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## Summary

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### ORIGINAL PAPERS

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**Adam Kawczyński, Dariusz Mroczek, Paweł Chmura, Kamil Kobialka, Pascal Madeleine, Jan Chmura**

#### INFLUENCE OF FOOTBALL MATCH ON RATE OF PERCEIVED EXERTION MEASURED BY PAIN PRESSURE THRESHOLD

**Aim of the study.** To assess the rate of perceived exertion in relation to football game.

**Material and methods.** Eleven male football players participated in the present study. Players were the Polish Young Extraleague Team members. The experiment was performed after league game. The procedure composed of following items: measurement of pain pressure threshold, level of creatine kinase and myoglobin before and immediately after football match.

**Results.** The rate of perceived exertion increased in both legs thigh muscles as the result of football game. Level of creatine kinase and myoglobin did not change significantly.

**Conclusions.** The present study showed an increase in the rate of perceived exertion as the effect of football match and showed a biomarker like pain pressure threshold can be used an indicator physical exertion.

**Key words:** fatigue, muscle soreness, football, lower extremities

**Ewa Puszczałowska-Lizis**

#### CONNECTIONS BETWEEN THE FEET STRUCTURE AND EXPLOSIVE POWER OF

**Aim of the study.** Foot is one link of the human proprioceptive kinetic chain. Feet proficiency is a part of general static-dynamic fitness. The aim of this study was to analyze connections between the parameters of feet structure and explosive power of lower limbs in 20–28 years old men.

**Material and method.** Cross-sectional studies included 130 randomly selected men between the ages of 20 to 28, the students at the University of Rzeszow and the Beskid Skills College in Żywiec. Plantographic method non-marking technique was used to evaluate feet. There were drawn suitable lines and angles on plantograms and on this basis plantographic indexes were calculated. Explosive power of lower limbs was examined on the base of measurements of the long jump from the place and the high jump. Methods of descriptive statistics were employed to analyze the collected material. To evaluate connections between chosen plantographic features and explosive power of lower limbs, and connection between chosen motor fitness tests there was used Pearson's linear correlation.

**Results.** Studies show that there are no statistical significant correlations between the feet structure and the long jump from the place and the high jump.

**Conclusions.** The feet structure does not have a fundamental influence on explosive power of lower limbs in tested men

**Key words:** the longitudinal arch, the transverse arch, hallux valgus angle ( $\alpha$ ), the V toe varus deformity angle ( $\beta$ ), the long jump from the place, the high jump

**Mirosław Mrozkowiak, Mariusz Strzecha**

#### PROJECTION MOIRÉ AS A MODERN TOOL FOR DIAGNOSIS OF BODY POSTURE

Diagnosis of body posture should be based on a set of strict criteria typical of a particular method. Each method is subject to an error which results from temporal and unequivocal individual values. Taking measurements of a particular characteristic should be

based on an assumption that the measurement will differ from its value during the second measurement. Assuming the reliability and validity of a method used for body posture diagnosis, the difference results from errors and accuracy of measurements, lack of standard conditions and the patient's posture which is continuously adapting to the stressors present in the external and internal environment human body is exposed to.

The end of the 20th century saw dynamic progress in technical sciences. This allowed for utilization of electronics for measuring spinal curvatures. After solving a variety of problems of technical and methodological nature, the assessment of body posture was rested on the phenomenon of projection moiré discovered in 1935. This study discusses the advantages and drawbacks of this method. The normative ranges developed by Iwanowski, Łubkowska, Mrozkowiak, Nowotny, Wolański, Zeyland-Malawka i Żołyński were also presented. The authors of the present study determined angles of thoracic kyphosis and lumbar lordosis and the types of body posture according to Wolański.

**Key words:** projection moiré, body posture

**Robert Walaszek**

## EVALUATION OF THE RELATION BETWEEN BODYPOSTURE PARAMETERS AS MEASURED WITH THE USE OF THE MOIRE PHOTOGRAMMETRIC METHOD WITH SOMATIC FEATURES AND MOTOR SKILLS OF KRAKOW'S GIRLS AGED 14

**Aim of the study.** To evaluate the impact of body posture parameters – as measured with the use of the Moire photogrammetric method – on selected motor skills and somatic features of Krakow's girls aged 14.

