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AVAILABILITY OF AREAS AND FACILITIES FOR PHYSICAL ACTIVITY FOR THE NON-REGISTERED PUBLIC

Andrea VÁŠKOVÁ

Abstract

The conference on sustainability and accessibility of sports infrastructure organised by the NSA in 2022 showed how the issue of accessibility of sports and physical activities for citizens is crucial in the context of ensuring a healthy lifestyle for the general non-registered public. It also confirmed that there is a lack of any national concept for the country that addresses this topic. One of the key factors in promoting regular physical activity among the general public is accessibility, both geographic and financial. This paper outlines the current approaches to the development of databases for these places in the Czech Republic, which is the subject of the author's PhD thesis. They demonstrate that unless a national register of areas and facilities for sport and physical activity is quickly created, it is impossible to have an objective basis for planning the urban development of these places. Using the example of an analysis of selected cities in the country, it is shown that just few existing facilities are year-round complex wellness centres and that there is an insufficient number of them in relation to the demands of the people in the localities. Finally, a system of uniform methodology for the registration of suitable places and their relevance for the preparation of urban plans of town and municipality is outlined.

Keywords

physical activity; wellness centre; non-registered public; accessibility; evidence of facilities and areas; development of the territory

1. INTRODUCTION

Regular physical activity is one of the key factors in maintaining good holistic health. There are several possibilities how to include physical activity to everyday life. One of them is the most natural motion – walking, which is more suitable than driving cars or using public transport. Another option is the use of areas and facilities for physical activity and sport. These facilities must be available for public in their surroundings to eliminate necessity of using other transport than walking. Meaningful development of this infrastructure in the Czech Republic must be based on a nationwide register of these facilities used to identify and evaluate the current state of the art and then on a site-specific concept. There is currently no national database of facilities and areas for physical activity and relaxation intended for the general non-registered public in the Czech Republic, although some sporting associations use their databases to provide a basic perspective of current facilities in the field of exercise and sport. However, these databases do not have analyses in relation to the population. Some presentations at a conference on the sustainability and accessibility of sports infrastructure, organised by the National Sports Agency in 2022, showed that databases of sports areas and facilities in other European countries have been compiled and made available online. However, these databases usually do not overlap with urban development concepts, but an exception is Finland, for example, where the database is linked to population data and serves as a basis for individual municipalities and regions in the area of urban development.

2 RESEARCH OBJECTIVE

The aim of the research was to obtain a more detailed insight into the issue of wellness facilities from the perspective of architecture and urban planning, and to find out what the current status and approach to the registration of these facilities is, and what conclusions can be deduced from this. Two primary hypotheses were formulated based on the generally known facts about this topic in the Czech Republic. The first hypothesis is that there is no unified database of facilities for physical and recreational activities, which would also be a suitable basis for sustainable planning of these activities. The second hypothesis assumes that there is no valid national document or methodology on the topic of wellness facilities at the urban planning level.

3 METHODOLOGY

The research uses a compilation method to present findings and data in the field of wellness centre design. Furthermore, the study analyses different approaches to the registration of sports facilities both abroad and in the Czech Republic. The research also includes an analysis of several cities in the Czech Republic in terms of the existence of facilities for physical and relaxation activities and their availability to citizens. Consequently, the conclusions for the future development of these facilities are made.

4 PROCEDURE AND RESULTS

4.1 Contexts of the wellness centre design

Defining a term “wellness centre” and its facilities is difficult due to the variety of services that can be offered in the centre and the complexity of the design of these facilities. The following is a possible definition:

„As far as possible, wellness facilities ought to offer a broad range of physical, relaxation and fitness activities, combined with health monitoring and preventive care for overall condition – physical, mental and health.“ (Kopřiva, 2011)

A wellness centre is a complex facility that must meet both legislative and public benefit requirements. This article primarily deals with the urban context of the proposal, but there are many more important aspects for the design (economic, target group of visitors...) and none of them should be neglected.

The national concept for the development of sports facilities ought to target the general non-registered public, which is the largest group of citizens in the field of sport and physical activity, and at the same time the one to which the least amount of space is allocated, as can be seen from the graphs (Figure 1) from prof. Kopriva's research. (Mirovský, 2016)

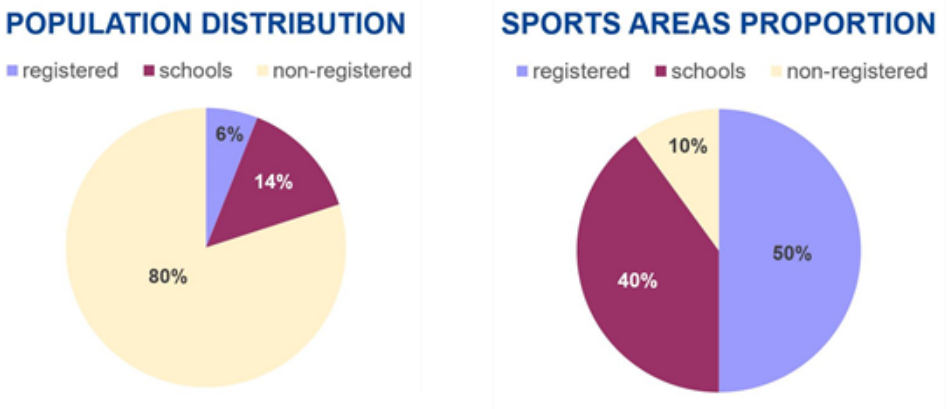

Figure 1 Graphs illustrating the percentage of different sports areas and the number of users, source: (Mirovský, 2016)

In the past, the public sport and recreation indicator was set at 17 m2 per individual. However, the distribution of this indicator among various groups was heavily unbalanced in favour of organised movement. Unorganised movement, which comprised green spaces, playgrounds for children, youth and adults, was only given 6.87 m2 per individual in school physical education and 8.0 m2 per individual in organised physical activity. It is impossible to verify whether the indicators have been met, but it is likely that there have been large deviations from theoretical needs in practice. The precision of the global indicator and selected sections with respect to the true needs of different population groups may be questionable. At present, no such indicators exist. (Urbanismus architektura design – studio spol.s.r.o., 2007)

To enhance the overall holistic health of society, we must start with the generation of children who are encouraged by their parents to make physical activity a natural part of their daily routine. Nevertheless, it is crucial to note that parents too must adopt a natural approach towards movement in order to teach their children accordingly, which is yet to become the standard in all households. Guidance on movement at school can be helpful in this respect, where, among other things, the necessary facilities need to be created. (Urbanismus architektura design - studio spol.s.r.o., 2007)

The financial and geographical availability of facilities and areas for physical activity is essential for regular physical activity. In terms of financing, it is important to explore options for state or health insurance support in order to ensure equal access to year-round physical activity for all population groups. Short walking or commuting distances play a key role in sustainability and regularity. Suitable locations for wellness centres are those in close proximity to our homes or workplaces, reducing the need for commuting. These areas are known as catchment areas, which are often already urbanised. As such, it may be necessary to identify alternatives such as high-rise developments, the reuse of brownfield sites, or incorporating wellness facilities into existing buildings, such as schools, hotels or office spaces. (Krejčí, 2016)

The catchment areas for physical and recreational activities can be divided into three sizes: the smallest is 600-800 m /10-12 minute walk; the middle is up to 2 000 m and can be reached either on foot or by public transport; the largest is about 30-40 km and requires public transport or private car transport. Figure 2 displays a schematic representation of these centers of population. The areas' size is determined by the optimal distances recommended for various activities that are part of the wellness centres. (Maier, 2016-2020)

Outdoor physical activities in nature, which are less preferred in the colder season, must not be neglected. When dealing with seasonal facilities, it is recommended to seek alternative uses for the facility during the remaining time to maximise its potential.

4.2 An inspiring foreign example - Finland

The matter of physical activity and its promotion is being discussed all over the world, but each country is approaching it with different priorities and in different ways. Finland serves as an inspiring model from abroad for approaching the issue in a national conceptual way. Geographers from the University of Helsinki and social scientists from the University of Jyväskylä, supported by the Ministry of the Environment, are studying equal access to sports facilities and opportunities for physical activity. The project created a national database named LIPAS, publicly available online and able to provide context and analyse the research data. As a consequence, a unique basis for future decisions on the development of the territory is created. (University of Helsinki, n.d.)

The LIPAS database provides information on public sports and recreational facilities and supports municipalities in exchanging experiences and comparing financial

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expenditure concerning these activities. These facilities are presented on an interactive map where they can be filtered according to several options (type of sport, type of sports ground, location, owner, operator, year of construction, current status ...). Additionally, the information is available in table format. The database does not contain the term "wellness centre" because of the unclear definition of the activities it encompasses. (University of Jyväskylä, n.d.)

The diversity tool contextualises data on movement opportunities and population data for the specific area being analysed. The analysis may also be founded on walking distance data using Open Street Maps. Comparison of results with normative or guideline values for movement opportunities in a given area is not possible, as such values are absent. (University of Helsinki, n.d.)

