



Wellbeing Technologies

**International Scientific Conference  
on Innovative Technologies for  
Wellness and Fitness**



**BOOK OF ABSTRACTS**



**September 28th, 2015**

**Vilnius, Lithuania**

BOOK OF ABSTRACTS OF THE *INTERNATIONAL SCIENTIFIC CONFERENCE ON INNOVATIVE TECHNOLOGIES FOR WELLNESS AND FITNESS*

28th September, 2014 Kaunas, Lithuania  
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Conference organizers:



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*BOOK OF ABSTRACTS*

*INTERNATIONAL SCIENTIFIC CONFERENCE ON  
INNOVATIVE TECHNOLOGIES FOR WELLNESS AND  
FITNESS*



**Wellbeing Technologies**

## **PREFACE**

Dear conference participants,

The Annual International scientific conference on Innovative technologies for wellness and fitness titled “Technologies for Wellbeing” will take a much deeper look into health and wellness enhancements for the masses through technologies and modern solutions: starting from individuals and going to the biggest communities. Discussions at the conference will reveal how the next generation of technologies will change our life’s, how our health status could be monitored and improved using IT solutions which are simple for users but very informative for health care professionals. The examples of individual approach and innovation in modern health care, best practices in public health, community’s resilience will be demonstrated during oral presentations and practical exposition.

Best, the conference organizers

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## **ORGANIZING COMMITTEE**

### **Head of the organizing committee:**

Dr. Mindaugas Balčiūnas, Lithuanian Sports University, Lithuania

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Mick Donovan, University of Worcester, United Kingdom

Rusnė Šermukšnytė, Lithuanian Sports University, Lithuania

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Prof. Dr. Alejandro Vaquera Jiménez, University of Leon, Spain

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## KEYNOTE SPEAKERS



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*Lithuanian Sports University, Lithuania*

## **CONFERENCE PROGRAMME**

### **28th SEPTEMBER, 2015**

08:00-09.00am Registration, Coffee & Mingling

09:00-09.15am Conference Opening. Welcome speech

09:15-10.15am Michael Graetz: CEAn initiative to Take on the Burden of Chronic Disease Management in the Hyper-Connected Patient Era

10:15-11.15am Albertas Skurvydas: Mental health as the social well-being factor

11:15-11.30am Break

11:30-12.30am Matt Weston: Technological „Solutions“ for sport performance: worldwide virtual database for players testing

12:30-02.15pm Lunch

02:15-03.15pm Jaime Sampaio: Exploring new measures of performance in sports

03:15-04.00pm Rusnė Šermukšnytė: The latest technologies in the health and wellness industry: UK market overview

04:00-05.00pm Tomas Blažauskas: Technologies for wellness at Kaunas University of Technology: development and application.

05:00pm Closing of the conference

### **29th SEPTEMBER, 2015**

**Exhibition stands presentation at Panorama shopping center (address: Saltoniškiu str. 9, Vilnius)**

10.00am Opening of the exhibition

Every 30 min. presentation of the new product

18.00pm Closing of the exhibition

# ABSTRACTS

## WELCOMING A NEW GENERATION TO WELLNESS: DESCRIPTIONS, CHARACTERISTICS, LIFESTYLES, AND ATTITUDES

Balčiūnienė Vaiva

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**Relevance of the research.** Over the past decade, many researchers in the context of Strauss-Howe (1991) generational theory have been analysing exhaustively the concept of Generation Z, their thinking and outlook, relation to technologies, problematics of value-related attitudes and learning/teaching methods: Williams, Page (2011); Scholz (2014); Berkup (2014); Cowan (2014) and others. Generation Z is characterized by the fact that this Generation representatives were born in the technological environment, they are closely related to various technologies and their rapid development and improvement. The birth dates of this Generation persons are close to the time of the *World Wide Web* invention and full flourish, therefore it is not surprising that Generation Z is highly literate technologically and has particularly close relationship with technologies (Kapil, Roy, 2014; Berkup, 2014).

The **object** of the research is the description of Generation Z, and this Article **aims** to describe briefly Generation Z in terms of the times in which they grew up as well as the characteristics, lifestyles, and attitudes of the group.