**Material and methods.** The research material was a group of 140 girls from the 1<sup>st</sup> form of five of Kraków's grammar schools. First the subjects' somatic features were determined. The body height was measured with the anthropometer and the weight with the help of the medical scales. Further research went through two stages. Stage number one included an examination with the use of the Moire projection method which allowed us to obtain fourteen parameters defining the body posture. In the second stage, the marching balance test, and the examination of the movement speed of the upper limbs was conducted.

**Results.** Following all the examinations, significant correlations were ascertained between many of the parameters measured with the use of the Moire method and the selected motor skills of the subjects

**Conclusions.** It was also observed that the body height and body weight of the examined girls significantly influenced some of the body posture parameters as measured with the photogrammetric method.

**Key words:** Moire photogrammetric method, motor skills, body height, body weight

**Jerzy Januszewski, Edward Mleczko,  
Joanna Gradek, Elżbieta Cieśla**

## PHYSICAL FITNESS COMPONENTS ACCORDING TO HEALTH (H-RF) OF GIRLS AND BOYS FROM SOUTH-EASTERN POLAND IN THE FIRST DECADE OF THE XXI CENTURY AND THEIR PLACE OF RESIDENCE

**Aim of the study.** Assessment of the degree of manifestation of social gradients in south-east Poland in the first decade of the twenty-first century.

**Material and methods.** To develop a research issue there were used the results of research gathered during 2001–2010 among 14,899 children and adolescents aged between 8 and 18 years, from primary and secondary schools from south-east Poland. As a measure of social gradients manifestation the range of differences in the level of development of physical fitness components in terms of H-RF was adopted in 5561 village residents (2530 ♀ and 3031 ♂) and in 9338 tested in the cities (4448 ♀ and 4890 ♂). Basic statistical characteristics (Me and SD min-max) and the rate of dimorphism were calculated. The measurement results were normalized using the scale T ("Tenowa Uniyear"), developed by Januszewski and Mleczko [1]. The scope of social gradients was characterized on the basis of index of point differences of taken into account components of physical fitness in terms of H-RF, taking as the measure of statistical significance the value of 4 points in the "Tenowa Uniyear Scale".

**Results.** The proposed method of scoring on a scale T turned out to be a good tool to grasp both the many-sided dynamics of morphological, functional and motor development and physical fitness components focused on health (Health-Related Fitness).

The results of the analysis of variability caused by the factors of socio-cultural environment allow to notice a tendency to maintain an overbalance of somatic development among city residents over both sexes living in rural areas. In the measurement of physical fitness and endurance capacity villagers often predominated their peers in cities.

**Conclusions.** The findings did not provide enough evidence to make the claims of the falsification to the thesis about the existence of social stratification in the first decade of the twenty-first century society in two ecological niches (urban-rural) of south-east Poland. In the somatic development still remains a tendency to predominance of kinetics and dynamics of development of children and young people from the cities. In the functional development can be seen only in the endurance capacity of the tested the echoes of the old desired adaption of villagers to living conditions conducive to achieving positive health indicators. The applied tool of evaluation of physical fitness proved to be useful for assessing the social gradients, that is the variation caused by environmental factors.

**Key words:** Health-Related Fitness (H-RF), children and youth, T-scores (uniyear scale), south-eastern Poland, social gradients

## Zygmunt Sawicki

### SPORTS AND RECREATION ACTIVITY OF GERMAN PUPILS FROM ALPINE REGION

**The aim of the study.** To analyze recreational sports activity of pupils from alpine region of Germany considering sex and the size of the town. This explicitly includes motives, behavior and attitude toward this activity and selected elements of physical education. Another aim was to determine the statistically significant correlations between physical education mark, possibilities of doing sports and level of sports activity.

**Material and methods.** The research was conducted in 2012 among 387 people – pupils from the final class of grammar schools in Alpine region in Germany. It were 91 boys and 97 girls from a large town (over 1 million inhabitants) and 93 boys and 106 girls from a small town (15.000 inhabitants) using ATPA (Attitude Toward Physical Activity) by Kenyon [1,2,3], modified by the author of this research to check the motives of recreational sports activity of the pupils. Furthermore it was used a questionnaire to check certain items of leisure and school sports activity. In addition, it was used an attitude scale to assess the importance of physical education among other school subjects.