Figure 2 Catchment areas – scheme, source: (Vášková, 2023)

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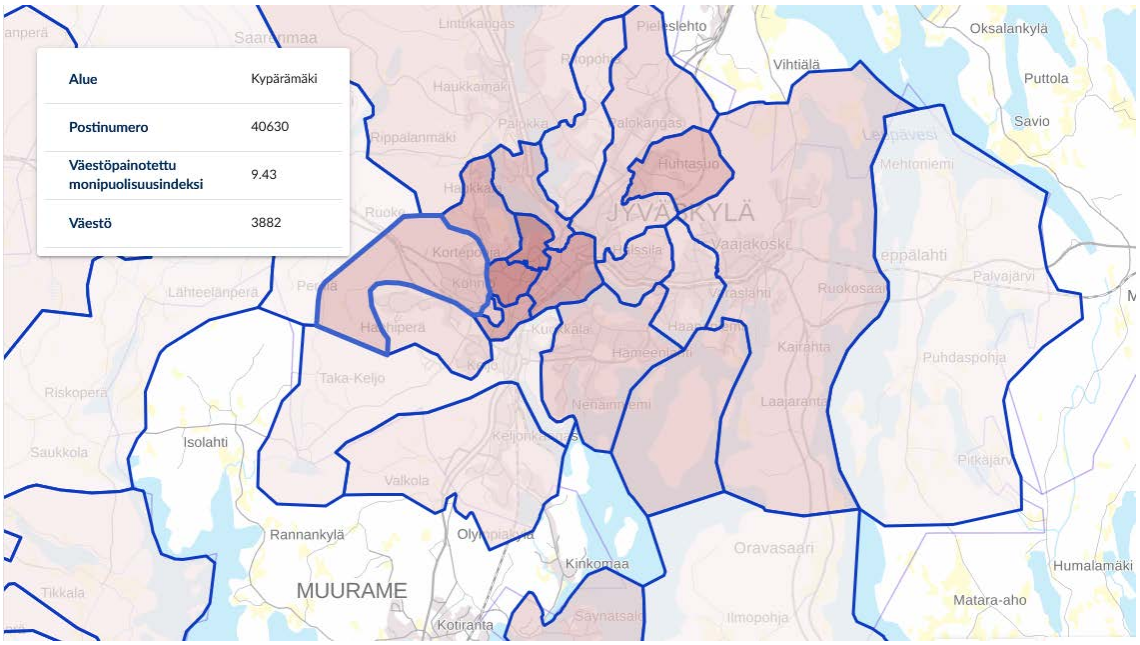

Figure 3 Project LIPAS – Finland, the database and the diversity tool, source: (University of Helsinki, n.d.)

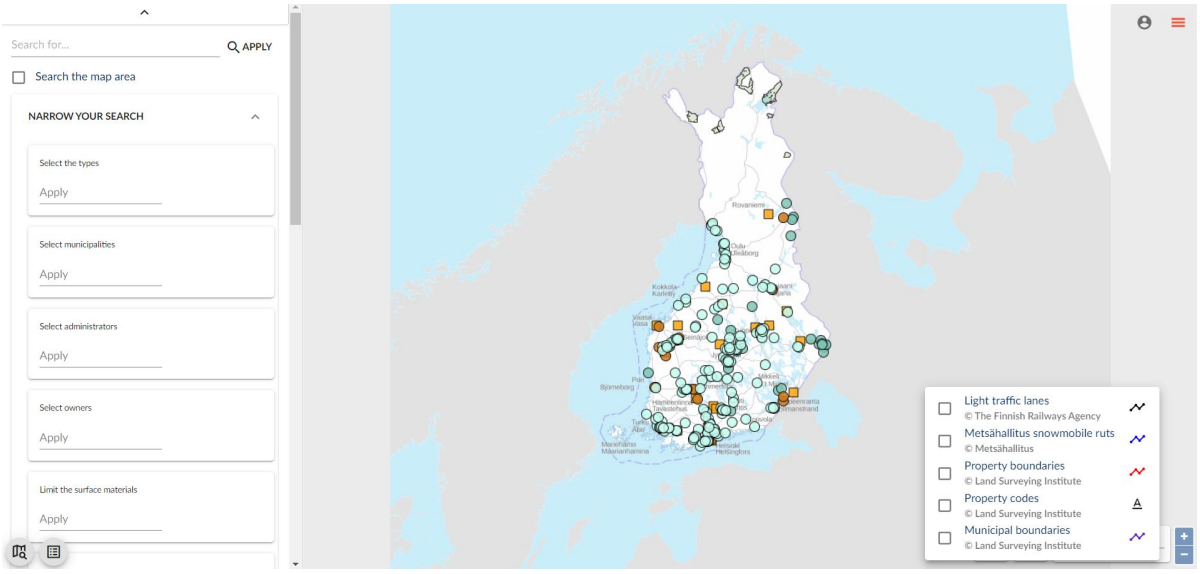

Figure 4 Project LIPAS – Finland, the database, source: (University of Jyväskylä, n.d.)

4.3 Registration of facilities and areas for physical activity in the Czech Republic

The Czech Republic lacks a unified system for registering areas and facilities for physical activity and relaxation. Presently, diverse databases are processed, with each recording specific areas or facilities for the specific purpose of the establishing organisation, which is related to the differences in the

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recorded data. Furthermore, these databases are incompatible with each other.

The National Sports Agency (NSA) established the Register of Sports as the initial example of sports facility registration. This record contains a register of all sports organisations, sportsmen and sportswomen, coaches and sports facilities that apply for state subsidies. Some facilities are listed multiple times since they are registered by different clubs that use them. The database solely provides a list, which users can filter according to location and sport type, without any markings on the map. Therefore, the overview holds no relevance for subsequent reference. (Rejstřík sportu Národní sportovní agentura, n.d.)

The Czech Union of Sport's Information System provides a more complex system for registering sports facilities than the NSA, in that facilities are displayed both on a map and as a list. However, this database primarily comprises sport facilities managed by member organisations of the Czech Union of Sport (CUS). (Česká unie sportu, n.d.)

The exception is the region of South Bohemia, where an agreement was reached between the CUS and the municipal sector to include all sports facilities in the region. However, not all sports facilities are included in the database, as per the author's research. Moreover, Czech Floorball and some cities register these facilities on their websites (such as Olomouc, Pardubice and others). Notably, there is no database for wellness centres, and this term does not appear in the databases and surveys.

Given the above information, it is challenging to obtain an overview of the actual amenities for physical activity and relaxation in the Czech Republic. Therefore, a survey of selected locations has been conducted with the goal of comprehending the current state of the matter. The survey of the area combined a personal visit to the city, studying various databases and concepts for the development of sport in cities or regions, communication with schools in the area and searching for additional information on the Internet. The study exclusively concentrated on indoor establishments adhering to the features of a wellness centre, such as fitness centres, swimming pools for fitness swimming, gyms, beauty salons, massages, etc. Schools were surveyed regarding their provision of a gym and its rental to the public outside school hours. The research was completed in a total of 15 cities / 5 regions and in 3 cities of different population within each region. For the purpose of this article, only 2 cities were selected: Pardubice, with a population of 88 520, and Strakonice, with a population of 22 214. (Český statistický úřad)

The full research can be found in the author's dissertation. (Vášková, 2023)

The maps in Figure 5 and Figure 7 illustrate the colour-coded facilities for physical activities, relaxation treatments, and their combinations. These facilities are categorized into dry or wet activities, as well as school facilities. The colour coding also indicates whether the facility is registered in one of the databases mentioned above. The accessibility of each wellness facility within a 10-12 minute walk (approximately 600-800m) is graphically displayed in Figure 6 and Figure 8.

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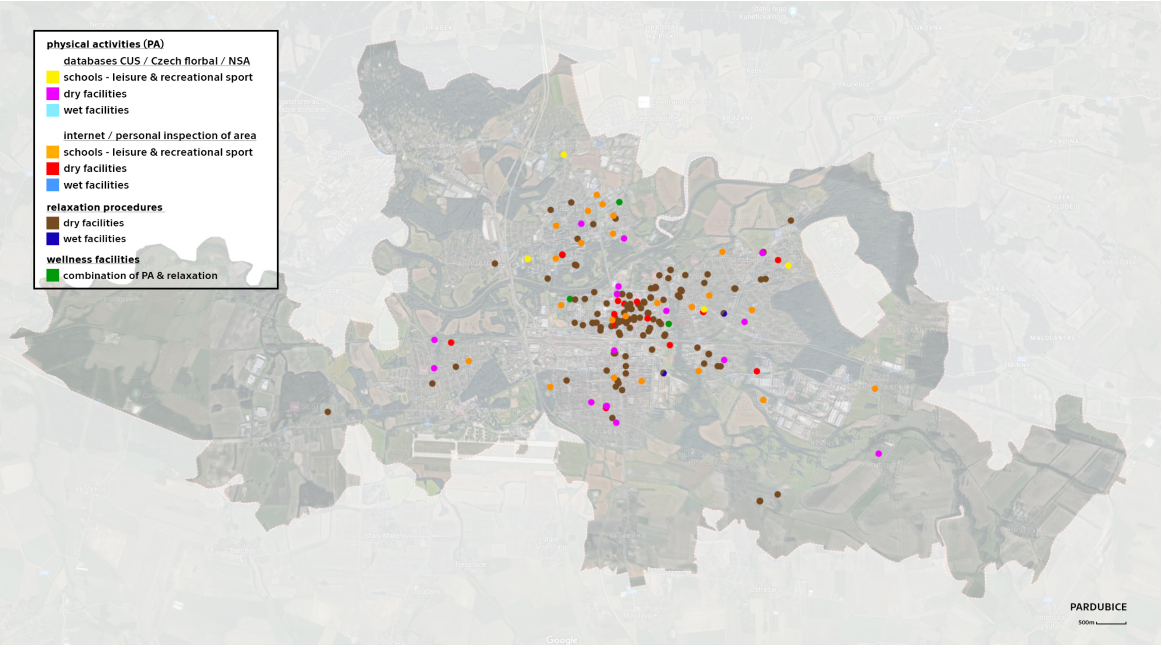

Figure 5 Map of the infrastructure of indoor facilities suitable for public movement and relaxation in Pardubice, source: (Vášková, 2023)

Figure 6 Map of the distribution of the infrastructure of indoor wellness facilities for the public in Pardubice, source: (Vášková, 2023)