**Research methods and organization.** The method of scientific literature analysis is used throughout the Article.

**Results and discussion.** Modern technologies are understood as a creativity enhancing factor, because development of virtual products promotes Generation Z schoolchildren's inventiveness and diverse activity, still, at the same time it inhibits cultivation of creativity (Saylik, Pečiuliauskienė, 2013). Therefore, Generation Z is quick to master various technological novelties and adapt them. Technological tools allow Generation Z to have contact, keep in touch with others and express their thoughts unrestrictedly anywhere and anytime. Therefore, the representatives of this Generation more frequently choose indirect form of communication. The main platform of their self-expression and communication are social networks, blogs, virtual communities etc. (Levickaitė, 2010; Williams, Page, 2011). Generation Z today's life is split into the life in virtual space and reality, and frequently young people become virtual space residents and confuse it with reality. Still, Generation Z feels itself more confident and safe in virtual space, while the virtual world becomes more real and understandable to them than the real one.

According to Giunta (2013), dynamics of life in this Generation people is quite higher. They are capable to control information perfectly well, still they often make irresponsible decisions. Irrespective of perfect abilities in multitasking, Generation Z representatives concentrate on various matters with difficulty, they accept information superficially and are distracted. Differently from previous generations, due to intensive technological interaction, the youth of this Generation think and process information differently, faster in essence, still in small quantities.

Many researchers (Scholz, 2014; Berkup, 2014) think that Generation Z representatives are inclined to individual being rather than joining any team. Individualism is typical of this Generation, and their growing in the environment of increasing consumerism has determined their commodity-oriented system of priority values: they look at the life through the prism of consumerism values.

**Conclusions.** Shift in knowledge of post-modern world and rapid development of technologies determine not only progress in various fields of activity, but also the socio-cultural context, which influences Generation Z adaptation to modern society and expression of their behaviour forms, habits and knowledge. On the basis of scientific scholarly literature analysis, it is possible to single out the following main traits of Generation-Z: high technological literacy, social autism, clipping as a practice of thinking, individualism, pragmatism and consumerism, increasing infantility, high level dynamics of life, cultural colourfulness and attention deficit syndrom.

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## FACING THE DATA TSUNAMI: EXPLORING NEW MEASURES AND METHODS FOR ANALYZING PERFORMANCE IN SPORTS

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**Relevance of the research.** The recent technological advances have allowed improving the validity of available data on physiological and physical requirements of sports and revealed new possibilities for understanding performance in practice and competition.

**Discussion.** Most of these wearable and low-cost equipment are producing large amounts of data, that require to be carefully inspected to constitute new variables and performance indicators. In addition to this problem, these new variables also require different hardware and software processing tools that aim to provide comprehensive reports. For example, non-linear signal processing techniques such as Approximate Entropy and Relative Phase can help to better describe the complex nature of performance by capturing signal regularity and signal coordination. Additionally, some of the most prominent data processing techniques like Cluster Analysis and Discriminant Analysis help to automatically create and classify cases into data-derived or well-known groups. Particularly in team sports, technological advances are based in radio frequency systems, semi-automated video tracking systems or GPS units. Each of these systems aims to capture the players' in-field positional data with a higher degree of accuracy and minor demands for the data analysis and interpretation.

**Conclusion.** At the end, all processes can be used to improve sports performance by optimizing physical, technical and tactical preparation decisions, prevent overtraining and maximize recovery and, ultimately, help prevent sports injuries.

## THE TECHNOLOGY TO PREVENT THE HEALTH IN ELITE SPORTS

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**Relevance of the research.** Hyperthermia (H) is the general name given to a variety of heat-related illnesses. The 2 most common forms of H are: A) heat exhaustion and B) heat stroke (EHS) (body temperature is too hot), estimate is a critical vital sign in the assessment of a collapsed marathon runner who may have EHS (Ronneberg et al. 2008). A reliable core body temperature (Tcore) is also important in differentiating between heat exhaustion and EHS, as well as monitoring the success of cooling therapies. H increases in Tcore above 38°C induced by intense exercise causes central fatigue (Nibo et al. 2001), such as a study demonstrated in triathletes during a 226 km Ironman triathlon where the Tcore was  $38.1 \pm 0.3$  degrees (Laursen et al. 2006). Moreover, time to exhaustion in cyclists in the heat is reduced (Gonzalez-Alonso y col. 1999) and alter the prefrontal cerebral area activity (Nibo et al. 2001). During exercise, Tcore is proportional to the metabolic rate and largely independent of a wide range of environmental conditions and the accelerated H mediated fatigue during prolonged and maximal exercise is preceded by functional alterations in multiple bodily systems including the brain, heart and muscle. It is proposed that the impaired marathon running performance in warm environments is associated with a greater thermal, cardiovascular and metabolic strain, and perception of effort that prevents marathon runners from running at their personal record speed without inducing an accelerated regulatory dysfunction in multiple bodily systems (González-Alonso, 2007).