**Results and conclusions.** The most important motives of sports activity of the pupils are health, ascetic experience and social experience. The boys prefer risk and ascetic experience and the girls health and aesthetic experience. The favourite leisure activities of the youth were meeting friends and doing sports (second place among boys and fourth place among girls). The youth is physically very active, which is reflected in the frequency of doing sports and the large number of kinds of sport. It depends on the sex and the size of the town. The most played sports by boys are football, bike-riding and swimming and by the girls bike-riding, horse-riding and swimming. Extreme sport activities are not practiced, but they are desired activities. The pupils get good marks in physical education, want more lessons and in their opinion it is the favourite school subject. 81 percent of the pupils are going to do sports after finishing school. It was determined that there are correlations between physical education mark, possibilities of doing sports and level of sports activity.

**Key words:** leisure, recreational sports activity, school youth, Alpine region, Germany

## Janusz Maciaszek

### EFFECT OF PHYSICAL ACTIVITY FOR FUNCTIONAL FITNESS AMONG SMOKING ELDERLY MEN: A PILOT STUDY

**Introduction.** The main objectives of programmed physical activity for heavy smokers are above all to minimize inevitable effects of smoking and to prevent premature aging. A knowledge-based approach towards the health state of regular Tai-Chi practitioners assumes that Tai-Chi training may positively affect the functional efficiency of elderly heavy smokers.

**Material and methods.** The subjects were recruited from among heavy smokers without health complaints. To participate in the experiment, 13 men were accepted, ranged in age from 60 to 75 years ( $x = 65 \pm 4.8$  years). In the first experimental group "E" there were six men who attended physical training regularly twice a week in a 4-month period. The control group "K" formed 7 men who did not undertake any extra physical activity. Before and after the 4-month training period lower body strength, dynamic balance and aerobic endurance were measured. Sample used in the "Senior Fitness Test". In addition, height and weight were measured and BMI was calculated.

**Results.** In all measured variables, lower body strength, dynamic balance and aerobic endurance, positive changes were observed. However, a statistically significant increase ( $p < 0.05$ ) was observed in the lower body strength and dynamic balance.

**Conclusions.** Well-programmed physical activity has a positive effect even on functional fitness of heavy smoking addicts.

**Key words:** training, smoking, aging, fitness

## Urszula Pasiut

### BIOLOGICAL STATE OF THE STUDENTS AT THE UNIVERSITY SCHOOL OF PHYSICAL EDUCATION ON THE BACKGROUND OF THE WHOLE OF YOUNG ADULTS STUDYING IN BIGGEST STATE UNIVERSITIES OF KRAKOW

**Introduction.** The issues concerning biological development and physical fitness of a human being are among the most important research areas these years. Anthropometric research forms an integral part of population screening. The results and indicators, constructed on the basis of direct measurements being conducted, provide useful information about the body structure of examined subjects, framing at the same time the underpinnings for the evaluation of the biological condition of the measured population. General representation of changes in trends in Poland, covering decades, seems to be incoherent, and the results of studies carried out on different samples are ambiguous. Thus, our current aim is to track and analyze changes in biological condition of populations from the perspective of living and socio-economic conditions.

**Aim of the study.** The aim of the study was to assess the current biological condition of men and women, the students at the University School of Physical Education, in relation to the level of somatic traits of population of young adults studying in Krakow.

**Material and methods.** The differences in somatic and anthropometric indicators, describing the body built and the type of fat distribution in the body, were calculated. Variable deviating from normal distribution were subjected to logarithmic transformation. Somatic differences between the students at the University School of Physical Education and university students in general (JU, CUE, PU, UA, CUT, UST) were illustrated graphically by using morphological profiles with the help of standardized indicators. The significance level of group differences was evaluated by the Student's t-test for inhomogeneous variables.

**Results.** Compared on the background of average female sample, the University School of Physical Education female students were characterized by better developed muscle structure, bigger body weight and significantly higher index of fat free mass, whereas male students contrasted with average male subjects were characterized by lower volume of the analyzed somatic traits with the lack of intergroup differences in fat free mass. It is typical that the participants from the University School of Physical Education were characterized by the significantly lower fat tissue in their bodies.

**Conclusions.** The results presented in the study, based on a random sample of a large number of participants, seem to confirm the relationship of body built with the functional characteristics of the University School of Physical Education students in the direction of their better physical development. It seems that this is caused by the impact of a selective factor and obvious differences in the area of examined lifestyle and particularly in the level of physical activity associated with the profile of education and specific program of studies.

