization is an inseparable part of adaptation. It serves for volunteers adjusting in an organisation. Volunteers are introduced with positions of their future activities; they are informed on organisation culture, values, instructed on behaviour standards. Adaptation period includes initial training; usually these are activities do not requiring specific skills or abilities.

In the period of volunteer's evaluation, performed activities are compared with the position descriptions, the position standards if such ones exist, objectives for volunteer position are analysed. Staff evaluating is close to management function. Insufficient evaluation could cause such actions as additional training of a volunteer or vice versa - good evaluation could become a reason for encouragement.

Volunteers' training is a purposeful activity, targeting to prepare a volunteer for better performance and for new positions. If a manager focuses on activities but not on potential, it could require very high standards. Standards could be reduced but it is impossible to higher them. Model training is applied in case a volunteer did not get enough training in adaptation period.

Volunteers as well as employers have opportunities for climbing career steps; this depends on volunteer's intentions, time, opportunities, knowledge, skills and other. Volunteer level positions are not equal, some are managerial, particularly responsible, there are positions requiring specific knowledge. Volunteer movement management is another tool for volunteers', seeking maximum targets, and motivation.

Volunteer safety assurance is one of volunteer human resources management activities. This safety is usually related to stress and conflicts management.

Motivation comprises a significant part of volunteering. Motivation rather frequently becomes the essential factor in volunteering; a volunteer's decision depends on his intention to remain a volunteer or not to remain. A volunteer's decision is based on the fact whether he is recognized or unrecognised.

Model itself, regardless the decision to continue or to cancel volunteering, requires renewing information system of data bank.

Model for management of volunteering human resources in sport organisations is like an infinite cycle, always opened to new volunteers and closed to problems, not desired in organisations. Problems comprise internal, external and indirect elements, which are identified, and located around this model with established negative factors which impact or could impact management of volunteer human resources.

Qualitative and quantitative analyses results evidence that the greater part of organisations do not perform any activities for management of volunteer human resources, small part perform some chaotic, single activities. Such sport organisations behaviour could cause one of the negative results – volunteer movement. After performed corrections the

model for management of volunteer human resources is ready for practical application in sport organisations.

Discussion

Estimating and generalising volunteering as an object of scientific research, conceptions presented by Lithuanian and foreign authors, it is established that volunteering is not an innovative phenomenon, on the contrary it is very old and having deep historical roots. Organised volunteering began in the second half of the 19th century.

It comes that volunteering has been performed not for material benefits, for a length of time, applying your own skills, without any force, on free will and do not suffering any financial loss. Volunteering is an essential part of every modern society. Citizens develop their skills and contribute significantly to community social and economical development through volunteering activities. The concept of volunteering implies different kinds of activities – participation in various levels and aspects of social life.

Volunteering characteristics:

- Unpaid;
- Performed on free will;
- Benevolent;
- Planned;
- Sustained;
- Performed in an organisation surroundings.

Having disclosed theoretical aspects for management of sport organisations and their possible impact to organisations results, it is proved that private organisations seek to relieve sufferings, to represent the interests of disadvantaged, to care environment, to provide social services, encourage development of society. Activities of sport organisations are usually grounded on moral values; they fully or partly depend on charity or volunteer services.

Possible threats were defined, which could escape the competence of management authorities, thus, attention should be focused on hired managerial personnel. The later one forms organisation policy, establishes volume of activities, manages and really controls its resources. Competition frequently occurs for income, positions but not for organisation mission or aims.

Theoretical aspects of management of volunteering human resources have been analysed and essential management of volunteering human resources activities in sport organisations are defined:

- Volunteer accountancy

- Analysis of volunteer activities
- Volunteer planning
- Volunteer recruiting
- Volunteer selection
- Volunteer adapting and training
- Volunteer evaluation
- Volunteer training
- Volunteer movement management
- Volunteer safety assurance
- Volunteer motivation.

Management of volunteer human resources differs from business sector. Volunteers are less dependable on an organisation than people who earn their living from it. Volunteers as a rule can leave an organisation and look for more favourable perspectives with less effort and discomfort. As a consequence volunteers themselves do not receive as much control as paid personnel in an organisation. Standard means of employees' encouragement in an organisation such as rise of salary, higher position, some privileges, are not applicable to volunteers.

Meanwhile it is proven that trust building, cooperation, team work, challenges, improvement, rewards, values and obligations appear much more efficient management means for employees than the traditional ones.

Questionnaire survey method enabled to obtain qualitative research data. Questions in the questionnaire are clearly formulated, understandable, having single meaning and adequate. Half structured interview method was applied for data receiving in qualitative research. In this case interpretive standpoint to management of volunteering human resources in sport organisations is presented. Qualitative research was performed grounding on qualitative content analysis conception. Analysing transcribed interview text, categories up to the key words were distinguished; the content of these categories was divided into subcategories. Both categories and subcategories were interpreted and justified. Half structured interviews were chosen for the purpose to give open questions, which could be extended during the interview and balance the course of the interview.

Application of qualitative and quantitative method performing of the research determines internal and external validity assurance:

- Full rate of essential researched phenomenon characteristics is revealed, due to greater volume of data (internal validity);
- Results generalization is more objective (external validity).

The work relies on the provisions of qualitative and quantitative research adjustment and independence:

- Qualitative and quantitative researches are independent, applied coherently;
- Phenomenon research begins from qualitative methods application;
- Qualitative and quantitative researches are performed in different grips, existing in researched social reality.

Empiric volunteering activities process management in sport organisations research is composed of two parts:

- Respondents with volunteering experience and without it were questioned in quantitative research seeking to clear up the later attitude to volunteering activities and create typical profiles of them.
- Qualitative research included questioning of experts, aiming to evaluate occurring activities in sport organisations, to adjust results, to create model of management of volunteering human resources in sport organisations.

Conclusions

Performed experts questioning using half structured interview method evidenced that certain similarities and varieties of sport organisations activities analysed in theoretical part are observed. It is established that volunteering human resources are not properly managed in sport organisations. Many executive managers recognised the situation and admitted lack of knowledge and competence.

Quantitative research established that:

- Huge working loads in working place become the greatest internal obstacle for preventing to joint volunteering. External factor comprised the lack of local authorities' attention and funds for organisation supervising and development.
- Larger part of respondents who participate in volunteering are members of sport organisations. Besides, they are absolutely free to submit offers to the management of an organisation.
- Most respondents perform activities related to aid for children and youth. Factorial analysis provides an opportunity to state that three factors with single elements exist preventing to join volunteering, namely human's internal factor, human's external factor and indirect factor, which could be caused by an employer and which is out of person's control.

References

1. Bartlett, J.E., Kotrlik, J.W., & Higgins, C.C. (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research. *Information Technology, Learning, and Performance Journal.* 19 (1).

2. Brudney, J.L. (1990). Training in Volunteer Administration: Assessing the Needs of the Field. *Journal of Volunteer Administration*. 9.
3. Brudney, J.L. (1995). The Daily Point of Light Awards: An Analysis of Recipients and Effects. *Journal of Volunteer Administration*. 13.
4. Cochran, W.G. (1977). Sampling Techniques (3rd ed.). New York: John Wiley & Sons.
5. Cohen, R. (2008). Volunteering by the Numbers. The Nonprofit Quarterly. Fall.
6. Cuthill, M., & Warburton, J. (2005). A Conceptual Framework for Volunteer Management in Local Government. *Urban Policy and Research*. 23 (1).
7. Davies, L.E. (2004). Valuing the Voluntary Sector in Sport: Rethinking Economic Analysis. *Leisure Sudies*. 23 (4).
8. Downward, P., Lumsdon, L., & Ralstonc, R. (2005). Gender Differences in Sports Event Volunteering: Insights From Crew 2002 at the XVII Commonwealth Games. *Managing Leisure*. 10 (4).
9. Duncombe, S. (1985). Volunteers in City Government: Advantages, Disadvantages and Uses. *National Civic Review*. 74 (9).
10. Ellis, S.J. (1996). From the Top Down: The Executive Role in Volunteer Program Success. Revised Edition. Philadelphia: Energize, Inc.
11. Ellis, S.J. (1998). Volunteerism and the Government Sector.
12. Enjolras, B. (2002). The Commercialization of Voluntary Sport Organizations in Norway. *Nonprofit and Voluntary Sector Quarterly*. 31 (3).
13. Enjolras, B. (2003). A Governance-Structure Approach to Voluntary Organizations. *Nonprofit and Voluntary Sector Quarterly*. 38 (5).
14. Gazley, B., Brudney, J., L. (2005). Volunteer Involvement in Local Government Post-9/11: The Continuing Question of Capacity. *Public Administration Review*. 65.
15. Gerber, B.J., Cohen, D.B., Cannon, B., Patterson, D., & Stewart, K. (2005). On the Front Line: American Cities and the Challenge of Homeland Security Preparedness. *Urban Affairs Review*. 41 (2).
16. Haas, S.C. (2000). Virginia Save Our Streams (SOS): Volunteers' Motivations for Participation and Suggestions for Program Improvement. *Leisure Studies*. 24 (4).
17. Hager, M. A., & Brudney, J.L. (2005). Net Benefits: Weighing the Challenges and Benefits of Volunteers. *Journal of Volunteer Administration*. 23 (1).
18. Hager, M.A., & Brudney, J.L. (2008). The Impact of Volunteering on Successful Aging: a Review with Implications for Program Design. *Voluntary Action*. 9 (1).
19. Johnson, N. (1981). Voluntary Social Services. Oxford: Blackwell & Robertson.
20. Jonutytė, I. (2006). Jaunųjų savanorių motyvavimas tęstinei socioedukacinei veiklai su vaikais. Pedagogika. 83.
21. Kinzel, A., & Nanson, J. (2000). Education and Debriefing: Strategies for Preventing Crises in Crisis-Line Volunteers. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*. 21 (3).
22. Kučikas, A. (2007). Savanoriškos veiklos samprata Lietuvoje ir Vakarų Europos valstybėse. *Apie savanorišką veiklą: straipsnių rinkinys*. Kaunas: Kauno kolegija.