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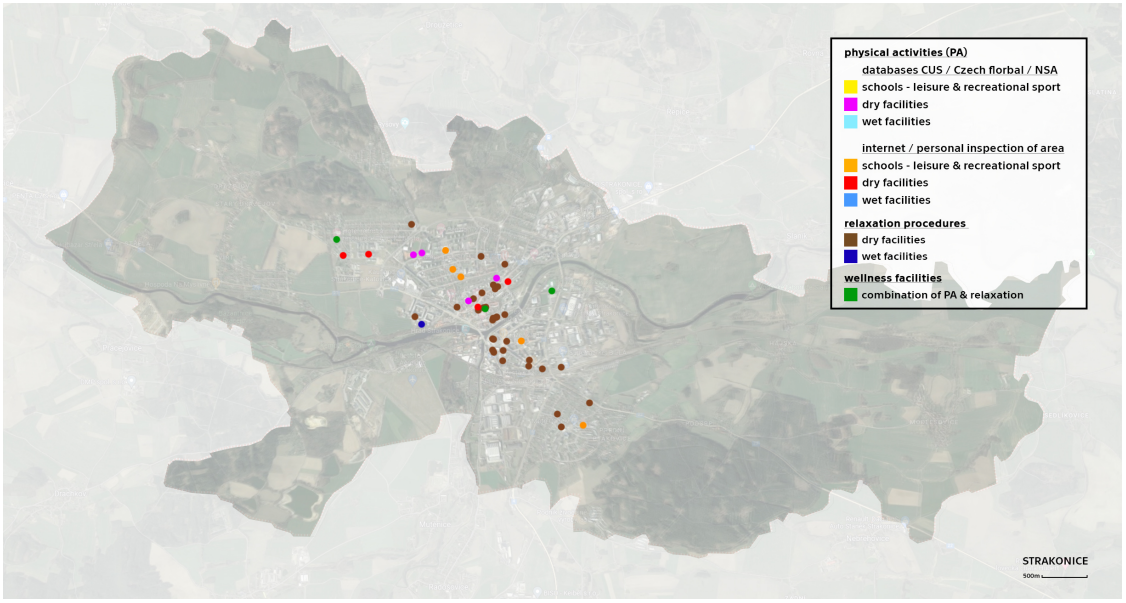

Figure 7 Map of the infrastructure of indoor facilities suitable for public movement and relaxation in Strakonice, source: (Vášková, 2023)

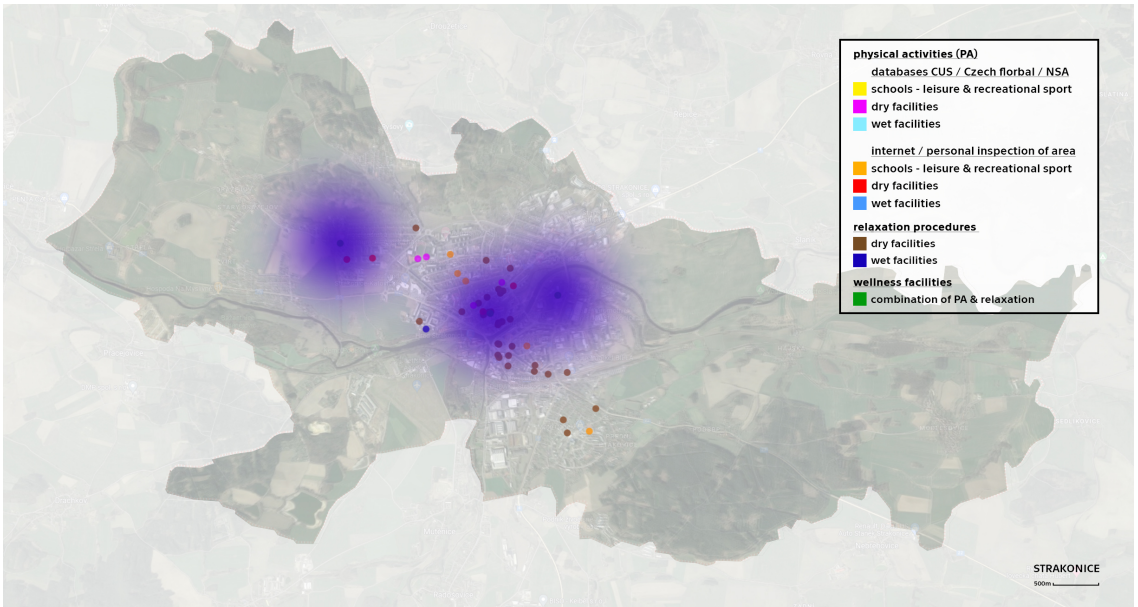

Figure 8 Map of the distribution of the infrastructure of indoor wellness facilities for the public in Strakonice, source: (Vášková, 2023)

As the maps demonstrate, all exercise and relaxation facilities in the city are not comprehensive wellness centres. Consequently, these centres are not accessible within a 10-minute walk of all the city's residential areas, forcing residents to spend more time on the road, using public or private transport. As a result, most people's visits are irregular. The depicted distribution of individual wellness centres

does not consider any untraceable or unavailable research data, such as the walkable street network, the residents' concentration in each building, and the capacity and size of the facility. (Vášková, 2023)

4.4 Uniform methodology for the registration of facilities for physical exercise and relaxation activities

The author provides their subjective opinion on how to approach registration due to incomplete information about the current state of equipment in areas and facilities for movement and relaxation activities. To enable the evaluation of the current situation at both local and national levels, the database should have uniformity throughout the Czech Republic. Despite the complexity of the issue, it is crucial to clearly define the areas and facilities that require registration. The registry ought to encompass establishments set up by the municipal sector, as well as club and commercial establishments. Registered facilities should be accessible to the public without the need to register with an association or club. Physical activity and relaxation need not perforce be the primary and sole activities at a registered facility, since, as an illustration, a hotel, office establishment, or school facility may also provide excellent venues for movement. It is important that the database is clear, allows filtering of results according to different parameters and is user-friendly for citizens. A mobile app that provides a timely overview of the available opportunities for physical activity in one's neighbourhood seems to be appropriate. (Vášková, 2023)

The database must contain data on the population, including permanent and temporary residents, as well as commuters. It should also be linked to the street network to evaluate the state of facilities for a given number of residents and walking distances. A comprehensive analysis also requires mapping the capacities of facilities and identifying the interests of citizens in the locality. Benchmarks for evaluating the amenities of a locality should be given on a national level so that the whole country comes as close as possible to an ideal state where citizens can move, play sports and relax in the vicinity of their home or work. After a complete and up-to-date inventory of facilities and subsequent evaluation of individual sites, it is necessary to address individual problem areas and look for specific suitable locations where areas could be integrated or completely new ones created. (Vášková, 2023)

5 CONCLUSIONS AND ACKNOWLEDGMENT

The research aimed to investigate wellness in greater depth by documenting the current state of amenities, their links to urban planning and site development. The study revealed the absence of a unified national database covering all facilities and areas for exercise and relaxation. Defining the facilities to be registered seems to pose a complex challenge. The establishment of this database will take several months, which significantly postpones any conceptual change at national level. The assessment of the current status must be consistent throughout the country, based on comparable reference values that each region should strive towards. The historical values of the overall urban indicator should be revised in favour of the non-organised public. Simultaneously, the protection of the so-called yellow areas in the urban plans, areas for sport and recreation, which are being eliminated over time in favour of other functions, is necessary. The implementation of these changes is a long-term process, and the search for suitable sites to supplement the missing facilities becomes more difficult as development increases. It is essential to initiate these changes promptly so that the next generation, at least, can feel the change for the better in their daily lives. (Vášková, 2023)

I would like to thank prof. Ing. arch. Miloš Kopřiva for his invaluable guidance during this research.

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A CASE REPORT ON THE EFFECT OF EARLY MOBILIZATION IN THE REHABILITATION OF AN ACROBAT POST-OPEN TRIANGULAR FIBROCARTILAGE COMPLEX REPAIR

Arthur AGERO

Abstract

The Triangular Fibrocartilage Complex (TFCC) is one of the more vital structures in the wrist. The TFCC functions as a stabilizer of the distal radioulnar joint and a conduit in the transmission of load in the upper extremity. Its integrity is important to allow the dynamic movement of the hand and wrist as well as in weight bearing. The TFCC can be subjected to excessive stresses, especially in elite performing athletes such as an acrobat, that can lead to its rupture.

Partial or complete rupture of the TFCC of an elite athlete would benefit most from an open surgical repair. Surgery is then followed by hand therapy. However, due to the complexity of the TFCC, there is currently no gold standard in the rehabilitation of the TFCC. Albeit the globally practiced treatment post-surgery involves prolonged immobilization in a cast or a Muenster Splint that can range between 3 weeks and 8 weeks beforehand therapy can commence.

The length of immobilization and time spent in hand therapy to recover range of motion, function, and strength can consume more than four months. This is a time that a performing acrobat may not have.

This paper presents the effect of immediate hand therapy and early mobilization of the wrist of a professional acrobat who had an open surgical repair of a partial rupture of the TFCC and the Lunotriquetral ligament of the wrist.

Keywords

Triangular Fibrocartilage Complex, TFCC, Hand Therapy, wrist injury, early mobilization

1. INTRODUCTION

The Triangular Fibrocartilage Complex or TFCC is a confluence of six different ligaments and a cartilage to form a structure that connects the distal radioulnar joint and some of the carpal bone on the ulnar side. The TFCC also serves to transmit forces from the upper extremity and aids in the regulation of load during object manipulation.

The TFCC is comprised of the (1) ulnocarpal or articular disc, (2) meniscus homologue, (3) deep and superficial radioulnar ligaments, (4) tendon sheath of the Extensor Carpi Ulnaris, (5) dorsal and volar ulnar carpal ligaments, and (6) ulnocarpal capsule. (Lerma et al., 2022) Injury of one or a combination of these structures can cause pain and compromise wrist stability. (Jung et al., 2009)

Diagnosis of a TFCC injury can usually be done through physical examination in the clinic, using a battery of special tests to determine the integrity of the components of the TFCC.

However, to further reinforce the result of the physical examination, an MRI is usually obtained. To further identify the ligament damage in detail, arthroscopy may be done. Arthroscopy is regarded as the gold standard in wrist ligament injury diagnosis. (De Santis et al., 2022)

TFCC injuries are categorized by Palmer as either traumatic or degenerative. Traumatic injuries to the TFCC are identified based on the location. (Palmer, 1989) The case presented in this paper is a TFCC Type 1B injury associated with a Lunotriquetral ligament rupture.

2. CASE PRESENTATION

A 24-year-old, male, professional acrobat, who performed as part of an acrobat troupe in Dubai, United Arab Emirates in 2017, came for consultation due to ulnar-sided wrist pain aggravated by supination of the wrist and weight bearing. Upon clinical examination by a seasoned Orthopaedic Hand Surgeon, he was diagnosed to have a TFCC injury. To confirm the diagnosis, an MRI of the wrist was ordered.