**Key words:** students, somatic traits, body composition, physical activity, sports selection

## Łukasz Tota, Wanda Pilch, Szczepan Wiecha, Marcin Maciejczyk

### SEX DIFFERENCES IN PHYSIOLOGICAL RESPONSE DURING INCREMENTAL TEST IN YOUNG LONG AND MIDDLE DISTANCE RUNNERS

**Aim of the study.** To determine sexual differences in the values of selected physiological measures at two levels of exercise intensity, i.e. at the threshold of decompensated metabolic acidosis and during maximal exercise. The levels of selected physiological measures were expressed in absolute terms and relative to body mass and fat free mass FFM.

**Material and methods.** The study covered 11 male and 16 female subjects at the age of junior and cadet (15–17 years) who specialized in medium and long distance running events. Graded exercise test until fatigue performed on mechanical treadmill was employed to determine the maximal and threshold levels of basic physiological measures. The exercise test was started with a four-minute warm-up, with subjects running at constant speed (male subjects: 9 km · h<sup>-1</sup>; female subjects: 8 km · h<sup>-1</sup>) and then the speed was increased every 2 minutes. At the final phase of the test, exercise intensity was increased every minute through changing the slope of the treadmill. The TDMA threshold was determined based on the dynamics of alterations in selected parameters of the respiratory system.

**Results and conclusions.** Intergroup differences in the level of somatic measures are typical of general population within this age range. Global levels of maximal oxygen uptake were at the level of 4.02 ± 0.2 l · min<sup>-1</sup> in male subjects and 2.83 ± 0.5 l · min<sup>-1</sup> in female subjects. The results obtained by women were at the level of merely 70% of those obtained by men. The levels of this

measure relative to body mass were significantly different between the groups (lower in women by 15%), whereas relative values of oxygen uptake at the threshold of decompensated metabolic acidosis did not differ significantly. No significant differences were found in the value of oxygen uptake relative to FFM observed at the level of TDMA and maximal exercise intensity.

**Key words:** sexual dimorphism, graded exercise, decompensated metabolic acidosis threshold, maximal oxygen uptake

## **Małgorzata Potocka-Mitan, Michał Spieszny, Tomasz Klocek**

### **THE DIFFERENCES BETWEEN THE LEVEL OF THE COORDINATIVE SKILLS OF 13–15-YEAR-OLD ALPINE SKIERS AND OF BOYS WHO DO NOT PRACTICE ANY SPORTS**

**Aim of the study.** The main aim of the thesis is the attempt to compare the level of the selected motor skills of boys who practice alpine skiing and of their peers who do not practice any sport. The next aim is to discover which coordinative skills do the best Polish skiers aged 13–15 excel in.

**Material and methods.** The material of the thesis consists of the examination results of 38 skiers and 74 boys who do not practice any sport. All the subjects, both skiers and boys who do not train, were divided into 6 groups. They were divided into three age groups: 13- 14- and 15-year-olds. The research was aimed at assessment of the coordinative predispositions (time of simple and complex reaction, visual-motor coordinative, spacial orientation, multitasking, orientation-perception). They were measured by the computer coordinative skills test PNTR. The basic statistic methods, normalized coefficients and Spearman's rank correlation coefficient were used to elaborate the results.

**Results.** The boys who train the alpine skiing prevail over the boys who do not train by their level of the analyzed coordinative predispositions. The champions among their age group were characterized by a higher level of coordination, it was evident especially among the 13- and 14-year-olds. It was proved that the strongest link between the sport level of the young skiers and their level of coordinative predispositions have multitasking and orientation-perception.

**Conclusions.** Alpine skiing requires the highest level of motor skills. Thus, while coaching children and adolescents, it is important to put the emphasis on the motor activities that develop not only the balance, but also

**Key words:** alpine skiing, children's and adolescents' sport activities, coordination skills, coordination tests

## **Józef Bergier, Natalia Niewolna**

### **TECHNICAL TRAINING FOR SHOOTING GOALS FOR ONE-SIDE ORIENTED PLAYERS IN THE UEFA WOMEN'S EURO 2009**

**Aim of the study.** In contemporary women's football we can observe an increase in the importance of versatile preparation of players both in terms of motor activity and technique. What is essential in the play is the ability to take quick decisions i.e. to play one on one or cooperate with partners. It made us do research into: (1) determining the level of symmetry and asymmetry of shots at goal, (2) see through the topography of the shots taking into consideration the spots of players taking shots and the goal's sectors, (3) analyze the foot symmetry when taking penalties, (4) determining the successful shot technique, (5) pointing at the percentage of one-on-one and teamwork actions which were successful.