23. Meier, S., & Stutzer, A. (2004). Is Volunteering Rewarding in Itself? *Economica*. 75 (297).
24. Mele, V. (2008). Streamlining Volunteer Management Through ICTs: the Case of Sidelines. Chapter XIII. Challenges for Volunteer Management. Edited by Matthew Liao-Troth. Idea Publishing.
25. Meliski, J., & Holzer, M. (2007). Assessing Digital Government at the Local Level Worldwide: an Analysis of Municipal Websites Throughout the World, in Norris, D. (Ed.). *Current Issues and Trends in E-Government Research*, Cyber Tech, Hershey, PA.
26. Moynes, A. (1966). Volunteers in Development. Overseas Development Institute, London.
27. Penner, L., A. (2002). Dispositional and Organizational Influences on Sustained Volunteerism: an Interactionist Perspective. *Journal of Social Issues*. 58 (3).
28. Petrauskienė, A. (2007). Health Behavior of Families Having Preschool-Age Children. *Medicina (Kaunas)*. 43 (10).
29. Rehnborg, S.J., & DeSpain, M. (2003). Investing in Volunteerism: Recommendations Emerging from the Study of The Impact of Volunteers in Texas State Agencies. *Journal of Volunteer Administration*. 21 (2).
30. Remenyi, D., Williams, B., Money, A., & Swartz, E. (1998). Doing Research in Business and Management. London: Sage Publications.
31. Safrit, R.D., & Schmiesing, R.J. (2004). Toward a Model for Contemporary Volunteer Management: Qualitative Research Linking the Literature With Best Practice. *The Journal of Volunteer Administration*. 22 (4).
32. Šinkūnienė, J.R. (2006). Kūrybiškumo aspektai socialiniame darbe. *Socialinis darbas*. 10 (1).
33. Strigas, A.D., & Jackson, E.N. (2003). Motivating Volunteers to Serve and Succeed: Design and Results of a Pilot Study That Explores Demographics and Motivational Factors in Sport Volunteerism. *International Sports Journal*. 7.
34. Sundeen, R.A. (1990). Citizens Serving Government: The Extent and Distinctiveness of Volunteer Participation in Local Public Agencies. *Nonprofit and Voluntary Sector Quarterly*. 19.
35. Taylor, P., Nichols, G., Holmes, K., James, M., Gratton, C., Garrett, R., Kokolakakis, T., Mulder, C., & King, L. (2003). Sports Volunteering in England. Sport England, London.
36. Twelvetrees, A.C. (1991). Community Work. Macmillan Education.
37. Ulseth, A.L.B. (2004). Social Integration in Modern Sport: Commercial Fitness Centres and Voluntary Sports Clubs. *European Sport Management Quarterly*. 4 (2).
38. Vigoda, E. (2002). From Responsiveness to Collaboration: Governance, Citizens, and the Next Generation of Public Administration. *Public Administration Review*. 62 (5).

Submitted: April 21, 2015
Accepted: June 12, 2015

REVIEW PAPER

FAIR PLAY IN THE PHYSICAL EDUCATION CURRICULUM

Yutaka Miura

Hokkaido University of Education, Asahikawa Campus (HUEA)
Address: 9-Hokumoncho Asahikawa, Box: 070-8621, Japan
E-mail: miura.yutaka@a.hokkyodai.ac.jp

Abstract

At this time of rapid change in society, what kind of educational role must the physical education curriculum and sports instruction play? As a matter of course, the teacher assesses the ability of the students as a specialized leader of sports and must stretch it out to achieve competitive success. However, if the teacher enthuses about victory in excess, the corporal punishment that can be called violence might be caused [(15)]. In this case, the teacher doesn't recognize the underlying principle that physical education and sports instruction is vital to the development of rounded human beings as future citizens. Sadly the consciousness of this principle by some educators is missing. For this reason, a return to a basic standpoint of education is proposed, where the physical education class is a core subject of school education. This study proposes further enhancement and development of the physical education curriculum from a viewpoint of pedagogy. In the first half of this study, the definition and meaning of the phrase "fair play" was analyzed in terms of education, and how this phrase was used and meaning it has in Japan was assessed. The key findings were that the phrase "fair play" came to be used gradually in society but the spread of the concept didn't reach the physical education curriculum. Educationalists seem to have regarded fair play as learning of "knowledge and attitude", but the process of "thinking" isn't included in this interpretation. At the same time, it has been understood by some that the real value of the concept of fair play is where the sports practice unit and the physical education theory unit are linked to influence attitudes and social and life skills not only in school life but also the future lives of students as rounded citizens. The concept of fair play which encapsulates such educational value, as essential to human development (formation of character) as a basic principle of all of education, is therefore considered to be one of the major and essential roles of physical education teaching in modern society. The inclusion of the concept of "fair play" in the physica

education curriculum will ensure that the learning outcomes seek to develop the long term health and well being of students as future good citizens. This will mean the previous limited focus on improving physical fitness, sports skill acquisition, and competition will be built on thereby equipping students better for their time in school and in future social life.

Key words: *fair play, physical education curriculum, human development, formation of character*

Introduction

In 2008, the junior high school curriculum guideline and course of study was revised in Japan, and a "significance of sport as the culture" unit was set in "the theory of sport and physical education" of junior high school in the third grade newly. All the guidelines for schools courses of study have statutory legal status in Japan. In this unit, there is a section entitled "the cultural significance and role that international sport events have played", and the phrase “Olympic” appeared in it for the first time. Teachers now provide instruction mainly on the Olympic Games (the Paralympic Games or the Youth Olympic Games, etc.) in a class.

In promoting the Olympic Games, the International Olympic Committee (IOC) attaches great importance to the environmental issues after the 1970s. It is the result of citizens becoming sensitive to the impact on the environment and social life as each country promotes economic development. It is suggested that the IOC which promotes these international sport events wasn’t able to ignore it. This environmental issue is present now in both the summer and the winter Games. The present situation is that various other problems have occurred besides the environmental problems, such as energy consumption, economical problems, an athletic (competition) regulation, and doping. How should the teacher teach about these issues in the Olympic Games? The teacher should not teach only about the good side of the Olympic Games, but should probably point out the problems and issues the Games has experienced and could also strengthen the critical analysis for students.

It is important, however, to remember that the physical education class is of course part of a basic education. In other words, the class content isn’t only about learning the Olympics. Students should also apply the learned knowledge, and should utilize it for sport activities and their social life in the present and the future. Therefore, the teacher explains the good and not so good sides of the Olympic Games and gives students more than just a basic knowledge about the Olympic Games. Next, the teacher must let

students think about both the educational significance and the ethical values that Olympic Games have.

The cyclical learning (complimentary mutually), such as "knowledge ⇔ thinking and judgement" is fundamentally effective for learning. And for learning to join both together, the concept to become the grounds or the criterion of thought is required. Therefore, the author examines the concept of the phrase "fair play" as currently used in Japan and discusses about the design of the physical education class in this paper.

This study is aims to identify improvements of the physical education class. The author believes that the concept of "fair play" should be one of the key educational and ethical contents of the physical education class.

Material and Methods

In this study, the books (encyclopedias, dictionaries or guidelines) published after the 1970s in Japan (vid. Table1 and the details are cf. References, 13 in total) were made into the research objects. The contents of the descriptions of "fair play" shown in them were analyzed and examined from the view point of physical education pedagogy (teaching methods of physical education). Next the words fair (play) described in the current version of the guidelines (curriculum) for junior high school course of study (the volume on health and physical education) and its commentary were examined.

In order to analyze how the physical education class is performed at the present time, the present version (latest edition) of the guidelines (curriculum) and the commentary were considered to be the research objects to consider how "fair play" is handled in those. In addition, the Japanese Supreme Court decided that "the guidelines (curriculum) for school course of study" of all subjects have a statutory legal status.

Results

The phrase of "fair play" in Japan

In recent times in Japan, the phrase "fair play" has come to be known only gradually. The phrase is one of the well known words of foreign origin. This phrase has already been described in the book of "Riron/Jikken Kyougiundou[1)]" in their publication in 1904 (note1). The exact time that, however, the phrase "fair play" has come to be generally used isn't certain now. Table 1 is the list of the existence or non-existence of the term fair play item described in the above mentioned books.