On the other hand, the accurate measurement of Tcore is essential to protect individuals from heat injury during exposure to high levels of thermal stress (Bernard y Kenney, 1994). This stress is not necessarily commensurate with high ambient temperature and or relative humidity (Cheung et al. 2000). the measurement of the Tcore of research purposes of clinical safety is generally done using either esophageal or rectal temperature. When used with a new receiver from has been found to provide data comparable esophageal temperature to (O'Brien et al. 1998). Both temperatures are reproducible and not based by environmental temperature (Brenngelmann, 1987). There recent advances in technology have made a small telemetric pill, which is swallowed and passed through the gastrointestinal tract, a commercially available and accurate method for measuring Tcore during typical locomotor activities (McKenzie et al. 2004), although, as early as 1968 a temperature sensitive "radio pill", was proposed as a suitable device for monitoring Tcore (Mackay, 1968). Recent investigations have reported problems with manufacturer temperature calibration of the pills (Kolka et al. 1993), but other studies, demonstrated that there was a correlation between the ingestible capsule sensor and a standard rectal thermistor, there was a  $0.59^{\circ} \text{C}$  to  $0.93^{\circ} \text{C}$ , discrepancy during rest and peak exercise, respectively (Sparling et. al 1993). The Cort Temp pill system requires the user to enter calibration values into the receiver for each individual pill prior to use, because the pills transmit continuously on the same carrier frequency (McKenzie et al. 2004). However, to be a cost-effective and practical solution for measuring Tcore in these situations, the gastro intestinal pill would have to be ingested shortly before operational deployment in response to an emergency call.

**Results and discussion.** The cited studies have been performed in a lab setting using trained subjects (Nybo et al. 2001) or during competition with medium athletes (Laursen et al. 2006). However, for author's knowledge it remains unclear: 1) if elite athletes experience hyperthermia during their regular training and competition and 2) furthermore if that could negatively affect health and performance.

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## SMARTPHONES APPLICATIONS FOR THE PROMOTION OF PHYSICAL ACTIVITY

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**Relevance of the research.** Today physical inactivity during leisure time, obesity, chronic disease - problems topical all over the world and in Lithuania. One of the most suitable solutions to these problems – the promotion of physical activity and active leisure. In today's society, in order to promote an active lifestyle large attention should be paid to the outdoor areas such as city parks modernization, to which today can contribute smart technology developers.

In the market of smartphones there is the development of health applications, which are one of the most appropriate measures to promote physical activity in the field. Extra attention is paid to the use of a QR code for active outdoor recreation areas, which help to ensure the quality of outdoor leisure services and the optimal satisfaction of society needs. In recent years in Lithuania to the urban parks is given considerable attention in order to make them attractive outdoor areas. An increasing number of Lithuanian municipalities and various organizations contribute to the modernization of the public parks, make suggestions for the improvement of outdoor recreation for the use of the QR code and it's application in optimal public recreation needs. For this reason, it is important to understand that the smartphone health applications and QR code can help to encourage people to take an interest in sports and be physically active.

The **object** of the research is smartphones applications for the promotion of physical activity and the **aim** to assess the need for a smartphones applications for the promotion of physical activity for the quality of life.

**Research methods and organization.** The main methods of the research was scientific literature content analysis, questionnaire survey, descriptive statistical analysis of the data. The research process consisted of four stages: conception, study design, empirical process and analysis Based on the analysis of scientific literature and on the England Leisure Net Solution (2011), American Parks & Recreation Department (2005) and Oregon Parks and Recreation Department (2007) studies, the questionnaire of 29 questions was formed. The survey was conducted in March, 2013, Kaunas, Lithuania, distributing 400 questionnaires, of which 92 percent came back (369 questionnaires).

**Result and discussion.** Research showed that despite the fact that to the sports clubs and to the sports in an open air the majority of respondents look positively, results disclosed that active leisure in the nature is more admissible. The largest benefit, which can be get from outdoor simulators is active leisure in nature and that sports in nature with outdoor simulators provide better quality of sleep. Aiming to determine how many Kaunas city residents are interested in and know smartphones applications and their functions for the health, it was determined that largest part of respondents are familiar with QR-Code reader (64 percent) and MOPET programs (34 percent). Summing up the results of the survey it can be stated that the study allowed an assessment of the overall perception of the active outdoor leisure activities. It also helped to assess the opinion of the QR code and smart phone applications use for the promotion of physical activity and outdoor promotion. In addition, the results confirmed the company's UK Leisure-Net Solution survey results that the choice of active leisure activities indoors or outdoors, are usually selected outdoor recreation.