The MRI revealed a partial tear or rupture in the TFCC complex and a complete rupture of the Lunotriquetral ligament of the right wrist. The injury was sustained during rehearsals of a new acrobatic act that was different from his trained and usual role.

Within the week of the diagnosis, the patient agreed to an elective open surgical repair of the TFCC and Lunotriquetral ligament. A few days after the surgery, he was referred to the author's clinic for hand therapy.

Figure 1. The patient performs active range of motion exercises with the forearm and wrist in the neutral position.

The hand therapy involved wound care, edema management, use of physical modalities, gentle active range of motion exercises of the wrist, tendon gliding exercises, isometric exercises, scar management, conditioning, and strengthening exercises, proprioceptive exercises, simulation, and scaled actual task performance.

The patient was provided with a wrist brace from the first session of hand therapy, a few days after the surgery, instead of being placed in a Münster Cast or Münster Brace. The brace was always worn including during sleeping and was only removed for therapy and hygiene activities. The patient was instructed to ensure that the wrist and forearm are not rotated palm up or supinated when not

wearing the brace. The brace was weaned off by week 6 post-surgery and was only worn during light gym exercises and in crowded public venues. By the 8th week, the wrist brace was discarded completely.

The patient engaged in intensive hand therapy in the first month, having sessions 2-3 times per week and reduced to twice per week in the second and third months. Whenever the patient did not have sessions with the author, he was treated by the Troupe's in-house Physiotherapist who used the Human Tecar as a physical modality and replicated the exercises prescribed. The in-house Physiotherapist collaborated with the author to ensure that the exercises to preserve the strength of the proximal muscles of the shoulder girdle and upper arm are still carried out during the initial stages post-surgery.

Figure 2. The patient lifting 150kgs pain-free 5 years post-surgery.

By the 8th week post-surgery, the patient was back in the gym performing scaled exercises for conditioning and strengthening. By the 12th week from the surgery date, the patient was discharged from my care and resumed his work, easing in with reduced participation in shows. As of the time of writing, the patient is performing as part of the Cirque De Soleil Troupe.

3 DISCUSSION

The aim of immobilization of the wrist and forearm in the neutral position in the treatment of a TFCC injury is to allow the structures to heal without the risks of re-injury or re-rupture. However, prolonged immobilization also increases the chances of stiffness of the wrist joint and muscle weakness. (Lerma et al., 2022) Immobilization also creates cortical changes in the brain, influencing mental imagery, muscular sensitivity, and limb control. (Gaffney et al., 2021; King et al., 2022)

Knowledge of the wrist and biomechanics also allows the initiation of hand therapy for early mobilization. By positioning the wrist and forearm in the neutral position, the stress in the TFCC is reduced. (Jung et al., 2009; Lerma et al., 2022)

The stability of the wrist is not exclusive to the integrity of the TFCC, the tendons that cross the wrist also provide extrinsic support for strength and stability. Therefore, the muscle strength and general fitness of the patient before the injury are factors that would facilitate faster recovery. (Lerma et al., 2022) Additionally, the patient's athletic genes may

also play a role in the recovery rate allowing for faster progression.

Moreover, the time window between proper diagnosis of an injury and actual surgical and therapeutic intervention impacts the outcome of recovery as well.

4 CONCLUSION

Early mobilization of the wrist post-Open TFCC repair of an athlete may be beneficial to achieve a good outcome and safely allow the return to work within a shorter period. Early mobilization prevents complications such as adhesions, weakness, loss of range of motion, and unfavorable cortical and sensorimotor characteristic changes. However, a sound knowledge of the TFCC anatomy, biomechanics, and surgical method used in the repair are essential in confidently implementing the method.

Limitations

This is a single case report, and the same method needs to be implemented in a bigger sample population. Likewise, the same method of early mobilization therapeutic intervention needs to be implemented in other facilities for comparison.

Acknowledgement

The Early Mobilization of the wrist for Open TFCC repair is a brainchild of Dr. Lucia Heras, who laid down the fundamental principles that served as cornerstones for my therapeutic exercise routine that I have developed and continually fine-tuned up to this date. I worked with Dr. Heras from 2013 until 2021, treating orthopedic post-surgical cases for hand therapy, the majority of them with TFCC injuries. I thank Dr. Lucia Heras for initiating and providing me with the main guidelines for the post-surgical treatment of her Open TFCC repairs.

Ethics

Consent was obtained from the patient in 2017 and is logged in the records of Burjeel Hospital for Advanced Surgery in Dubai, United Arab Emirates. Consent for publication and use of data and images were obtained personally by the author from the patient via e-mail.

Declaration: The author has nothing to declare.

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COLLECTING ELECTRONIC HEALTH RECORD (EHR) TO SUPPORT HOLISTIC SPA THERAPY AS A DIAGNOSTIC PROCEDURE FOR ADVANCE CARE PLANNING (ACP): A LITERATURE REVIEW

Jan WALENCIK, Barbara ROSOŁEK, Anna ZWIERZCHOWSKA

Abstract

Developing technology and collecting electronic information are fostering the creation of new procedures and clinical decision-support tools for therapy in rehabilitation hospitals and spa resorts. Electronic health records (EHR) does not take into account the complementarity of activities with the need for effective patient care in rehabilitation and sanatorium hospitals and spas. This paper aims to present a proposal for a complementary electronic anamnestic tool (CEAT) in a holistic approach to the patient's prevention and rehabilitation process in a rehabilitation hospital or a spa resort using EHRs that will be effective in ACP. To achieve the objective thus formulated, the literature was reviewed and thoroughly analyzed in terms of stratification and classification of the tools using EHRs. designed CEAT tool consists of a history of physical status (weight, height, waist circumference), neurological incidents, cardiovascular disorders, past treatments/surgeries, psychiatric disorders, and level of daily physical activity, supplemented by survey questionnaires selected in a literature review based on their widespread usefulness supported by scientific evidence. The questionnaires included in CEAT allow for a multifaceted assessment of the patient's health status, taking into account their physical state, functional capacity, and well-being.

Keywords

Electronic health record (HER), advance care planning (ACP), holistic therapy, complementary electronic anamnestic tool, CEAT

1 INTRODUCTION

Developing technology and collecting electronic information are fostering the creation of new procedures and clinical decision-support tools for therapy in rehabilitation hospitals and spa resorts. Increased collection of patient data in healthcare institutions opens up new opportunities to apply this information to improve treatment outcomes (Gunn et al. 2023). Furthermore, it seems that such activities can be educational for spa patients by raising their awareness of the cause-and-effect relationships for healthy living. From the perspective of the effectiveness of the treatment, this is equally important in terms of the holistic approach to this process in rehabilitation and prevention. At the same time, there is a perceived lack of advance care planning (ACP) implemented to support the patient. Collecting electronic health records (EHR) can be a way of eliminating the barriers associated with the lack of ACP, which can significantly affect the quality of medical services and the adaptation of treatment forms and methods, thereby supporting the patient in the healing process (Huber et al. 2018). Lamas et al. (2018) indicate that EHR has the potential to capture patient knowledge. This action allows the subject examination to be extended to include anamnestic patient data. As suggested by Lamas et al. (2018), however, this requires improved levels of security and system performance, as well as regular monitoring and documentation.

To the best of our knowledge, although EHRs are increasingly popular in many

healthcare settings, this procedure does not take into account the complementarity of activities with the need for effective patient care in rehabilitation and sanatorium hospitals and spas. Such activities are interim and often target specific needs of the medical facility, such as collecting statistical data on the prevalence, age of patients, and demand for specialist doctors, which is undoubtedly important for adapting the management plan in medical facilities.

The patient's ACP needs using EHRs could be met by using an electronic tool built from complementary and compatible survey questionnaires, providing holistic information about the patient and whose effectiveness is based on scientific evidence. Building such a tool requires the verification of scientific evidence assessing the patient in a multifaceted manner, which will potentially allow the anamnestic study to be broadened. In this way, the knowledge collected can support the doctor qualifying the patient in the sanatorium. It allows him or her to identify the patient's needs and accurately diagnose and classify them into appropriate methods and forms of therapeutic interventions.

2 OBJECTIVE

This paper aims to present a proposal for a complementary electronic anamnestic tool (CEAT) in a holistic approach to the patient's prevention and rehabilitation process in a rehabilitation hospital or a spa resort using EHRs that will be effective in ACP. It was assumed that only validated survey questionnaires, supported by scientific evidence collected during direct patient interventions, could be included in the developed complementary electronic anamnestic tool with advance care planning. To achieve the objective thus formulated, the literature was reviewed and thoroughly analysed in terms of stratification and classification of the tools using EHRs.

3 METHODOLOGY

A data mining approach was used. A selective literature review using platforms such as Ebsco Information Services, PubMed, and Google Scholar was conducted. The selection of keywords was made by a panel of experts consisting of the scientific research team at the Jerzy Kukuczka Academy of Physical Education in Katowice (field of medical and health sciences) and the medical staff of the Accessmedica Rehabilitation Centre in Olsztyn, Poland (nurses, physiotherapists, doctors, and management staff). The assumption was that the keywords should address a variety of aspects of human functioning to obtain information that would allow for holistic patient care. The keywords selected were questionnaire, quality of life, functional capacity, and physical condition, which were entered in different configurations using &. After the initial search, the following filter restrictions were introduced: (1) year of release from 2018 to 2023, (2) original research, and (3) intervention.

4 RESULTS AND DISCUSSION

The data collected using the EHR are used to holistically assess the patient's condition and plan to support his or her rehabilitation process at every stage.

In our analysis, we used the EHR literature, which was classified and stratified. The table below (Tab.1) present a summary of selected questionnaires verified on scientific evidence in intervention conditions. Literature review regarding the classification of the questionnaire on three issues regarding the qualitative component in its anamnestic subject context. The procedure used resulted in a collection of articles that were classified into three groups: (a) physical status, (b) functional capacity, and (c) quality of life analysed in detail. The our action was based on the assessment of the questionnaire and their synthesis to only one holistic tool whose we created for patient diagnosis.