Table 1

Existence or nonexistence of fair play item

Nr.	Title	fair play	pub. year
1.	Gendai Supo-tsu Hyakka Jiten	-(*1)	1970
2.	Taiiku Kagaku Jiten	○	1972
3.	Gendai Gakkoutaiiku Dai Jiten	-(*2)	1973
4.	Supo-tsu Yougo Jiten	○	1975
5.	Shinsyuu Taiiku Dai Jiten	○	1976
6.	Supo-tsu Kagaku Jiten	-(*3)	1981
7.	Shinban Gendai Gakkoutaiiku Dai Jiten	○	1981
8.	Saishin Supo-tsu Dai Jiten	-(*1)	1987
9.	Gakkoutaiiku Yougo Jiten	-	1988
10.	(NichiDokuEiFutsu-Taisyo) Supo-tsu Kagaku Jiten	○(*4)	1993
11.	Saishin Supo-tsu Kagaku Jiten	○(*5)	2006
12.	Chugakkou Gakusyu Shidou Youryou = the guideline for junior high school course of study	○	2008
13.	Chugakkou Gakusyu Shidou Youryou Kaisetsu = the commentary of the guideline for junior high school course of study	○(*6)	2008

12 Chugakkou Gakusyu Shidou Youryou and 13 Kaisetsu are abbreviated to "the guideline" and "the commentary", hereinafter.

There is no reference to fair play in 1, but this phrase has been explained in relation to the definition of "sportsmanship". It seems that term phrase "fair play" was used at the beginning of 1900's as a part of the contents of the word; ex) "kyogido", meaning an athlete's special character, contestant's soul, athletic soul, sportsmanship or sportsman spirit. For this reason, it is historically thought that fair play was introduced especially as a part of the contents of the phrase "sportsmanship" in Japan (*1). Fair play is explained here in the foreword as "a social system, custom and sport (fair play)" with 2. In this encyclopedia, unique interpretation is considered to be it, not general explanation about the phrase "fair play" (detailed below). There is the item called Fair Play Award, but there isn't the item called fair

play in 3 that is the encyc. for school physical education (*2). Fair play item was added to 7 (new publication) published eight years later than 3. With 4, general contents of fair play are explained briefly.

There is the fair play item in 5 that is the general physical education encyclopedia. The phrase fair play is explained in detail over a half page. Most of the explanation of the contents are the interpretation of the writers, however, and these contents which are common, were understood. 6 is the encyc. of the Japanese editions which Peter Röthing edited. This doesn't have the item of the word fair play. Fair play is shown with → fairness (vide→fairness) (*3).

Although 7 has an item of fair play and this is generally explained most contents are the same as 5. Reference 8 is the authoritative encyc. which the Japan Amateur Sports Association supervised and was published 11 years after 5, but there isn't a reference to fair play. As for fair play, it is only explained in connection with the sportsmanship in the sportsmanship item.

9 is a dictionary for school physical education teachers, but there isn't a fair play item. 10 is a Japanese edition of the dicationary entitled "Wörterbuch der Sportwissenschaft : Deutsch, Englisch, Französisch." This is the dictionary of four languages and was supervised by German Beyer. E. The English translation doesn't have the item of fair play and cf. is fairness (vide→fairness) (*4). The Japanese word for "fair play" is transcribed into the word of "fairness" in English, "fairneß" in German and "fairplay ou franc-jeu" in French in this. The explanation is similar to many Japanese encyclopedias. The encyc.11 is published in later years and specialized in physical education and sport. The phrase fair play is listed three times and every domain has an item in this. The domain is in three parts-games, sport ethics and youth sport. In addition, it is listed in the sentence of the associated item three times (*5). In all items, it is explained in the general contents including "the justice of fair play, rule observance and the ethical norm".

In 12 the guidelines(curriculum), this phrase has been used(note2) only four times. In 13, the commentary, the phrase "fair play" isn't described (*6, note3), but it is used 14 times in total as an adjective and an adverb i.e. the word to be fair. For example, like "fair play (fair play ≠ fairplay)", and "compete fairly."

On the other hand, the phrase "sportsmanship" is used in present Japan. In this phrase the male term is used. Therefore, there is the person using the phrase the "sportspersonship", but this word isn't common.

In 1983, the translation of a book of "fair play (1979)" by the Briton Peter McIntosh was published (note4). Therefore, the phrase “fair play” begins to be gradually used as a part of the contents of the sportsmanship from the about 1970s, and it is thought that it spread from then. At that time, however, there was no common understanding of the concept of either term yet, and those different points weren’t clear.

In the physical education class, the phrase "fair play" is used, but it is only about the sport scene. When students play games as a player, it is the instruction about the mental attitude for encouraging action as an athlete, the teacher instructs; "Make an effort! Hustle, hustle!" In addition, it is important the instruction in the attitudes and understanding of the rules of "fair play" is given to players by teachers e.g. saying; "Follow the fair play rule and play the game! Be supportive!" It is the instruction about the attitude as well as the game. True sportsmanship is a mental attitude like the will and the interest for play, etc., and fair play is a moral attitude like knowledge and the understanding of the rules, etc.

In the previous physical education class, there were many situations that the phrase the "sportsmanship" was used for. In later years, however, both terms are used as a similar meaning word "sportsmanship ≒ fair play", because both of them are the components of the same attitude. Therefore, the way the phrase of "fair play" is used is ambiguous now, and their interpretation varies by the researchers.

Fair play in the guidelines(curriculum) and the commentary. This term “fair play” which is common in modern Japan, is also used in the physical education class to learn about sport. Where this phrase is described is only part of the section covering "the grade objectives" and "the attitude of ball games."There is little reference as the term is described only four times in total. In other sport events, like the case of interpersonal events such as judo, kendo and sumo, this word isn’t used in particular. In the swimming the phrase "fair play" can’t be found either. It is certainly one of the important things as the content of the sport learning to take fair attitude when students are taught in ball games.

The word of fair play is pronounced "feapure-" the same as English in Japanese. There isn’t a pronunciation difference between "r" and "l" in Japan. This word is usually often used about the playing of sport. In addition, there is as an antonym (anti-meaning word) of fair play, the word of "unfair play" not "foul play" in English is used.

In the case of the curriculum guideline, the "fair play" word has been described in the third item of the school grade objectives in $1^{st}/2^{nd}$ and 3^{rd} grade (total 2 places). The contents are described as follows:

- "1st/2nd grade objectives (2) To enable students to motivate fair play, cooperate with one another and accept their responsibilities through experiencing competition and cooperation in sport and to develop the attitude of making efforts to the best of their ability while paying attention to health and safety."

- "3rd grade objectives (3) To enable students to motivate fair play, cooperate with one another, accept their responsibilities and participate through experiencing competition and cooperation in sport, and to develop the motivation to be familiar with sport in each life stage while paying attention to health and safety."

In addition, the curriculum commentary explains instruction contents in more detail than the guideline. The word of fair play, however, isn't described in it as one word. All there is a description called "fair ..." The historic investigations or the detailed analysis by the English dictionaries will be necessary in the future to establish what kind of difference point is in "fairplay" and "fair play". A noun has been given one word in the Japanese grammar, and no blank between words. It is in the present conditions that "fair play or play fairly" in Japanese is translated into "fair play" as per the meaning by the English translation. Both have been similarly treated. Fair play should be applied in all sport that students learn at school for all sport events mentioned above, for the reason why fair play is listed in the curriculum objectives of all school grades.

Instruction contents

This is the content of the instruction that the teacher performs for students in a physical education classes.

As for the instruction contents of the field of physical education (practical exercise area), three areas of "skill", "attitude" and "knowledge, thinking and judgment" are shown in the commentary. The instruction ratio of each item isn't described in it, but the teacher must instruct about all three items for students. In addition, the class of the theory of sport and physical education "cultural significance and role that international sport events serve as" isn't a practical exercise area (later description). Because there isn't a "skill" item in the commentary, the contents become "understanding" of knowledge in "knowledge, thinking and judgment" in it.

Fair play in the ball games area. The term "fair play" shown in the curriculum guideline and the commentary was examined as follows;- In the instruction contents of each sport events, the phrase "fair play" has been described only in the context of "attitude" (total 2 places). Specifically, it is described as follows:

- "1st/2nd grade attitude (2) To enable students to actively engage in ball games. To enable students to strive to observe fair play, fulfill one's own responsibilities, and take part in discussions on game plan, as well as to enable students to mind health and safety."
- "3rd grade attitude (2) To enable students to independently engage in ball games. To strive to hold fair play in high esteem, fulfill one's own responsibilities and contribute to discussions on game plane, as well as to enable students to maintain health and safety."

In addition, there isn't a description of "fair play" in the commentary, it is referred to as "play fairly", as having mentioned above. The number is 14 times, and the breakdown is as shown in Table 2.

In this table 2, the word of "fair" is often used as an adjective "fair." And same time, it is also used as an adverb "fairly." I doubt why the word of "fair play" isn't described as a noun by one word (fairplay) though the word of fair play is becoming common at present in Japan.

From the view point of pedagogy, however, the term "fair play" made an important point in the instruction on "play" and the word of "play fairly" put it on "fairly". This is because the word to be fair or fairly is an adjective and the adverb is often used as a same meaning of "fair ≒ just/impartial ≒ right" in Japan. About this, more detailed examination is required in the future.