**Conclusions.** Kaunas city population approach to the physical activity in parks is positive. Outdoor fitness field in city parks digitization by QR code and smartphones health applications exploitation would encourage residents more actively use the service offered. With the help of these applications residents would have the opportunity personally and free observe certain health indicators, would have outdoor fitness instruction, a free training program and a 3D virtual coach. The survey data showed that the QR code and smartphones applications use by digitization of outdoor fitness in city parks is an appropriate tool to promote an active lifestyle and to reduce sedentary population number.

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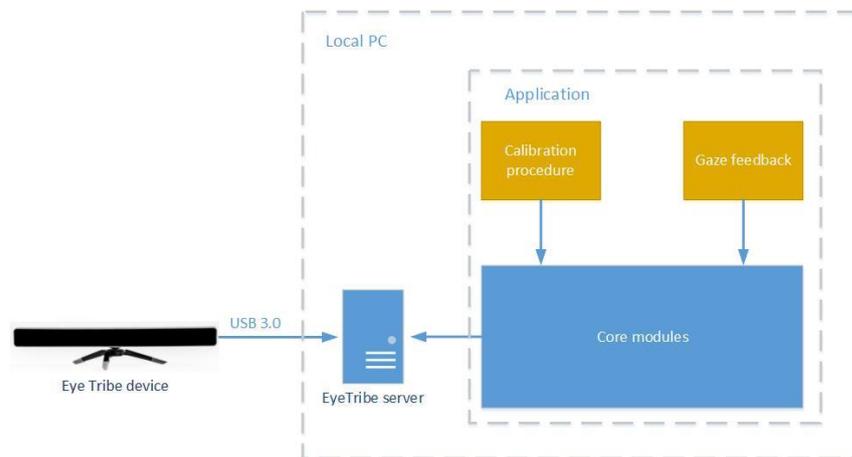
# ALTERNATIVE WAYS OF COMMUNICATION FOR PEOPLE WITH DISABILITIES

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**Relevance of the research.** In this paper, we discuss alternative ways of communication for people with disabilities. We present two types of neural computer interfaces: (1) EMG-based speller, which gives an opportunity to enter text using eye blinks and forehead muscle strain, and (2) concept-based EMG speller, which is an extension of EMG-speller. We also propose a gaze tracking system, which allows enter the text by tracking user eye movement. We examine the two types of text input interfaces. Finally, all systems are evaluated using empirical metrics analyzing performance and accuracy.



## PHYSICAL ACTIVITY OF 6-8 CLASSES STUDENTS IN GAME PLAY AND MOTOR SKILLS PRACTICE LESSONS

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**Relevance of the research.** It is argued that physical activity (PA) in physical education classes often do not meet the moderate to vigorous physical activity (MVPA) recommendations (50 percent of total lesson time) (National Association for Sport and Physical Education, 2000; Williams, 2010). Researches suggest that PA level can vary depending on the content of physical education classes (McKenzie et al., 1995). High quality physical education (physical education classes) may contribute to the general (daily) PA level and child health improvement (Ehrlich, 2008). In this study, we are trying to objectively evaluate the students' level of PA throughout a different type of physical education classes. We want to find out what kind of content of physical education classes (game play and motor skills) is associated with higher students' PA during physical education lessons.

**The object.** Students from 6-8 grades during PA physical education classes. **The aim.** To determine 6-8 grade Lithuania students PA game play and motor skills in physical education classes.

**Research methods and organization.** Physical activity indicators were assessed using *Tri-axis ActiTrainer* Activity Monitor accelerometer (27g; 3.8 x 3.7 x 1.8 cm).