**Material and methods.** The material was an analysis of 84 goals during 25 matches of the UEFA Women's EURO 2009 in Finland.

**Results.** Amongst the analyzed goals only 33.9% were scored with the left foot, while 66.1% were scored with the right foot. The observation of symmetry taking into consideration the pitch zone and goal sectors showed higher symmetrization of actions. From the right pitch zone 55.4% of goals were scored while from the left one 44.6%. Whereas the right sector of the goal was aimed at 44.6% of cases and the left one – in 55.4%. Among 49 players scoring goals for their team only 5 showed the ability of scoring goals with both right and left foot. An important question the goals analysis is the technique of shots. More goals were scored with foot (81.2%) than with head (18.8%). In the foot shots the inside of the foot was used (35.7%) and inner-foot volley (22.9%).

**Conclusion.** It was found that the shots at goal featured significant asymmetry. Among the successful actions teamwork is very important.

**Key words:** women's football, symmetry and asymmetry of shots, effectiveness index

## **Andrzej Ostrowski, Arkadiusz Stanula, Marek Strzala, Mirosław Juskiewicz, Witold Ziara**

# THE PREDICTION OF FREEDIVING ACHIEVEMENTS DEVELOPMENT BASED ON ANALYSIS OF WORLD RECORDS SET IN THE YEARS 1993–2009

**Introduction.** Human stay under water with breath hold is limited by production and accumulation in organism of carbon dioxide with simultaneous increase in oxygen shortage, high hydrostatic pressure in internal space, especially on chest and ears. Physical and mental predispositions as well as the age belong to basic factors determining human adaptive prospects in breath hold diving. Technical skills and experience are bound to these factors. Advances in freediving testify systematic development of human adaptive mechanisms in water.

**Aim of the study.** Evaluation and prediction of world records in freediving in individual competition, for men and women.

**Material and methods.** The research material consists of 220 world records obtained between 1993 and 2009 in men and women categories, regarding 8 freediving competitions. Results analyses were conducted in 5-years-long periods, computing the predictions for 2014.

**Results.** Conducted analyses show that world records in all freediving competitions from between 1993 and 2009 were beaten multiple times. Men more often than women have beaten world records, they also obtained better results. The largest progress was noted in Dynamic Apnea (DYN) and Dynamic Apnea Without Fins (DNF) as well as in Constant Weight Apnea Without Fins (CNF). The smallest increase in world records in freediving occurred in VWT (Variable Weight Apnea) and FIM (Free Immersion Apnea) in which success is determined not only by physical effort but also by increasing with depth water pressure.

**Conclusions.** By the year 2014 freediving world records should have been improved in all competitions, for women mostly there where the main role plays time of immersion and high hydrostatic pressure, and for men additionally physical effort.

**Key words:** freediving, competition, world records, adaptation to breath hold, water pressure, physical effort

**Wacław Petryński**

## ANDRZEJ WOHL – THE FORGOTTEN TITAN

The author reminds some of achievements by Professor Andrzej Wohl. By education he was a philosopher, he dealt mainly with the sociology, but by now his works on human motor behaviour seem to be underestimated. He was a communist, what to great extent determined his scientific views, and thus also the content of his kinesiological works. Nevertheless, he was an insightful thinker, and while remaining in the circle of fans of I.P. Pavlov's theory, which dominated in socialist countries in that period, he showed many directions that might lead to the real progress in kinesiology. Above all, he emphasized the great potentialities of theoretical analyses, underlying any progress in science. It seems that in contemporary science (also in kinesiology), being dominated by empirical researches, the voice of Andrzej Wohl is especially worth remembering. It would be reasonable to reject the ideological layer of his analyses and to adopt his methodology of thinking, which still – or, may be, peculiarly nowadays – may turn out to be particularly valuable in leading the kinesiology, all over the world, out from the state of stagnation.

**Key words:** theory of motor control in humans, Andrzej Wohl, threat to kinesiology development