Table 2

List of "fair/fairly"

	number
fair play	10
fair behavior	1
play fairly	1
compete fairly	2

In any case, "fair .../... fairly" is shown as the contents of the attitude and doesn't describe as the contents of "thinking and judgment" in the commentary.

Fair play in outdoor sports events. The reason to take up the area of outdoor sports events is that the relation between sport and the various environments problems have become closer in recent years in the world. In studying natural environments, students learn science. For the physical education class with regards to the outdoor sport, "knowledge and understanding" and "thinking and judgment" about natural environments are required. Because, it is that "natural environment ≒ sport environment".

Only in swimming has been picked up in the curriculum commentary as an event of outdoor sport. Skiing and skating have only been really learned in the northern part, the cold and snowy area in Japan, but these events aren't described in the curriculum commentary. The reason why this isn't described, isn't clearly shown in it. Probably, the reason is that winter season sport doesn't have a nationwide appeal.

The term "fair play" has not been described in the instruction contents of swimming. It has been described in the detailed curriculum contents to "strive to keep the rules and accident prevention in swimming", but there is no description of the attitude of a sport person about the property of nature called the water and the sport environment of the pool containing the water. The indirect instruction of nature merely only teaches students the rule of "When swimming, let's put one's cap on one's head." Although the related thing, "value the rules and manners" as the contents is described in the curriculum commentary, this is the contents of "attitude" of how to learn.

After all, neither the term "fair play", nor related contents are described in the "knowledge, thinking and judgment" item.

Fair play in the area of "Budo" (judo, kendo and sumo = martial arts)

In the commentary (1st and 2nd grade), the objectives of attitude are described as following:

- *"(2) To enable students to actively engage in budo: To enable students to respect one's opponent, strive to uphold the ways of traditional conduct and fulfill one's own responsibilities, as well as to enable students to mind health and safety, such as not using prohibited skills."*

Although there is no mention of "fair (or fair play)" in this place, there are contents of "respecting a partner (opponent/adversary)" as semantically related words. Thus "respecting a partner" is the content of "attitude", and is understood also as a one aspect of fair play. This content wasn't derived from the concept of fair play, however, and was invented from the educational feature of martial arts as a historical sport of Japan. Also in the area of these martial arts, "respecting a partner" is showed as the contents of "attitude." In Budo area, the contents about fair play aren't also the contents of "thinking and judgment."

Fair play in the class (theory of sport and physical education) of "the cultural significance and role that international sport events served as". "The significance of sport as culture" unit has been newly introduced into the guideline and commentary which were revised in 2008. The Olympic Games have been taken up in this unit. This class is mainly a class

to learn knowledge not a practical study (students learn in a classroom). Specifically, it is described as follows in the guideline;

- *(1) To enable students to understand the significance of sport as culture*
- *(a) Sport are important for leading a cultural life and living better*
- *(b) The Olympics, international sport events and the like, play a major role in international goodwill and world peace*

And this class of "the cultural significance and role that international sport events served as" is described in the commentary as follows;

To enable students to <u>understand</u>: Olympics and the international athletic (sports) meets play the large role in international goodwill and global peace, through deepening people's mutual understanding by telling the educational significance and the ethical value which sport have to people all over the world.

Neither the concrete contents nor methods are described in it. "Understanding" is that students remember the given knowledge "A is B" as it is. They will merely remember only the result as a form without thinking about the contents (acquisition of the "knowledge"). But, will it be really possible to understand without thinking?

When a question is asked "What do you think about A?", how should students who know only the knowledge of "A is (=) B" answer? It is necessary that students think why it is so and the reason why in order to internalize "learning to understand." It may be said that it is the true understanding to pass through the stage of "think, and understand" ("understanding ⇒ knowledge"). It becomes the foundation to understood knowledge in this stage. Next, the understood knowledge is utilized and a new subject is grappled (knowledge ⇒ "thinking and judgment"). And when students meet with the new problem which isn't understood, newer knowledge is explored and it is considered. Students develop the ability to be able to explain their thought to friends. This is the learning that is cyclical learning (complimentary mutually) such as "knowledge ⇔ thinking and judgment."

The contents learned by a practical exercise area and the theory of sport and physical education mean that a student thinks by himself taking advantage of it, after learning fundamental knowledge, such as the rule, the judging method and commencing time of the Olympic Games ("thinking and judgment"). Students could not have their own thought about the environmental problem etc. of the sport which poses a social problem, if this isn't covered.

Therefore, the concept of fair play should be a requirement to be explained as of educational significance and the ethical value of the

Olympics in this class. In an actual class, it is educationally effective that the teacher introduces the concept of fair plays and an example of unfair play. It is educationally very important that students learn about the importance to live in society fairly as a responsible citizen, including sport activities. It is the ultimate role of education in forming and nurturing human character.

Discussion

If the physical education class is only for the education of sport from beginning to end, the teacher might only have to bring up the elite athlete who has wonderful ability and skill. It is understood that students learn about sport through the instruction of the teacher, and only skill or knowledge which was learned will be important in learning by this method.

The most important thing is that the presupposition of the physical education class is education. Physical education is education, so we must not forget that physical education is the subject which helps the human being in formation of character, through the physical education class experiencing the learning of exercise, practical sports and the theory. I think that the concept required in order to perform such learning is "fair play." It is because the concept of educational instruction which includes both sports and the theory of sport and physical education is required in order to connect, form and secure the cyclic learning of "knowledge ⇔ thinking and judgment" (above mentioned).

The explanation about the concept on "fair play" currently introduced in Japan is various. There are the following contents which are served as grounds to locate fair play in the physical education class.

1. Fair play is required by all the sport events held based on the rule [11]. This content includes not only ball games (the curriculum commentary), but also the theory of sport and physical education which concern sport and events.

2. Through fair play, the person realizes the establishment of the self in others. It is based on the social relations and correlation of self and others. It contains the simultaneous formation of human character between oneself and others developed in the sports world of "performing by oneself" [3].

Fair play in the sense of "following the rules" and "competing fairly" is of course important as educational instruction. But, is this fair play attitude to be required only in the sport setting? Isn't it necessary for the everyday life that a person leads as a social life? The answer is very clear.

The result of the physical education class should be connected not only with the sport merely but also with the present and future formation of human character. The educational instructions that students can think about

feeling and behavior as a person by oneself is very important to the physical education class as human character formation.

In order to carry this out, two instructions are needed about "fair play." One is ability ("knowledge and attitude") to be taught and the other is ability ("thinking and judgment") to think. The learning that is the cyclical (complimentary mutually) is essential for the human being formation of character called establishment of the self by learning fair play. This learning way is the circulation of "think ⇔ understand ⇔ know ⇔ and think ⇔ and know ⇔ and understand".

In other words, it is also important to follow the rules as a sport person, and it is also important that to understand as a human being "what kind of thing is important to prevent us from polluting precious water." Similarly, it is that students feel natural environments as beauty, and splendour the severity of winter nature with his skin, in sport to be played in outdoors such as skiing and skating. It is important that students can understand the winter benefit and product like skiing and skating in such environment. This is also the way of thinking of fair play for nature and the sport environment. Such instruction has clear educational worth that physical education of the human being is also about the formation of character.

In the class of the theory of sport and physical education, for example, the teacher takes up the legacy of the Sapporo Winter Games. The teacher takes up the deforestation of Mt. Eniwa as an environmental problem, after offering general knowledge to students. This is a familiar example for students. "What do you think about cutting down trees in the national country garden? (Fig.1)"

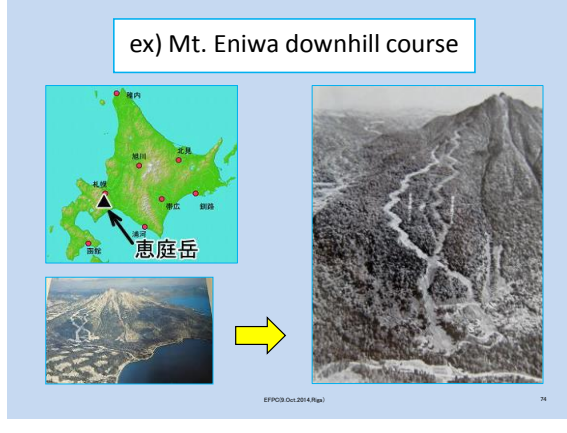


Figure 1. Topic 1 of the theory of sport and physical education

Moreover, it is a familiar example now that the skating photograph of Kim Yu-na in Vancouver Games period was taken and it was published on the next day as the handbill and the internet advertisement of her sponsor company in her mother country (Fig.2).

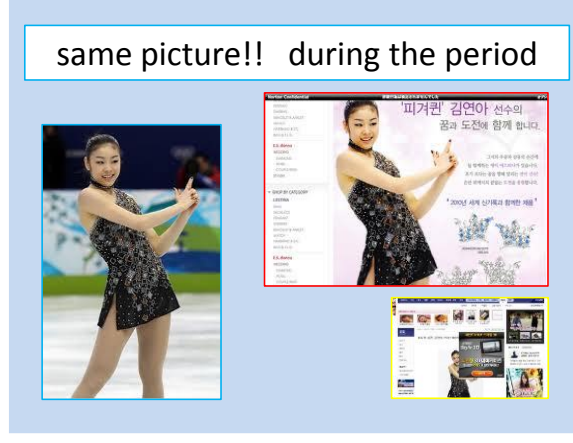


Figure 2. Topic 2 of the theory of sport and physical education

It is a method that the teacher introduces the Olympic Charter and lets students think about this photograph as a commercialism problem in a group or as individuals. There is the example that the length of ski jumping would be calculated by a formula, too. "How do you think about this called group victimization for Japan? Is it really fair to make BMI as the standard?" (Fig.3). There isn't the concept of fair play worldwide now. The concept needs to be taken care of now and very carefully in the future.