Tab.1 Survey questionnaires, validated in the scientific literature, selected to create the CEAT tool

Physical condition	NMQ 6 and NMQ 7 questionnaires (the Nordic Musculoskeletal Questionnaire 7 days and 6 months)	Assessment of body posture for pain complaints (Kuorinka et al. 1987)	Assessment of individual body parts for pain: NMQ 6 assesses the last 6 months, NMQ 7 assesses the last 7 days
	SARC-F (Strength, Assistance with walking, Rise from a chair, Climb stairs and Falls)	The SARC-F is the most recommended screening tool (Bahat et al. 2022)	Assessment of sarcopenia risk based on 5 questions related to daily activities
Functional capacity assessment	New York Heart Association (NYHA) scale	Assessment of limitations for physical activity in terms of functional capacity (Bredy et al. 2018)	a 4-point scale, where I means ,,No limitation of ordinary physical activity", II- ,,Slight limitation of ordinary physical activity", III- "Marked limitation of physical activity", and IV- ,,Severe limitation of physical activity"
	CCS scale (the Canadian Cardiovascular Society)	A survey questionnaire assessing angina pain on a 4-point scale to evaluate limitation of physical activity (Kotajärvi et al. 2022).	A 4-point scale where I means ,,No limitation of physical activity" and angina pain not present during daily activity, II means ,,Slight limitation of physical activity", III means ,,Marked limitation of physical activity", and IV is ,,Severe limitation of physical activity"
	Duke Activity Status Index (DASI)	Estimation of MET during daily physical activity (Carter et al. 2002).	Respondents answer 12 questions about daily activities, then an estimated level of daily activity [MET] is determined based on the weights of the questions [MET]
Quality of Life	SCAP-A questionnaire (Screening Checklist of Auditory Processing)	Assessment of auditory processing disorders (Muthuselvi and Yathiraj 2009)	Respondents answer 'Yes' or 'No' to 12 questionnaire items. A point is awarded for each affirmative answer. A score of 6/12 means that these individuals are at risk for auditory processing disorders.
	Questionnaire survey World Health Organisation- Five	Assessment of well-being (Carrozzino et al. 2022)	Respondents assess the truthfulness of 5 statements on a scale from 0 to 5, with 0

For each of the results of the patient's anamnestic examination, the most frequently used in the available literature is: the New York Heart Association (NYHA) classification, Canadian Cardiovascular Society (CCS), Screening Checklist of Auditory Processing (SCAP-A), The World Health Organization-Five Well-Being Index (WHO-5), Duke Activity Status Index (DASI), the Nordic Musculoskeletal Questionnaire 7 days

(NMQ7) and 6 months (NMQ6), Strength, Assistance with walking, Rise from a chair, Climb stairs and Falls (SARC-F).

The survey questionnaires presented above were used to build a tool (CEAT) (in Polish version: “Kwestionariusz Pacjenta v1”, available on https://forms.office.com/e/X0prJFCL5d and in the English version: “Patient Questionnaire v1” available on https://forms.office.com/e/N2L6MvAaXn) as an implementation to anamnestic of diagnosis of subjective patient for a holistic solution to his needs using an electronic data collection.

The CEAT is a tool developed for the holistic assessment of a patient's health and well-being using EHRs supporting ACP. The CEAT tool consists of a history of physical status (weight, height, waist circumference), neurological incidents, cardiovascular disorders, past treatments/ surgeries, psychiatric disorders, and level of daily physical activity, supplemented by survey questionnaires selected in a literature review based on their widespread usefulness supported by scientific evidence. The questionnaires included in CEAT allow for a multifaceted assessment of the patient's health status, taking into account their physical state, functional capacity, and well-being.

In assessing physical status, in addition to the declarative data collected in the metrics of the CEAT tool, information on musculoskeletal pain in patients as one of the first symptoms of conditions is important. Screening for musculoskeletal conditions uses the standardized Nordic Musculoskeletal Questionnaire 7 days and 6 months (NMQ 7 and NMQ 6). Kurinoka et al. (1987) demonstrated the reliability of NMQ 7 and NMQ 6 to an acceptable level. The questionnaire is short and easy for the patient to answer. Its widespread use in the identification of musculoskeletal pain in different populations (Comruk et al. 2023) and different age (Asadi et al. 2023) and professional groups (Gandolfi et al. 2021, Geraldo & Fiorini 2022, Zwierzchowska et al. 2022) has been confirmed by numerous scientific publications. In addition to chronic musculoskeletal pain, the patient's physical condition is threatened by sarcopenia, which can lead to adverse clinical effects such as falls, fractures, and physical disability (Bieniek et al. 2016; Cruz-Jentoft et al. 2019). According to the recommendations of the European Working Group on Sarcopenia in the Elderly, the F-A-C-S algorithm (Find-Assess-Confirm-Severity Pathway) is used for diagnosis. The tool recommended for use in the first stage in the F-A-C-S (Find) algorithm is SARC-F, with a sensitivity of 35.0-90.0% (Bahat et al. 2022; Krzymińska-Siemaszko et al. 2020). This questionnaire is commonly used in studies of adult and older adult populations (Williams et al. 2021, Ohkubo et al. 2022). Knowledge of the patient's physical condition, including musculoskeletal complaints and the risk of sarcopenia, is important for selecting appropriate forms of rehabilitation and planning the intensity and volume of exercise. The patient's functional capacity is also important in this context, with one of the indicators of its assessment being DASI (Duke Activity Status Index). Hlatky et al. (1989) showed a correlation of DASI with exercise testing. The DASI questionnaire contains 12 statements about activities of daily living assessed by the patient. Complementary to this indicator are the New York Heart Association (NYHA) scale and CCS, with a mutual agreement of 54%. NYHA, due to its simplicity, is widely used in clinical trials (Theuns et al. 2010) and allows a reliable assessment of functional capacity in patients with heart failure at a Cronbach's alpha level of 0.87, as demonstrated by Bredy et al. (2018) in a study of people with congenital heart defects. The NYHA scale is also used in patients with left ventricular dysfunction (Kempny et al. 2012). In contrast, the CCS scale is used to assess the level of angina in patients (Dybro et al. 2021). It assesses the presence of angina on a 4-point scale. The CCS scale score has been shown to correlate with quality of life, with the strongest correlations found in the group of questions on the respiratory system ($r = 0.40$) and vitality ($r = 0.30$) (Kotajärvi et al.

2022). The complementary NYHA and CCS scales and the DASI index provide a rapid and basic functional assessment of cardiorespiratory fitness in the form of an electronic health record (EHR) in advance care planning (ACP).

Over the past decade, research has seen a significant increase in interest in patients' quality of life because it is an important and complementary element of the holistic assessment of health (Fayers & Machin 2016). Haraldstad (2019) indicates that assessing patients' quality of life can inform the making and modification of medical decisions. Furthermore, Fayers (2016) indicates that the assessment of the quality of life is a predictor of treatment success, further highlighting the importance of screening patients for quality of life. At the same time, one of the components of quality of life is well-being, so it was important to use a questionnaire that selectively assesses well-being. A tool that is commonly used to subjectively assess a patient's general well-being is the WHO-5 questionnaire (Warr et al. 1985, Hall et al. 2011), which was incorporated into CEAT. The validity of the inclusion of WHO-5 in CEAT is supported by the results of a meta-analysis which showed that this questionnaire is a sensitive and specific screening tool for depression and that its usefulness in all fields of research is very high (Topp et al. 2015). Another aspect that cannot be overlooked when assessing quality of life is interpersonal communication skills. It is known that auditory processing ability deteriorates with age. Therefore, the identification of auditory processing disorders was one of the elements of CEAT that was important in the holistic assessment of the patient's health. A tool for assessing CAPD is the SCAP-A questionnaire (commonly used in research), with its effectiveness validated in Polish settings (Muthuselvi and Yathiraj 2009, Dajos-Krawczyńska 2016).

Finally, in our opinion, the proposed CEAT tool, which uses an electronic health record (EHR) procedure, allows for holistic patient assessment and advance care planning (ACP) in sanatoriums, rehabilitation hospitals, etc., and adaptation of the therapeutic process in these facilities to the patient's needs. As we have shown above, in the available literature, electronic health record (EHR) collection has functioned primarily as a tool for archiving medical data for facility documentation purposes to support the facility's operations. The CEAT tools developed by our team for rehabilitation hospitals and spas will, in our opinion, allow for improving the efficiency of working with patients by taking into account the holistic therapeutic process. At the same time, the tool will enable the planning of physiotherapeutic and nursing care. A strength of the CEAT tool is the complementarity of the questionnaires used. Furthermore, it can provide a good form of patient communication and education. The next stage in the development of the CEAT tool will be its validation for the needs of healthcare facilities.

5 CONCLUSIONS AND ACKNOWLEDGEMENT

The use of electronic health record (EHR) for advance care planning (ACP) using a holistic patient assessment tool prior to admission to a medical facility can be effective in tailoring treatment methods and forms of treatment.

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SOCIAL WELLBEING – A KEY FACTOR IN THE MENTAL HEALTH OF CHILDREN AND ADOLESCENT

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Abstract

This paper presents a long-term project to promote social wellbeing of pupils for use in the educational environment of schools. Social wellbeing emphasizes well-being in social relationships, specifically in the classroom environment and the overall school climate. It focuses on improving the atmosphere, rule-following, mutual respect, tolerance, as a basic source of social and individual well-being. The paper responds to the steady rise in mental health problems of children and adolescents (data from the National Institute of Health, CSU), the increase in self-harm and suicide in this age group, based on a long-term analysis of the school environment in which the author is involved, the results of research at home and abroad.

Guiding pupils to achieve life's optimum through the promotion of a healthy social environment has a positive impact on school performance, according to current domestic research. A healthy social environment increases tolerance for differences, reduces anxiety in children and adolescents, and enables them to maximise their own potential.

Thus, caring for the social wellbeing of pupils in schools must be one of the key areas in the comprehensive promotion of mental health, especially in the long term.

The theoretical starting points of the paper are different conceptions of "wellbeing", in which a different quality of this state is highlighted (cf. Jandová, 2021), the starting points are also the thought concepts of Z. Matějček, a leading child psychologist focusing on the needs of children (positive social bonds in the family and school environment, engagement in a variety of activities supporting physical, intellectual and emotional development, a sense of safety and security, a healthy sense of self, social fulfilment and a sense of an open future).