**Results and discussion.** The results of the research show that students during physical education classes do not reach the recommended 50 percent of MVPA rates both in mobile gaming (33.24 percent) and in movement training lessons (19.62 percent). Comparing our results with studies conducted in the United States and Europe, in physical education classes, students also did not reach the recommended norms of MVPA (Ehrlich, 2008). But there are studies in which physical education classes exceed or at least conform to the recommendations. For example, B. Chow et al. (2008) study showed that Hong Kong's fourth - sixth grades (9-12 years old) pupils' MVPA corresponded to 50 percent of class time recommendations. During physical education lessons students' MVPA was 50.7 percent. There are also studies that show that different types of lessons have different levels of physical activity. T. West and K. Shores (2008) conducted a study that used accelerometer (GTM1); it was used to evaluate children's activity levels during different physical activities. The results showed that children of all ages have been the most active during Modeled Play and Free Play; MVPA was higher than 56 percent. However, activity levels were significantly lower during the skills training and movement training lessons, as well as a Scrimmage physical activity; MVPA was only 38.5 percent. Thus, our results confirm the findings of scientists that games, applied to physical education classes, increase (raise) students' physical activity levels.

**Conclusions.** The average indicators of MVPA did not reach the 50 percent bound of time spent in it in neither of the lessons. Physical activity was higher and time spent passively lower in Game play rather than Motor skills practice lesson. Boys and girls didn't differ in terms of physical activity in neither of the lessons, except that girls spent more time in MVPA in Motor skills practice lesson than boys. Increased students' physical activity was associated with physical performance indicators, such as the explosive power and quickness, hand-muscle strength and single-leg muscle strength.

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## THE LATEST TECHNOLOGIES IN THE HEALTH AND WELLNESS INDUSTRY: UK MARKET OVERVIEW

Rusnė Šermukšnytė

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**Relevance of the research.** According to a recent market research report published by Transparency Market Research, the Europe wearable technology market is expected to expand at a CAGR of 42.1% during the period between 2014 and 2019. The report, titled “Wearable Technology Market - European Industry Analysis, Size, Share, Growth, Trends and Forecast, 2013 - 2019”, assesses the value of the overall market, which was worth US\$308.69 million in 2013. With increased demand for wearable devices in sectors such as healthcare, military, and infotainment, the wearable technology market in the region is expected to be valued at US\$2,545.51 million by 2019. The report points out that the large installed base and rapid adoption of mobile products has fueled the market for wearable devices in Europe. Advances in material sciences have led to compactness, multi-functionality, and easy use of wearable technology products. Increased application of wearable devices across various sectors has pushed the growth of the market (Transparency Market Research, 2014). It’s important to know – how wearable devices are segmented in European and UK market, which segments of European and UK industry, will use it more in the near future and how demand on these products will vary in the future.

**Research methods and organization.** Study has been performed reviewing the literature (scientific journals and internet sites) on topics related to the wearable devices trends in Europe and particularly in UK market. The main **objective** was to establish what kinds of segments in the wearable devices market are predicted to grow most of all, what kind of particular devices are pointed out by researchers as the future of wearable devices use for customers, and which sectors of the industry will use wearable devices most of all.

**Results and discussion.** The research studies have segmented applications and products as shown below:

Wearable technology Market: By applications

- Fitness and Wellness, Infotainment, Healthcare and Medical, Industrial and Military

Wearable technology Market: By products

- Smart clothing and smart sport glasses, Activity monitors, Sleep sensors, Smart watches, Heads-Up displays, Smart glasses, Continuous glucose monitor, Drug delivery, Monitors, Wearable patches, Hand worn terminals, Augmented reality headsets.

Authors agree that wearable technology market in UK is still a niche market. At the same time there are many studies stating that despite the cost of the products in this market is relatively high it has huge potential to grow. The wearable technology market in Europe, as well in UK, is expanding across numerous sectors including sports, medicine, military, engineering and etc. Reviewing the applications, the European wearable technology market is divided into the following segments: infotainment, fitness and wellness, industrial and military, and healthcare and medical. Important to acknowledge that segments of fitness and wellness led the market from 2012 and has potential of continuation growing.. On the basis of different products, the European wearable technology market (the same situation in UK) is segmented into activity monitors, smart sports glasses and smart clothing, smart watches, sleep sensors, smart glasses, head-up displays, drug delivery, continuous glucose monitors, wearable patches, augmented reality headsets, and hand-worn terminals.

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# EFFECT OF OAT-BASED READY-TO-EAT 70g BREAK-FAST ON APPETITE CONTROL, SATIETY AND PERSPECTIVE FOOD INTAKE VERSUS 55 AND 35g: A RANDOMIZED, CROSSOVER STUDY

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**The Aim** of the study was to establish the impact of most widely sold oat-based ready-to-eat breakfast cereal (RTEC) currently provided in different portions on appetite control until lunch.