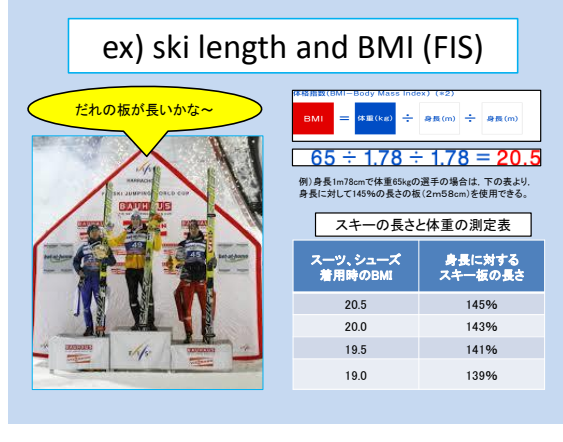


Figure 3. Topic 3 of the theory of sport and physical education

Conclusion

While the social circumstances of every country in the world change, what kind of role does physical education as a subject of the curriculum commentary play? In the physical education class, it is a condition that instruction in sports skill is a focus. May the concept of “fair play”, however, only be covered in the sports instruction lessons? Supposing that is right, fair play is then an effective concept only in a sport scene. It is the formal rule (fundamental ethical conduct).

It is important that students learn about fair play both as knowledge and as a value within the physical education curriculum. Moreover, it is essential to the formation of human character through physical education. What kind of role should the physical education curriculum play in this formation of human character?

The formation of human character means that a person establishes one's self ego socially. Students don't merely learn only knowledge and understanding: They are required to think about it, to use it practically and utilize it effectively. The concept of fair play isn’t only for the sports context, it is necessary for the concept to be reflected usefully as a social/life skill in the present and the future lives of individuals as whole people.

Anyway, the important thing in Japan is that the concept of fair play is reflected in the government guidelines and the curriculum commentary for junior high school study and in the physical education class.

"Center on the fair play" is described as an athlete's generosity and courtesy by explanation of the item of a "kyougidou." At this point, English word of "fair play" has already been translated into Japanese "fair play."

Present version of "the guideline for junior high school course of study" is translated into English on HP (temporary translation) of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), but there isn’t an English version of the commentary.

By the curriculum commentary, there is no word of "fairplay", or the expression called "fair play" is described as "fair .../... fairly."

Since this research is targeting the encyclopedias and dictionaries, this book isn’t analyzed.

References

1. C. Takeda, Riron/Jikkenkyougiundou, Hakubunndo, 1904, Tokyo.
2. Gendai Supo-tsu Hyakka Jiten, Taisyukan Syoten, pp.13-14, 1970, Tokyo.
3. Taiiku Kagaku Jiten, Daiichihouki, p.274, 1972, Tokyo.
4. Gendai Gakkou Taiiku Dai Jiten, Taisyukan Syoten, p.67,1973, Tokyo.
5. Supo-tsu Yougo Jiten, Gyousei, p.46, 1975, Tokyo.
6. Shinsyu Taiiku Dai Jiten, Fumaido Syuppan, pp.1297-98, 1976, Tokyo.

7. Supo-stu Kagaku Jiten, Presugimunasuchika, p.317, 1981, Tokyo.
8. Shinban Gendai Gakkou Taiiku Dai Jiten, Taisyukan Syoten, p.69,1981, Tokyo.
9. Saishin Supo-tsu Dai Jiten,Taisyukan Syoten, p.655, 1987, Tokyo.
10. Gakkou Taiiku Yougo Jiten, Taisyukan Syoten, 1987, Tokyo.
11. (NichiDokuEiFutsu-Taisyo) Supo-tsu Kagaku Jiten, Taisyukan Syoten, p.467,1993, Tokyo.
12. Saishin Supo-tsu Kagaku Jiten, Heibonsya, p.278, p.529, p.823, 2006, Tokyo.
13. Chugakkou Gakusyu Shidou Youryou = the guideline for junior high school course of study, Ministry of Education, Culture, Sports, Science and Technology (MEXT), Higashiyama Syobou, 2008, Tokyo.
14. Chugakkou Gakusyu Shidou Youryou Kaisetsu = the commentary of the guideline for junior high school course of study, Ministry of Education, Culture, Sports, Science and Technology (MEXT), Higashiyama Syobou, 2008, Tokyo. In this English translation, the word of "fair play" is translated into "fairplay (one word in Japanese)". (http://www.mext.go.jp/component/a_menu/education/micro_detail/__icsFiles/afieldfile/2011/04/11/1298356_8.pdf).
15. Yutaka Miura, Instruction environment of triumphalism sports, Report of the 19th European Fair Play Congress, p.123, EFPC, Istanbul, 2013.
16. Peter McIntosh, Tadafumi Mizuno(trans.), "Feapurei(=Fair Play)", Baseball Magazine Ltd., 1983, Tokyo. Original book : Peter McIntosh, "FAIR PLAY", Heinemann Educational Books Ltd., London, 1979.

Acknowledgement

I would like to pay tribute to the academic advices of PhD. Professor Juris Grants, Latvian Academy of Sport Education, President Raimonds Bergmanis of Latvian Olympians Club, President Christian Hinterberger of European Fair Play Movement and Steve Town, lecturer at the University of Worcester.

This study was supported by Grant-in-Aid for Scientific Research C (Ministry of Education, Culture, Sports, Science and Technology (MEXT), 24500721)

Submitted: March 23, 2015
Accepted: June 12, 2015

Short communication

PHYSICAL ACTIVITY, MENTAL HEALTH AND POSITIVE EMOTIONS

Ali Aziz Dawood Al Sudani[1,2]

[1]Faculty of Physical Education and Sport Science in Iraq
[2]University of Misan, Amarah, Iraq
Address: 18 Szwoleżerów Street, 71 – 062 Szczecin, Poland
Phone: + 48 518 602 122
E- mil: alipoland9@gmail.com

Abstract

This article presents a review of some studies connected with physical activity, mental health and emotions. There are limitations in the methodology used in physical activity and mental health studies. In this kind of research it's difficult to establish cause. This article will present reasons why such situations happen. Emotions play a big role in human lives. Physical activity can be used to change and regulate human feelings. It can cause positive emotions and also reduce experiencing negative feelings by individuals. Regular participation is important as exercises can help in the treatment of depression and anxiety. In general within the population research of physical activity found it had stronger influence in decreasing anxiety than depression. Furthermore physical activity has similar influence on brain functioning and hormones secretion as antidepressant drugs. For exercise professionals it's important to know what kind of factors can make physical activity less pleasant or unpleasant and control them, for the good of their students. This article provides such information.

Key words: *physical activity, emotions, mental health*

Introduction

For a long time it has been known that physical activity can make people feel better. This fact is evident in improving mental health and increasing motivation for participation in sport. Physical activity can be an important factor in treating anxiety and mood disorders for example depression because it has similar influences like drugs on mental health. The difference is that physical activity doesn't cost any money and doesn't cause any side effects (as with drug treatment) It offers a multitude of benefits for human health by improving cardiovascular, immune, skeletal and muscular systems. It also has been shown that physical activity can bring benefits for

cognitive functioning of individuals. The article will present review of studies about connection between physical activity and benefits for emotional functioning.

Limitations in studies about physical activity and mental health

Relating to measurement of connection between physical activity and its influence on emotional and mental health, we should take into account some of the important methodological limitations. One of the most considerable factors is that correlation doesn't mean causation. If for example we get a result that there is positive correlation between mental health and physical activity, it doesn't mean that mental health is a result of participation of physical activity. Another answer can be that people characterized by better mental health are more likely to take part in sport and physical exercises than people with mental problems. It is possible that physical activity and better mental health are connected with other factor such as genetic or economic status.

To find out if there is causation the most important seems to be well-designed experimental study. First, the sample should be representative of chosen population to generalize the results of study. Secondly researchers should assign the participants randomly into experimental and controlled groups. During research including physical activity it's also important to control expectations of benefits in any given research sample because normally people are aware that physical activity should have a good influence for their health. Most mental health variables are measured by self- reports which represent subjective thoughts about any given topic. For this reason controlled group (which will not participate in regular physical activity) should be involved in some activities which will make them think that these activities will bring something positive to their lives. They could for example take part in some seminars about health promotion or take a placebo drug.

People involved in research should not know in which group any given experiment applies. For example an active ingredient which could have influence on their feelings differs from a controlled group where no changes appear. It is also known that it would be better for research when participants from controlled and experimental groups will not have contact with each other. It is also important what name will be given to the study. It is challenging to provide strong evidence of casual relationship between mental health and physical activity. During presentation of some results from different studies we should be careful with making conclusions on this topic. It is important to do research and speak about the connections between physical activity and its influence on mental health and feeling

better, because it can have significant influence on quality of humans lives (Ekkekakis & Backhouse, 2014).