This background was used to design a project to promote the social wellbeing of pupils, the project was prepared in collaboration with Czech Television (CT Edu). Taking into account the possibilities of the school environment, it is ready for implementation in the classroom. All the aspects mentioned above are addressed in the different parts of the presented project, as well as the possibilities of the classroom teachers and their sense of security in working with personal development techniques.

Keywords

Social wellbeing, project, healthy environment, prevention, anxiety, classroom lessons

1 INTRODUCTION

"Wellbeing" can be understood as a synonym for well-being, life happiness, personal satisfaction. It is a complex and very broad concept – it touches on the understanding of human existence, the meaning of life and existence itself. It explores the material, psychological, social, spiritual and other conditions for a healthy and happy life. A comprehensive view of wellbeing affects both the external conditions and the internal dimensions of the person. Interestingly, in each country, a different quality of wellbeing is highlighted, taking into account the cultural, sociological and

anthropological contexts and traditions of a particular nation, which is also associated with different names for this state of 'wellbeing'. We encounter the terms “Ikigai” (Japan), “Feng shui” (China), “Gemütlichkeit” (Germany), “Gezelligheid” (Holland), “Hygge” (Denmark), “Koselig” (Norway), “Sisu” (Finland), etc. (cf. Jandová, 2021).

Despite the fact that the concept of wellbeing is "new" in our culture (in fact, with a tendency to adopt foreign expressions into Czech) and it is necessary to consider its specificity due to its scope, one cannot ignore the ideas of a number of leading Czech experts who have pointed out the importance of mental well-being - an important part of wellbeing - before.

Let us recall the wise words of Prof. Zdeněk Matějček and summarize what children need to support their mental well-being. These include positive social connections both in the family and in the school environment, engagement in a variety of activities that support physical, intellectual and emotional development, a sense of security and safety, a healthy sense of self and social fulfilment, and a sense of an open future. All of these aspects are the focus of the different parts of the new educational plan.

An important component of pupils' mental well-being at school is social well-being... Social well-being therefore primarily emphasises the well-being of social relationships within a particular classroom, and refers to the quality of the social climate of a particular classroom and the overall atmosphere of a particular school. It focuses on improving the atmosphere, respect for rules, mutual respect, tolerance.

The ideal means of building social well-being can be regularly implemented classroom lessons. These lessons can be set up as a full part of the pupils' regular timetable, and by preparing appropriate activities, teachers can be helped to increase their confidence in implementing classroom lessons (for more details see e.g. Švamberk Šauerová, 2023), while encouraging pupils to actively contribute to building a healthy social environment and promoting their own wellbeing.

The increase in mental health problems among primary and secondary school students is on the rise. The increase in the incidence of these problems is markedly related to the Covid-19 pandemic and other emerging risk phenomena that we have recently encountered (war conflict, extreme difficulties in transitioning to secondary school in some regions, economic contexts – a sense of subjective deprivation in many families, an increase in psychological difficulties among adults).

Emphasis on mental and physical health care (at different levels, including social health) can be found in almost all experts who deal with the topic of health education or wellness in general (Smetáčková, & Štech et al, 2020; Krejčí, Kornatovská, & Kokeš, 2014; Krejčí, 2011; Švamberk Šauerová, 2018; Maroon, 2012; Kallwass, 2007; Ptáček, Raboch & Kebza, 2013, Hošek, 1999, Jandová, 2021).

In this context, we also note a significant lack of psychological and paedopsychiatric care.

2 OBJECTIVE

The aim of this paper is to propose a program for long-term support of social well-being of secondary school students, which would be easily accessible to all schools and could be used by teachers without the help of specialists (psychologists, psychiatrists).

3 METHODOLOGY

The theoretical starting points are the analysis of the issue of the increase in stress among primary and secondary school students, the increase in anxiety and mental health problems in the general

population and the deterioration of the climate in student groups after the quarantine of the Covid-19 pandemic.

4 RESULTS AND DISCUSSION

4.1 Design of a long-term project to promote pupils social wellbeing for use in the classroom management lessons

The content of "wellbeing" is very closely related to a number of subjects, such as Health Education, Physical Education or Civics. Unfortunately, in practice it is difficult to imagine incorporating new educational themes into already full educational units. Linking topics to the content of classroom lessons therefore seems to be one of the ideal ways to develop pupils' wellbeing and to act on their health in a preventive way, in a safe environment with the class teacher.

When designing projects for use in the classroom management lessons, it is necessary to consider the professional competences of teachers to implement individual activities aimed at promoting social well-being - here it is necessary to respect their teaching position.

It is necessary to consider the multi-layered role of the teaching profession as presented by a number of specialists – e.g. Teacher – Preventionist (Emmerová, 2020), Teacher – Leader (Pašková, 2020), Teacher – Experience Designer (Božík, 2020), etc.

Within the framework of such broadly considered teacher competences, the project can use didactic methods they normally work with, personal development techniques (without deeper psychological topics) and an emphasis on encouraging reflection and self-reflection of the students. It is also necessary to consider the possibility of teachers conducting simple sociometric investigations, emphasizing that teachers should monitor the classroom climate on a regular basis, as part of routine pedagogical diagnostics (for more details, see e.g. Čapek, 2010; Jedlička, Kot'a & Slavík, 2018; Braun, 2003, 2013; Mareš & Ježek, 2012) and use this information for comprehensive work with the class. At the same time, it should be emphasized that standardized psychological tools of sociometric investigations belong only to psychologists, and I consider it unfortunate if standardized sociometric tests fall into the hands of teachers, as they are not sufficiently familiar with their use and unnecessarily neglect techniques that are much more appropriate from the perspective of their competences (but this topic can be the subject of another professional paper).

The described project is the author's work and was created over several months in cooperation with Czech Television - CT Edu division, the primary focus is to support the mental health of pupils and promote wellbeing. Within this cooperation, 10 basic topics with methodologies and worksheets were created for each month, with emphasis on use in classroom lessons. The entire project "School Wellbeing in the Classroom" is available on the CT Edu website (Švamberk Šauerová, 2023).

For each month, one area of wellbeing has been selected, for which a method sheet has been developed, using video demonstrations, a worksheet and recommended techniques/ games to achieve the intended competences. Teachers do not have to follow the elaborated scheme, but the selected areas of wellbeing are logically ordered with regard to the pupils' school life and the typical circumstances arising from the age period and themes that are typical for adolescents (e.g. academic failure/school workload, procrastination, time-management, working with goals and personal development, stress, social relationships, identity).

The activities primarily address the personal and emotional development of students, introducing them to practical ways of using positive emotions to support their own mental well-being and ways of processing negative emotions when dealing with common and challenging life situations. They focus on the above themes and support adolescents in taking care of their

own mental health, increasing resilience, developing well-being, and in the school environment.

The activities offer space for preventive preparation of pupils for similar situations (promoting desirable personal competences, competences for further studies in secondary/college or professional life).

In the whole concept of the project, the activities place average demands on the teacher, his empathy, and his ability to work with personal topics. The topic focusing on the processing of emotions may be more challenging than other topics, it is advisable to process these topics with the pupils with the support of an educational counsellor or a prevention specialist (if a school psychologist or special educator works at the school, then in their presence).

The topics are designed so that they can be implemented in the classroom, and in addition to developing the pupils' personal competences and supporting their own potential in achieving well-being, the project also aims to use the classroom and strengthen the role of the class teacher in preventing pupils' mental health.

Most topics are appropriate to revisit, with a suggested time period to revisit given in brackets for each topic within the Project Scheme (see below) and for each PL usually at the end or at a point that is appropriate. The Project Scheme is based on the regular delivery of the classroom sessions. For selected topics, teachers are also suggested procedures for further elaboration of the topic.

The project also includes the use of a "weekly journal" – similar to a diary. The structure of the weekly diary is simpler, it can better suit those who do not have the need to record every day, at the same time the guidance for self-reflection and planning is a very important part of promoting wellbeing, so it is advisable to motivate pupils to use it. It is designed to be usable in both electronic and printed formats (the variant of use should be discussed with pupils to meet individual needs). Pupils can create their own version of the weekly diary (mosaic of everyday week).

Fig. 1 Sample of the diary

Source: own

4.2 Project structure

The project is divided into 10 thematic areas:

1) Academic stress/prevention of academic failure - analysis of school stress - what stresses pupils – where they experience stress and how it can be addressed.
2) Swot analysis – strengths, own resources, reserves, personal development opportunities within the reserve analysis – self-reflection.
3) Procrastination – prevention options, 4 steps to change – increasing resilience.
4) Time-management – time pie, measurable goals, developing potential.
5) Comfort zone, discomfort, situation analysis, ways to use discomfort to increase comfort.

6) Emotions, coping with challenging life situations, experiences, returning to inner security, visualizing pleasant stimuli, relaxation.

7) Social wellbeing – fostering healthy group relationships, team building and promoting belonging to the group, empathy, tolerance of differences.

8) Stress, changing destructive thinking to constructive thinking, promoting positive thinking, visualising pleasant stimuli, mindfulness.

9) Using inner potential, dreams and long-term goals (Disney method) as part of developing one's own identity, analysis of inner resources, techniques for increasing self-efficacy.

10) Mental health support techniques - inducing calm, healthy communication strategies, sleep hygiene, adequate physical activity and appropriate eating habits as part of long-term wellbeing.

The main themes of the project promoting social wellbeing include:

- Personal development (the foundation of social wellbeing)
- Promoting tolerance of diversity (ethnicity, gender, disability, etc.)
- Adaptation to change
- Understanding emotions
- The Art of Cooperation
- Recognising your strengths

As mentioned above, the primary themes for promoting social wellbeing are promoting teamwork and fostering tolerance for diversity – ideally, techniques to promote teamwork, achieving a common goal, self-commitment to the whole, and developing an interesting joint class project.

Specifically, the following techniques can be used: work with class rules (revise them often, reflect on their meaning, add new ones), "My coat of arms", "Camera" (looking at the world through the eyes of the other), "Climbers", "Mission to the moon", SWOT analysis, games aimed at solving dilemmas, discussion on a set topic with the division of roles of the discussants.