**Research methods.** Thirty healthy participants (16 males and 14 females) were involved in a randomized double blind crossover study. Mean age  $-39\pm 13.5$ ; normal body mass index  $-22.3 \text{ kg/m}^2$ . Female subjects also completed a menstrual cycle questionnaire so that breakfast test days would fall within the luteal phase of the menstrual cycle. Participants kept records on amounts of food intake during the entire study period. The diet of the subjects was monitored throughout the entire survey process. The subjects had to eat in the usual way and not make any dietary changes. The subjects over a 9-day period daily consumed different RTEC breakfasts varied in dry weight (70, 55, 35 g).

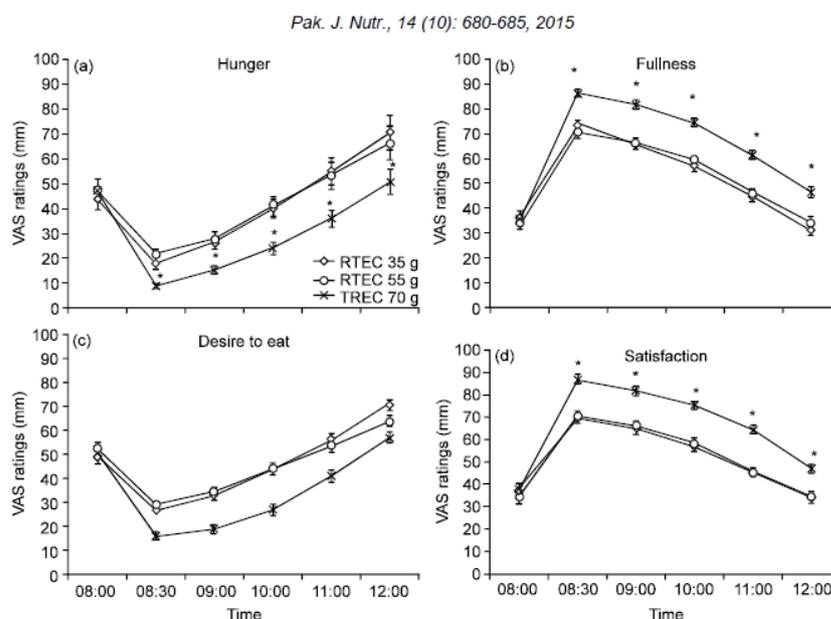


Fig. 1: Visual analog scale ratings (n = 30) before and after consumption of 35, 55, 70 g of RTEC.\*denotes significance between 70 g versus 35 g and 55 g RTEC (p<0.05)

These different breakfast foods were selected randomly and taken for 9 consecutive days at the same time. Visual analog scales for appetite measurements were administered before breakfast at 07:00 and repeatedly until 12:00 before lunch. Paired t-tests were performed for comparison of appetite ratings between different products. This study showed that 70 g of RTEC versus 35 and 55 g reduced hunger, increased sensation of fullness, decreased desire to eat and satisfaction after meal were significantly prolonged and greater in every time point (p<0.05).

**Results.** It is concluded that 70 g of RTEC is an appropriate portion to effectively increase satiety, subsequent decreased hunger and desire to eat up to 4 h after consumption.

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## EFFECTS OF “HOPSPORT BRAIN BREAKS” PROGRAM FOR PHYSICAL ACTIVITY AND PASSIVITY IN A PRIMARY SCHOOL

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**Relevance of the research.** Physical passivity in children raise concern as the majority of children did not meet the health-related level of physical activity (PA). Along, trends in physical fitness shows constant decline. Digital facilities may help to solve the problem. So, the aim of the study is to assess the effect of “HOPSport Brain Breaks” video exercise intervention program for PF and passivity in a primary school.

**Research methods and organization.** Study included 113 primary school children, grades 1-4, consisting of 62 children in an experimental group and 51 in a control group (Mage = 8.24, SD = 1.10). Physical activity and passivity were measured using questions from “Health Behaviour of School Children” (HBSC) questionnaire. The experimental group received Brain Breaks intervention every school day for three months in 5-9 minutes sessions during the breaks.

**Results and discussion.** after three months physical activity improved ant the passivity reduced in experimental group comparing with controls ( $p < 0.05$ ).

: The results mean that fun and enjoyment, which is the principle of Brain Breaks intervention, were important factors for reducing passivity. Studies also show that levels of PA and passivity became a proportionate when children are given the opportunity to play active games and experience fun (West & Shores, 2008; Wickel & Eisenmann, 2007).

**Conclusions:** It may be concluded that Brain Breaks intervention program contributes to physical health of primary school children.

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