Physical activity, sport and its positive effect on mental health and emotions

Practicing intense physical activity or sport increases the release of endorphins bringing the exercising person into a state of calm and relaxation (Allen & Coen, 1987) and also inhibits the production of stress hormones such as adrenocorticotropic hormones or corticosteroids (Allen, 2000). These two mechanisms seem to play an important role in making individuals calm down during or after doing exercises. The peak of secretion of endorphins occurs within 30 minutes of intense exercises. Other studies show that endorphins are responsible for reducing tension and anxiety, inducing a sense of relaxation (Herring et al., 2010).

Figure 1. Connections between intense physical activity and state of calm and relaxation

Systematic review of 32 researches concern the assessment of the impact of physical activity on positive and negative moods among older adults. In people participating in the exercises positive emotion was significantly increased higher compared making it to the controlled groups (average score ES=0.35). In the experimental groups the level of negative emotions was significantly lower (average score ES=0.39) (Arent et al., 2000).

Many studies demonstrated that physical activity can be an attractive and alternative way to regulate individuals' emotions (Puetz et al., 2006; Reed & Buck, 2009; Reed & Ones, 2006). Physical activity is also connected with numerous health benefits; it is free and doesn't cause any side effects. Furthermore the intensity of physical activity is self-selected in individual's positive high-activation state (giving energy and vigor). If the intensity of exercise is on quite a high level and causes a pleasant high-activation state it will be followed by an enjoyable low activation state and last for some time after physical exercise. Because of these positive effects on emotions physical activity might replace some unhealthy substances such as alcohol or sugar as an equally effective substitute. People who are addicted are looking for something which can change the way they are feeling quickly. Instead of drinking alcohol or taking drugs to improve their mood or change their emotions they could take part in some exercise program, which quite quickly can help them to feel better in a short time.

Studies on people with addictions suggest that incorporation of physical activity in their treatment programs has a good influence on their feelings and facilitates recovery process (Ekkekakis & Backhouse, 2014).

Physical activity, anxiety and depressive mood

According to Landers and Arent (2007) generally the reduction of anxiety is characterized as minimal in effect, but is clinically meaningful and important. There is proof that both aerobic and anaerobic exercises (for example resistance training) lower the level of anxiety and depressive moods. Systematic review of surveys and meta-analyzes about the relationships between negative emotions in the general population and physical activity, indicates that the effect size (ES) exercises varies from 0.15 to 0.56 for depression and from 0.53 to 0.72 for anxiety, which means that the impact of physical activity on depression is small or moderate and on anxiety is medium and large (Landers & Arent, 2007).

Still researchers don't know how different frequency, duration and intensity of physical activity influence on the level of anxiety or depressive mood. Results of some experimental studies showed that the level of anxiety decreases after about 20 minutes of intensive exercises for 40-50% of one maximum repetition but increases immediately after the 20-minute exercise sessions performed with the force of 85% of one maximum repetition (Bartholomew & Linder, 1998). Other studies have confirmed that the training must be moderate intensity to cause the greatest and longest lasting decrease in anxiety. More frequent exercise sessions seem to be the most beneficial in reducing anxiety. It is because the anxiolytic effect of exercise is strongest from the 46h after the completion of a session (Landers & Arent, 2007).

Similar results were obtained in the intensity of exercise for depressive mood. An exercise program of low intensity (7kcal/kg/week) reduces the depressed mood for about 30% and of moderate intensity (17.5kcal/kg/week) for about 47% (Dunn et al., 2005). According to Landers and Petruzello to effectively reduce the depressive mood, exercise programs should be used for no less than 9 weeks. General recommendation for frequency, duration and intensity of exercise requires that adults participate in physical activity of medium intensity for 30 minutes a day, 5 – 7 days in a week. This level of physical activity seems to be sufficient to lower depressive symptoms (Ekkekakis & Backhouse, 2014).

The similarities in the physiological effect of antidepressant drugs and physical activity on the human brain

Physical activity can cause changes in hormone secretion and brain functioning. During regular physical activity as well as taking

antidepressant drugs the level of brain-derived neurotrophic factor (BDNF) increases. BDNF is necessary for good functioning of some neurons connected with the areas of the brain which are responsible for cognitive, sensory and motor functioning. The best treatment results are obtained when individuals are taking antidepressant drugs and practicing some exercises (BDNF level is higher in the brain after 2 days of taking drugs and practicing exercises). If a person takes only antidepressant medicine the BDNF level is increased after 2 weeks.

It is well known that according to some researchers, depression is associated with lower level of norepinephrine synthesis in the brain. Physical exercise as well as anti-depressants causes a change in the noradrenergic system. Moreover the exercises cause changes in the secretion of dopamine, which is the precursor of norepinephrine. Because of its influence on brain functioning physical activity together with some antidepressant drugs can bring the best benefits for people who suffer from depression.

Intense exercise can cause activation of the cannabinoid system in the brain which is responsible for decreasing the level of perceived pain and blood pressure. This effect can last up to 10hours after completion of physical exercise and also produce a calming effect (Landers & Arent, 2007).

Table 1

Comparison between antidepressants and regular physical activity and their influence on brain functioning

antidepressant drugs	**regular physical activity**
increasing BDNF	increasing BDNF
cause changes in the noradrenergic system	cause changes in the noradrenergic system
–	cause changes in the secretion of dopamine
–	activates cannabinoid system
some side effects	no side effects

Factors which can make physical activity unpleasant

If physical activity brings only benefits to human lives why do people not participate regularly in exercises sport or games? The first factor is the attributes of physical activity itself. Some people like to run others like swimming. Participants will be tired or bored doing exercise, playing sport or participating in games which they don't like. Furthermore when intensity of exercise exceeds the ventilatory threshold being physically

active can be less pleasant, this can result in difficulty in breathing. A second group of factors connects with the characteristics of individuals, their personalities, level of self-esteem etc. Individuals who are obese or overweight and don't practice any sport for a long time, can feel a lack of confidence in his/her physical ability or think negatively about themselves, this can reduce the level of positive emotions experienced by him/her during physical activity. Another reason why reduction of pleasure during participation in sport can occur is the environmental conditions, for example high heat. Social environment is also important, for example a personal coach should provide positive feedback and strengthen the individual's autonomy. In other cases students may feel controlled by their coach and perform his orders reluctantly, making participation in sport very unpleasant (Ekkekakis & Backhouse, 2014).

There are also some limitations for practitioners who are physically active regularly. In aathletes who practice sport regularly, every break in training lasting at least 72h causes symptoms similar to abstinence which increases tension and unpleasant arousal or frustration (Allen, 2000). Some studies indicate that there is a threshold of exercise intensity above which the exercise probably doesn’t bring positive effects on mood.

Conclusions

Physical activity can change people’s feelings from negative to positive. This effect can have life-changing applications such as promoting mental health or can help individuals go out of addiction. Being physically active can be good for persons struggling with depression or anxiety, because physical activity has similar influences on brain functioning and hormones secretion as antidepressant drugs. It does not cost financially for people to do exercises and there are no side effects for their mental and physical functioning. Physical activity also causes some benefits for other spheres of life such as physical health. Still there is a big need for professional studies about connection between physical activity, mental health and emotions, which take into account all the factors which can disturb results achieved during research. The knowledge about this topic will be more objective and can be use to create treatment programs which will include physical activity exercises. Limitations of feeling better effect should be also being taken into account. This information can be especially helpful for exercise professionals who should be flexible and remember that pleasure and displeasure is powerful in human lives and is the main forces which cause their behavior.

References

1. Allen, M. (2000). The psychobiology of athletic training. In: Begel D, Burton RW, editors. Sport psychiatry. Theory and practice. Norton; 22-24.
2. Allen, M.E., & Coen, D. (1987). Naloxone-blocking of running-induced mood changes. *Annals of Sport Medicine*, 3:190-195.
3. Arent, S.M., Landers, D.M., & Etnier, J.L. (2000). The effects of exercise on mood in older adults: A meta-analytic review. *J Aging Phys Activ*.00; 8:407-430.
4. Bartholomew, J.B., & Linder, D.E. (1998). State anxiety following resistance exercise: The role of gender and exercise intensity. *J Behav Med*. 21:205-219.
5. Ekkekakis, P., & Backhouse, S.H. (2014). *Physical activity and feeling good.* Chapter 44. In: Papaioannou AG, Hacjfort D, editors. Routledge Companion to Sport and Exercise Psychology. Routledge, 687-704.
6. Herring, M.P., O'Connor, P.J., & Dishman, R.K. (2010). The effect of exercise training on anxiety symptoms among patients: A systematic review. *Archives of Internal Medicine*, 170:321-331.
7. Landers, D.M., & Arent, S.M. (2007). *Physical activity and mental health.* Chapter 21. In: Tenenbaum G, Eklund RC, editors. Handbook of Sport Psychology. Hoboken, 469-491.
8. Puetz, T.W., O'Connor, P.J., & Dishman, R.K. (2006). Effects of chronic exercise on feelings of energy and fatigue: A quantative synthesis. *Psychological Bulletin*, 132:866-876.
9. Reed, J., & Buck, S. (2009). The effect of regular aerobic exercise on positive-activated affect: A meta-analysis. *Psychology of Sport and Exercise*, 10:581-594.
10. Reed, J., & Ones, D.S. (2006). The effect of acute aerobic exercise on positive activated affect: A meta-analysis. *Psychology of Sport and Exercise*, 7:477-514.