It is also suitable to include relaxation methods or methods aimed at working with stress - e.g.: Ed's Doll, Pot of Wellbeing, breathing exercises (conscious breathing, triangle breathing, box breathing, visualization of a pleasant stimulus).

To increase the variety of activities, it is possible to use the material "Classroom at ease" (Šmejkalová, & Schmidová, 2012) or "Methodology of conducting classroom lessons (Skácelová, 2012), etc.

4.3 Discussion

In the framework of the project preparation, the pilot testing of the individual topics was carried out simultaneously (the piloting took place in five classes in three different schools). The results of the pilot testing showed that teachers feel considerable uncertainty in conducting regular and intensive classroom lessons, and that administrative classroom lessons are still preferred in practice.

The results of the sociometric survey in the classrooms (test B-III) before and one year after the programme showed an improvement in the overall climate in all the classrooms where the pilot was implemented (more positive evaluation of the classroom climate by pupils, reduction in the number of isolated pupils, more frequent choice of pupils' characteristics in the categories "friend", "cooperation", "safe environment").

Teachers in the survey preferred the presence of a school psychologist for most topics (it places high demands on the school psychologist's time).

Teachers' concerns were identified in providing feedback and encouraging self-reflection, teachers feel insecure, and the preparation of teacher workshops should be considered in this regard.

Teachers' apprehension to actively participate in the activities (to try them out) emerged as a fundamental limiting factor in the implementation of the project, which can be considered as a significantly negative finding and shows the need to prepare teachers more intensively already during their pre-service training for their active role in the teaching process, also criteria for personal selection for the teaching profession can be discussed.

Clearly, there was an increased interest of schools in using the project (the positive side is the ready methodology, ready worksheets, ready videos).

5 CONCLUSIONS

The CT Edu project, in line with the intentions of the Ministry of Education and the Strategic Framework for the Development of Health Care in the Czech Republic until 2030 (especially its support for changes in mental health care), aims to develop pupils' wellbeing in schools where pupils spend most of their time, through a plan for specific content of classroom lessons.

Attention to pupil wellbeing - guiding pupils to achieve this life optimum – can have a significant positive impact on reducing pupils' anxiety and increasing their resilience, making a significant contribution to the prevention of school failure (due to mental ill-health) and drop-out. Caring for pupils' wellbeing in schools needs to be one of the key areas in the comprehensive promotion of mental health in the long term.

Promoting mental wellbeing includes not only focusing on the art of relaxation, but also promoting resilience to challenging life situations, increasing the resilience of today's young generation and contributing to the overall empowerment of today's fragile children.

The whole project, as it focuses on different aspects of pupil wellbeing, not only contributes to the important prevention of mental health problems in children and adolescents, but also provides classroom teachers with appropriate practices, adequate to their profession, which they can use to promote the wellbeing – and social wellbeing – of their pupils. In spite of some uncertainty that teachers indicated during the pilot testing, they consider the activities to be reasonably safe.

Meaningful content of classroom lessons throughout the school year not only acts as a form of prevention of risk phenomena in children and adolescents, but also as a prevention of burnout syndrome of teachers (increases their confidence in working with the classroom team) and at the same time significantly strengthens the interaction between students and classroom teachers, improving the classroom climate. Its comprehensive concept influences the building of a safe environment for both sides of the educational process.

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INFLUENCE OF STATIC AND DYNAMIC CHANGES IN BODY POSITIONS ON FUNCTIONAL CHANGES OF THE CARDIOVASCULAR SYSTEM

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Abstract

The autonomic nervous system (ANS) plays an important role in the regulation of heart activity, breathing and blood pressure. Through changes in sympathetic and parasympathetic activity, it participates in the regulation, coordination and integration of internal organ function. The method of spectral analysis of heart rate variability (SAHRV) is used to examine the functional status of autonomic regulation of heart activity. During the examination, clino-ortho-clinostasis is used, which makes it possible to assess the reactivity of functional changes in the sympathetic and parasympathetic systems.

We were therefore interested in what functional changes in the autonomic regulation of heart activity will occur during static and dynamic changes in the position of the body head down and up at angles of ± 45°.

For the research, we used the method of spectral analysis of heart rate variability, supplemented by blood pressure measurement during the experiment. The experimental group included 24 healthy women aged 20-30. Before and after the experiment, a standard examination of the functional state of the autonomic nervous system was performed in the clino-ortho-clinostatic position.

During the experimental sequence, changes in sympathetic, vagus, heart rate and blood pressure reactivity were monitored in the following positions:

- *in an inclined position of the body with the head up – angle +45°*
- *in an inclined position of the body with the head down – angle -45°*
- *during dynamic changes in oblique body positions +-45°*

An auto-traction reclining couch was used for the investigation of oblique positions.

***The results:** During the application of oblique positions of the body, there are significant changes in the activity of the autonomic regulation of heart activity.*

In the head down position, there is an increased activation of the parasympathetic, a decrease in heart rate and an increase in systolic and diastolic pressure.

During dynamic changes in body positions +- 45°, there is significant alternating activation of baroreflexes, modulated by sympathetic and vagal aktivity.

***Conclusion:** The research study draws attention to the existence to multiple interconnections of regulatory mechanisms between the autonomic nervous system, cardiovascular and cardiorespiratory systems.*

Keywords

autonomic nervous system, sympathetic, parasympathetic, oblique body positions ± 45°, spectral analysis of heart rate variability

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1 INTRODUCTION

The autonomic nervous system (ANS) plays an important role in the regulation of heart activity, breathing and blood pressure. Through changes of the sympathetic and parasympathetic activity, it participates in the regulation, coordination and integration of internal organ function. The method of spectral analysis of heart rate variability (SAHRV) is a non-invasive method that enables examination of the functional state of the autonomic regulation of cardiac activity. During the examination, clino-ortho-clinostasis is used, which makes it possible to assess the reactivity of functional changes of the sympathetic and parasympathetic system (Brychta et al, 1997; Javorka 2008).

In a number of research works, the influence of the static inverted body position (head down position) on the functional changes of the cardiovascular system was investigated (Kolisko et al., 1997; Geberová, 2010; Malhotra, 2021; Vijayalakshmi, Madanmohan, 2006; etc). Dynamic changes of the oblique body position head up, head down, which occur during some human activities (aerobatics, weightlessness, diving, acrobatics, etc.), were minimally investigated. An unpublished prospective study (Kolisko, 2008) brought attention to these changes.

Therefore, we were interested in what functional changes of the autonomic nervous system, heart activity and blood pressure will occur, when applying horizontal, vertical and inclined positions of the body head down and up at ± 45° angles.

2 RESEARCH QUESTIONS

2.1. What changes of the sympathetic and parasympathetic functional activity, heart rate and blood pressure will occur during the ortho and clinostatic position (standing - lying). (intervals M1T2 : M1T3, M3T2 : M3T3)

2.2. Do sympathetic and parasympathetic functional activity, heart rate and blood pressure change pre and after the application of oblique body positions?

2.3. What changes in sympathetic and parasympathetic activity, heart rate and blood pressure occur during aplication static oblique positions of the body with the head up +45° and head down - 45° (Intervals M2T1 : M2T2).

2.4. What changes in sympathetic and parasympathetic activity, heart rate and blood pressure occur during dynamic changes in oblique body positions at angles + - 45°? (M2T3 interval)

3 METHODOLOGY

Methods used

- Spectral analysis of heart rate variability (SAHRV) supplemented by blood pressure measurement during the examination.
- An experiment with purposefully manipulated independent variables during the experiment (see 3.3. Variables).

Research file

24 healthy women, age 20-30. Before the measurement the conditions for the examination were observed: (24 hours in advance absence of alcohol, nicotine, nutritional supplements, medication, only light physical load, spontaneous respiratory rate > 9 breaths/min.) The examination was carried out in the morning before meals.

3.1. Examination methodology

- 10 minutes rest before examination.
- M1 measurement: examination of autonomic nervous system reactivity before: 1. in the supine position - clinostasis, (interval T1); 2. in the standing position - ortostasis (interval T2); 3. in the supine position - 2nd clinostasis (interval T3).
- M2 measurement: interval T1 The static oblique body position + 45°); interval T2 the static oblique body position -

45°); interval T3 - the dynamic changes of oblique body positions (± 45°).
- 10 minutes rest
- M3 measurement: identical to measurement M1.
- The length of each measured intervals (T) was 300 heart beats; gap between measured intervals 60 sec.

3.2. Used instrumentation

Sima Varia TF7 diagnostic system, Omron digital calibrated tonometer, Autotraction positioning couch (See attachment figure 1).

A method of spectral analysis of heart rate variability (SAHRV) by the Sima Varia TF7 diagnostic system, enables the recording of R-R intervals and ECG in lead V5, during the measurement. Duration of each measured interval (T) = 300 heart beats. The software of the system enables the conversion of data into numerical form in the frequency range of 0.02 – 0.5 Hz using a fast Fourier transformation and the frequency and spectral analysis of the three frequency band: Very Low Frequency (VLF) 0.02 - 0.05 Hz, Low Frequency (LF) 0.051 Hz - 0.15 Hz and High Frequency (HF) 0.151 - 0.5 Hz. which provide information on sympathetic (LF frequency) and parasympathetic (HF frequency) activity. A prerequisite for the correct interpretation of monitored SAHRV parameters in the LF and HF frequency bands is a spontaneous respiratory frequency > 9 respiratory cycles/min.

The result of the spectral analysis of heart rate variability is a graphical and numerical output protocol.

3.3. Variables

Manipulated independent variables throughout the experiment.

Body positions: lying (clinostasis 0°), standing (orthostasis +90°), static oblique body position with head up (+45°), static oblique position with head down (-45°), dynamic changes in oblique positions of the body, with head up and head down+- 45°. Body position change interval 5 seconds

Observed dependent variables (monitored parameters of SAHRV, heart rate, blood pressure)

- Total spectral power/ms2 (Total Power) in the frequency band 0.02 – 0.5 Hz;
- Spectral power of the frequency component LF/ms2 (Power LF) - frequency band 0.051 – 0.15 Hz (sympathetic activity);
- Spectral power of the frequency component HF/ms2 (Power HF) - frequency band 0.151 – 0.5 Hz (parasympathetic activity);
- Ratio LF/HF (Ratio LF/HF) – an indicator of sympathovagal balance;
- Relative values of spectral power LF and HF (Rel. Power LF, HF) that express the proportion of sympathetic and vagus (parasympathetic) activity in %.
- Average heart rate values in individual measurement intervals (SF/min.).
- Average values of systolic and diastolic blood pressure (mm. Hg).