Submitted: February 24, 2015
Accepted: June 12, 2015

Short communication

PECULIARITIES OF DEVELOPING VARIOUS TECHNICAL AND TACTICAL INTERACTIONS IN 13-14 YEAR OLD HOCKEY PLAYERS

Alexander Ovechkin, Dmitry Cherenkov

Russian State University of Physical Education, Sports and Tourism
Address: 4, Sireneviy Boulevard, Moscow, 105122
E-mail: dmitriych61@mail.ru

Key words: *hockey, technical and tactical interaction, training*

Introduction

For over half a century has been a rivalry between hockey teams from North America and Russia. When these teams confront each other in competition of any level, it draws not only fan, but also specialist attention. Such interest exists because of the particular way these teams play, showing different styles of tactical play when they face off each other. Analyses show that the difference in tactical play is determined by the various tactical training these athletes had since childhood. However, despite the various training methods players had in the long-term aspect, at the highest level of sportsmanship observed the possibility of combining individual game styles of players who were brought up by different methods. This is eloquently proved by the successful careers of Russian players participating in the National Hockey League (NHL) in North America. It should be noted that the technical and tactical aspects of Russian players for the most part remain specific and are recognizable. Such a contrast to North American players not only discords with teammate game, but for the most part, gives an advantage when playing against other players. As the consequence of the above mentioned, in our paper is suggested that introducing Russian hockey players to the methods of training technical and tactical actions of the North American style of play will improve competitive efficiency. To confirm this hypothesis was conducted a pedagogical experiment

Material and Methods

To carry out this pedagogical experiment was chosen a hockey team with 13 – 14 year old players participating in the Moscow Championship. For a comparative analysis of the progress of the training process, as a control group were chosen three teams also taking part in the Moscow

Championship. At the beginning of the pedagogical experiment, the teams in the control group were placed as follows: 4th place above the experimental team, as well as one and two places below it in the championship table.

The duration of the pedagogical experiment was one season, including the preparatory and competitive periods from June to April.

The main direction of the pedagogical experiment is related to the improvement of technical and tactical training of young players. The characteristic of the experiment was to train players in group activities with the use of specific schemes typical with Russian players and actions of North American players.

The organization of the experiment involves the use of a 2 + 2 + 3 cycle (where within 2 microcycles used the Russian methodology, within 2 microcycles: North American methods and 3 microcycles: mixed technique), a microcycle lasts for 3 days with the presence of a day off at the end of each microcycle, two times during the preparatory period: during on ice and off ice training. In the preparatory period, during off ice training, training days in the microcycle were 2 + 1. During on ice training in the preparatory period, training days for one microcycle were 3 + 1. On the final training day of a microcycle, after the day of rest, a two-way game was played. Both off ice and on ice training during the first two microcycles had technical and tactical exercises used in Russia hockey school. During the second two microcycles the team improved with exercises from the North American approach to technical and tactical organization of the game. The final three microcycles involved the use of both approaches in training, but their use was determined with exact instructions from the coach, what style should be used. The time allocated for addressing technical and tactical questions in the general training plan for each practice was distributed in accordance with other types of practices and objectives of the training period. During off ice training as a means of improving technical and tactical interactions of players outdoor games were used, basketball, handball, football, rugby with simplified rules. In each case, the players received clear instructions on the nature of interactions they should have with partners, as well as about how to play in offense and defense.

During the course of the pedagogical experiment we monitored the quality of performance of the fulfilled training tasks using a specially designed system of evaluation. The rating system provided information on athletes – how they got used to completing training tasks, each task had an increase complexity. The rating system was a 10 point scale. The 10 point rating scale included a comprehensive assessment of the correctness of the

choices the group chose for the current situation, the complexity of technical and tactical actions, the overall effectiveness, as well as a comprehensive assessment of the actions of the opposing players against which it was conducted.

To be able to compare the results of the technique used in training, the rating scale was not only used with the experimental team, but also used with the selected control group teams. A comparative analysis was conducted before and after the pedagogical experiment.

Results

Figure 1 presents the changing dynamics of the indicators that measure the quality of the training process of the experimental team for pedagogical experiment.

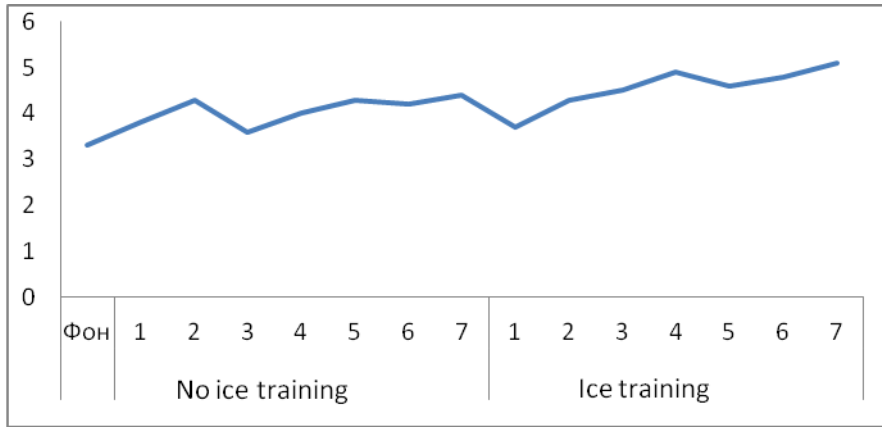


Figure 1. The assessment of the quality of training during the microcycles in the preparatory period (in points)

These dynamics show that during the preparation process in off ice training, interactions between players are more pronounced and have a positive trend then during the same time period of on ice training. This can be explained with the following. Entry-level assignments of technical and tactical interactions are different. By the beginning of on ice training, hockey players already possessed certain skills to interact with each other. Therefore, the increasn absolute values of the second phase was smaller than in the first. Also the quality of training was affected by player different speed of movement, which in ice conditions is higher than on the ground. Reducing the time to make decisions increases the probability of partner errors in group interactions; it also increases the demands for technical skills to carry out necessary movements with the puck. Given the age of the

athletes taking part in the experiment, we can talk about insufficient technical components of the game they conduct, which further affects the quality of the implementation of tactical ideas. In addition, the volume of completed technical and tactical interactions during off ice training is higher than in on ice training due to the high level requirements for speed and strength preparedness of young hockey players, especially during high-speed training tasks. These features have a negative impact on the quality of development of tactical preparations and do not allow players to develop all range of actions that they can, including highly complex tactical tasks. Nevertheless, we can state the positive dynamics of learning technical and tactical coordination and the development of the athletes in the experimental team with both Russian and North American style of play. It should be noted that the training process was not directed only towards the development of tactical coordination between players, but also towards the ability to select the correct action, depending on the actions of the opposing team. Results of the pedagogical experiment are presented in Table1.

Table 1

Estimate (in points) of the quality of technical and tactical training of both experimental and control groups

	Background (previous rank in the Championship in Moscow)	Evaluation of the first round of the Championship in Moscow	Evaluation of the second round of the Championship in Moscow
Experimental Team	3.1±1.8	4.5±1.2	4.2±1.7
Control Team 1	3.5±1.2	3.7±1.1	3.5±1.4
Control Team 2	3.1±1.6	3.1±1.4	2.9±1.9
Control Team 3	3.0±2.2	3.3±1.4	3.1±1.8

The results in Table 1 show that the data before the pedagogical experiment generally reflect the position of teams in the final table of the Championship in Moscow. Control Team 1 in the standings is above the experimental team by 4 places and eventually became the winner of the Championship, whereas control teams 2 and 3 were in 1st and 2nd places below than the experimental team. In the middle of the season there was a huge positive dynamics boost of the quality of technical and tactical components of the game in the experimental team, while the three control teams had very little changes. At the end of the playing season all unidirectional changes of the test are written down for all teams, including

the control team. It is obvious that in this age group to last a long season is rather difficult. Because of the insufficient level of special physical preparedness, the quality of technical and tactical preparedness is reduced. This is quite a natural process associated with the general biological laws of development and the formation of the body at this age.

Conclusions

The results of pedagogical experiment show that using the proposed method in the training process in terms of technical and tactical training of 13 – 14 year old players, has a positive impact on the results of the experimental team. This was shown in the ability of the experimental team players to use adequate options for group actions which resulted in positive results in game situations with their peers.

The results of the pedagogical experiment showed that 13 – 14 year old athletes can master not only the Russian style of play, but also the North American style (tactical interaction). Mastering the proposed method of training will enhance the efficiency of game activity in players of the future, due to the increase of their skill level.

It is based on the fact that the development of styles of play and the possibility of their use in specific game situations in matches remain in the memory of the players, and with the improvement of the special physical and technical preparedness, will contribute to a wider choice of actions in games against teams with a different playing style.

References

1. Carpenters, V.V. (2013). *Methodology of technical and tactical training hockey players during the in-depth specialization.* Synopsis of the doctoral theses candidate of pedagogical sciences. FEDERAL VPO "Volga region Academy of physical culture, sport and tourism.

Submitted: April 24, 2015
Accepted: June 12, 2015

CURRENT NEWS

Latvian Academy of Sport Education

The 9th Conference of Baltic Society of Sport Science
April 27 – 29, 2016, Kaunas, Lithuania

OSRESS 2015

Outdoor Sports and Recreation Education Summer School 2015

September 14 – 18, 2015 Malaga, Spain

Organizers: University of Malaga, Spain **in collaboration with** Latvian Academy of Sport Education and Latvian Association of Outdoor Education and Recreation Jozef Pilsudski University of Physical Education in Warsaw, Faculty of PE in Biala Podlaska, Poland, State College of Computer Science and Business Administration in Lomza, Poland, Swedish School of Sport and Health Science, Sweden.

http://osress.weebly.com/

We congratulate Ieva Kundzina, PhD student at the Latvian Academy of Sport Education, who has defended her Thesis "Physical Recreation to Improve the Well-Being of 45-55 Year Old People" (Sport Science) at the Latvian Academy of Sport Education on January 22, 2015. Supervisor: Dr.paed., prof. Juris Grants.

Ieva Kundziņa professional work experience since 2012 is connected with fitness study "Vingrosev.lv", where she is the president, and since 2009: with Latvian Academy of Sports Education, where Kundzina is an assistant in the Department of Anatomy, Physiology, biochemistry and Hygiene, conducts the courses in Anatomy and Dynamic Anatomy.

The Doctoral Thesis has been developed by ESF support within the project "Support for Sport Science" Nr. 2009/0155/1DP/1.1.2.1.2/09/IPIA/VIAA/010 work program „Human resources and employment" 1.1.2.1.2. sub activity "Support to Implementation of Doctoral Study Programme"

INVESTING IN YOUR FUTURE

ESF EIROPAS SOCIĀLAIS FONDS

Latvijas Sporta pedagoģijas akadēmija

GUIDELINES FOR CONTRIBUTORS

Instruction to Authors

The **LASE Journal of Sport Science** is a journal of published manuscripts in English from various fields of sport science. It covers the following types of papers:

- ✓ *original research papers* (maximum 12 standard pages of typescript, including tables, figures, references and abstract),
- ✓ *review papers* commissioned by the Editor (maximum 20 standard pages of typescript, including documentation),
- ✓ *short communications* (maximum 3 standard pages of typescript plus two table or figure and up to 5 references),
- ✓ *letters to the Editor* delivering an opinion or a comment to published manuscripts (maximum 2 standard pages of typescripts),
- ✓ *current news* (information on conference, abstracts of PhD. theses and Post-Doc. theses, book reviews, biographical notes),
- ✓ *advertisements* that may be covered on separate pages of the journal (prices are subjects to individual negotiations).

Papers must be accompanied by the following submission letter (form available at journal's website), signed by all Authors: "The undersigned Authors transfer the ownership of copyright to the **LASE Journal of Sport Science** should their work be published in this journal. Authors state that the article is original, has not been submitted for publication in other journals and has not already been published except in abstract form, preliminary report or thesis. Authors state that they are responsible for the research that they have carried out and designed; that they have participated in drafting and revising the manuscript submitted, which they approve in its contents. Authors also state that the reported article (if it involves human experiments) has been approved by the appropriate ethical committee and was undertaken in compliance with The Helsinki Declaration."

Research papers and short communications will be sent anonymously to two reviewers. Depending on the reviewers' opinion, the Editors will make a decision on their acceptance or rejection. The Editors' decision is ultimate.

Manuscript specification

Articles must be submitted in English and only to the **LASE Journal of Sport Science.** Authors should observe the ethics of manuscript preparation (avoiding duplicate publication, inaccuracy of citations, fraudulent publication, plagiarism and self-plagiarism).

Copyright will be owned by the publisher: **LASE Journal of Sport Science**. A properly completed Transfer of Copyright Agreement must be provided for each submitted manuscript. A form is available at journal website.

Authors are responsible for the factual accuracy of their papers, for obtaining permission to reproduce text or illustrations from other publications and for an ethical attitude regarding the persons mentioned in the manuscript.

Format

Document format – Microsoft Word 97-2003 or 2007.

Page format – 210x297 mm (A4).Text – single column (font Times New Roman, letter size 12 pt), line spacing – Single, paragraph alignment – Justified, left margin – 20mm, right margin – 20mm, bottom margin – 25mm.

Style

Papers must be written in a clear, concise style appropriate to an international readership. Familiar technical terms may be used without explanation. Acronyms and abbreviations are likely to need full presentation at least once.

Content

Research or project reports, case studies of practice, action research reports, and reports on teaching practice or techniques will be accepted.

Research reports should include a description of the practical application(s) of the ideas tested, while reports of teaching practice or techniques should contain an explanation of the theoretical foundation underlying the practice or technique in question.

Material in the form of illustrations or photos is welcomed. This material should be accompanied by text clearly setting out its philosophical or practical origins or implications. All material should be clearly referenced to its sources.

The manuscripts should be arranged as follows: title page, abstract and body text

Title page should contain: title of the paper, first and last names of authors with affiliation, first and last name of corresponding authors with postal address, telephone, fax and e-mail.

Abstract (up to 250 words) consisting of the following sections: justification and aim of the study, material and methods, results, conclusions, as well as 3-6 key words, should be provided before the body text.

Body text should be sectioned into: Introduction, Material and Methods, Results, Discussion, Conclusions, Acknowledgements (if necessary) and References. In articles of others types, the text should follow in a logical sequence and headings of its particular sections should reflect issues discussed therein.

Introduction – should be short and concise; it should introduce readers into research problems addressed in the study as well justify undertaking the research and specify its aim.

Material and methods – should describe the subject of the study (in the case of human subjects data should include their number, age, sex and any other typical characteristics) and methods applied in a sufficiently exhaustive way to enable readers to repeat the experiments or observations. For generally known methods only references should be given, whereas detailed descriptions are to be provided for new or substantially modified methods.

Results – should be presented in a logical sequence in the text, tables and figures. Data collated in table and figures should not be repeated in the text which should summarize the most important observations.

Discussion – should emphasize new or important aspects of experimental results and discuss their implications. Results of own studies are to be compared with findings described in the respective domestic and international references used by the Authors.

Conclusions – should be started in points or descriptively and should be logically connected with objectives stated in the *Introduction*. Statements and conclusions not derived from own observations should be avoided.

References – following instructions for Authors on References (APA style).

Citing in-text

Following artificial text shows different types of in-text citation:

Claessens (2010) found evidence that attention will be given to multi-compartment models, such as the 3-water, 3-mineral and 4-compartment models, to assess percentage of body fat. However, Raslanas, Petkus and Griškonis (2010) noted that Aerobic physical load of low intensity got 35.1 % of total trainings time. Research on physical loading also focused on

identifying the basis of many years' research of physical activity (Bytniewski et al. 2010). According to Ezerskis (2010), "… heavy physical loads had the undulating character depending on the dynamics of workloads…" (p. 71) yet girls are more ascertained that the Track & Field training helps to develop courage.

Instructions for Authors on References (APA style)

This document describes standards for preparing the references in the APA style. The following sections give detailed instructions on citing books, journal articles, newspaper articles, conference papers, theses, web pages and others.

Please provide all the required elements in the references to your paper. Please pay particular attention to spelling, capitalization and punctuation. Accuracy and completeness of references are the responsibilities of the author. Before submitting your article, please ensure you have checked your paper for any relevant references you may have missed.

A complete reference should give the reader enough information to find the relevant article. If the article/book has DOI number, the author should include it in the references. And most importantly, complete and correct references may allow automatic creation of active links by the MetaPress technology that we use for making the electronic version of our journal. Active reference linking is regarded as the greatest benefit of electronic publishing and it adds a lot of value to your publication.

Additional information about APA style writing is found on LASE web page: http://www.lspa.lv/ .

Tables – should be prepared on separate pages (saved in separate files) and numbered using subsequent Arabic letters. They should be provided with titles (above). Every column in a table should have a brief heading and more extensive explanation should be given under the table, e.g. statistical measures of variability.

Figures – should be prepared in an electronic form and saved in separate files. A separate page should be provided with legends to figures, authors' names, manuscript's title, and consecutive number of figure with "*bottom*" or "*top*" identification. Photographs or other illustrative materials may be submitted in an electronic form (*.tif, *.jpg, image resolution: 300 or 600 dpi) or any other form suitable for final technical typesetting by the Editorial Office. In the appropriate places in the text consecutive numbers of tables or figures should be provided in parentheses, e.g. (Tab. 1) or (Fig. 1). Places of insertion of the illustrative material should be marked with pencil on the margin of the typescript.

General principles – the Editorial Office reserves for itself the right to correct stylistic errors and to make necessary changes (abridgements) in the text without Author's knowledge. Articles not accepted for publication are not returned. Manuscripts not prepared following *Instruction to Authors* will be sent back to Authors for revision. Galley proofs of manuscripts will be sent to Authors for proofreading. It is the Author's responsibility to return the proof within one week. Each Author will receive free-of-charge one copy of the issue in which their work appears.

Submission of manuscripts

The articles should be sent to:

Inta Bula-Biteniece
E-mail: inta.bula-biteniece@lspa.lv