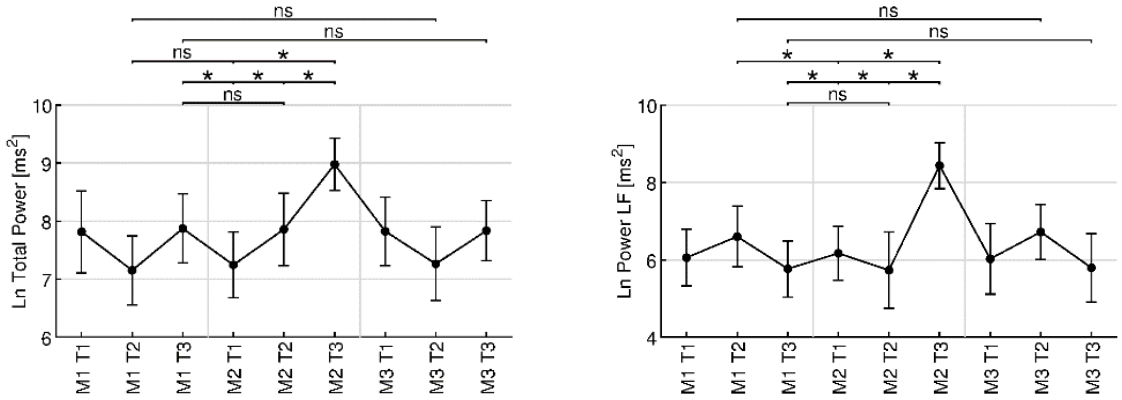
3.4. Statistic methods

Numerical data of the results SAHRV were logarithmized.The following statistic methods were used to evaluate the ensemble effect after analyzing the normality of the data distribution: ANOVA, Fischer's LSD test, Kolmogor-Smirnov test, Cohen's d, to evaluate the size of the effect. We considered statistically significant changes at the level of significance $p < 0.050$ (*) with the current size of Cohen's $d \geq 0.50$. The measurement results were processed in the form of graphs and tables.

4 RESULTS AND DISCUSION

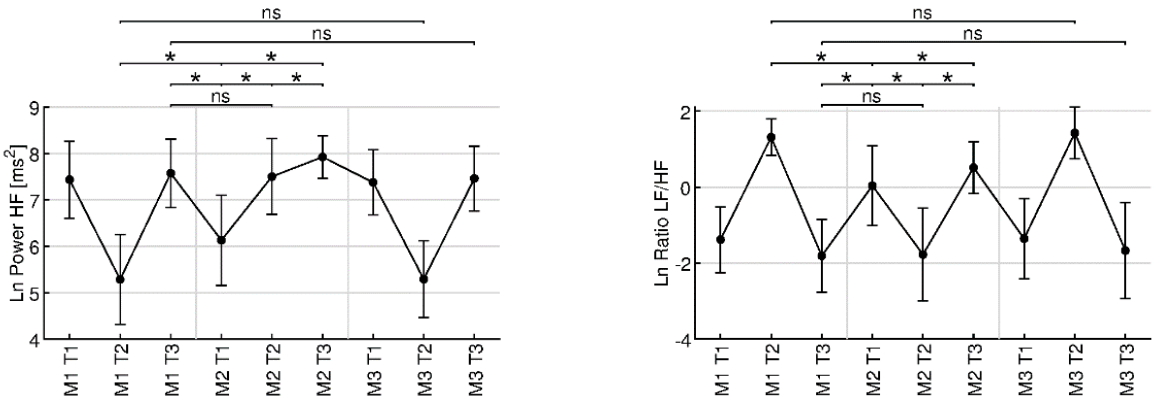
4.1. Results are presented in graphs and tables. Statistically significant changes in the comparison of individual positions (T) and measurements (M) during the experiment are marked with * ($p < 0.050$.).

Figure 1, 2. Changes of the total spectral power (Total Power) and spectral power in the LF frequency band (Power LF).



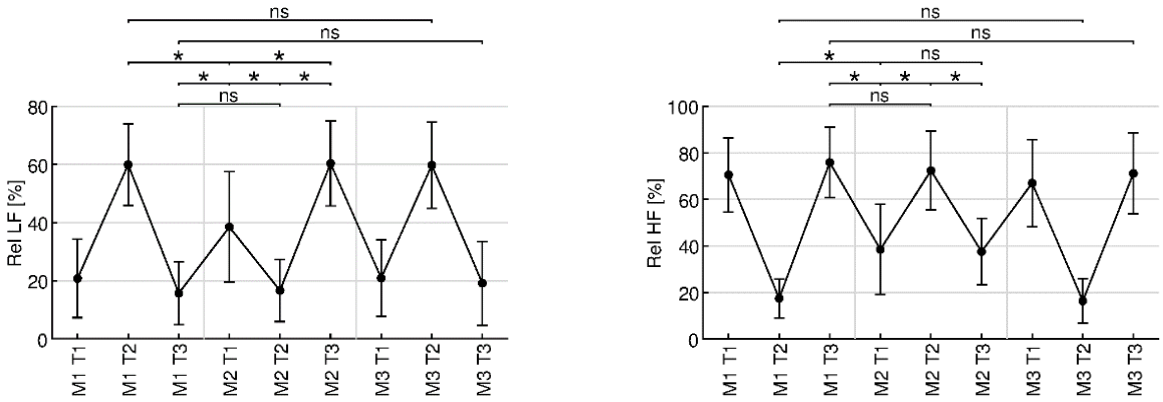
Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position
Ln – logarithmic average value

Figure 3, 4. Changes of the spectral power in the HF frequency band (Power HF) and sympathovagal balance (Ratio LF/HF)



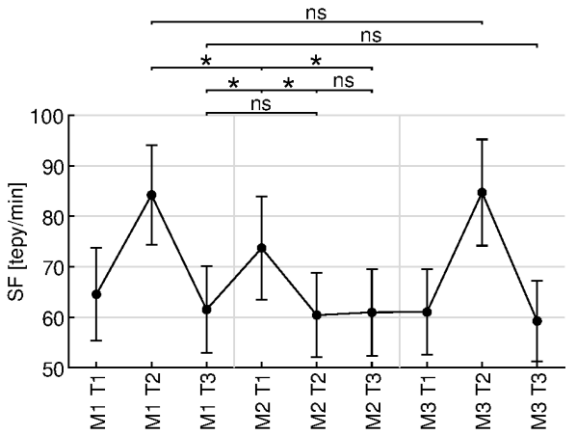
Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position
Ln – logarithmic average value

Figure 5, 6. Changes of the relative spectral powers (%) in LF and HF frequency bands



Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position

Figure 7. Changes of the Hert Rate/min. (SF/min)



Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status post**: M3T2 standing position; M3T3 supine position

Table 1 Changes of the Systolic blood pressure/mm Hg

1. comparison		2. comparison					
Measur. Interval	Mean ± SD	Measur. Interval	Mean ± SD	P		D	Efekt
M1 T2	118 ± 9	M3 T2	121 ± 9	0,030	*	0,52	Střední
M1 T3	108 ± 8	M3 T3	107 ± 7	0,238		0,24	Malý
M2 T1	112 ± 8	M2 T2	129 ± 6	0,000	*	-3,32	Velký
M1 T3	108 ± 8	M2 T1	112 ± 8	0,010		0,67	Střední
M1 T3	108 ± 8	M2 T2	129 ± 6	0,000	*	-3,18	Velký
M1 T2	118 ± 9	M2 T1	112 ± 8	0,020		-1,89	Velký

Table 2 Changes of the Diastolic blood pressure/mm Hg

1. comparison		2. comparison					
Measur. Interval	**Mean ± SD**	**Measur. Interval**	**Mean ± SD**	**P**		**D**	**Efekt**
M1 T2	79 ± 7	M3 T2	78 ± 5	0,203		0,26	Malý
M1 T3	67 ± 6	M3 T3	67 ± 5	0,820		-0,05	Triviální
M2 T1	75 ± 6	M2 T2	86 ± 6	0,000	*	-2,31	Velký
M1 T3	67 ± 6	M2 T1	75 ± 6	0,000	*	-1,93	Velký
M1 T3	67 ± 6	M2 T2	86 ± 6	0,000	*	-4,24	Velký
M1 T2	79 ± 7	M2 T1	75 ± 6	0,000	*	0,89	Velký

Comment:
M1 – **state pre**: M1T2 standing position; M1T3 supine position
M2 – **static and dynamic body positions**: M2T1 oblique position of the body upside down; M2T2 oblique position of the body with the head up. M2T3 dynamic changes in oblique body positions +- 45°
M3 – **status after**: M3T2 standing position; M3T3 supine position

4.2. Comment on the results

4.2.1. Changes during the clinostatic position (M1T3, M3T3) compared to the orthostatic position (M1T2, M3T2).

Effects of clinostatic position:

- a significant increase of total spectral power (Total power); (Graph 1)
- a significant increase the activity of the parasympathetic (Power HF, Rel. Power HF, Ratio LF/HF); (Graph 3, 4, 5, 6)
- a significant reduction in sympathetic activity - Power LF (See chart 2, 3,4, 5, 6.)
- a significant reduction in heart rate; (Graph 7)
- a significant reduction in systolic and diastolic blood pressure (Table 1, 2). See research question 2.1.

Compared to the standing position, in the clinostatic position there is a significant increase in the activity of the parasympathetic system, the heart rate decreases and at the same time there is a decrease in systolic and diastolic blood pressure.

These functional changes in monitored parameters are characteristic of the optimal function of the autonomic nervous system.

4.2.2. Changes in standing - supine positions - Status pre and post:

Comparation standing and supine positions status pre - post (M1T2 : M3T2); (M1T3 : M3T3).

- There were no significant changes in monitored parameters. See research question 2.2.

The application of oblique body positions cannot be understood in young, healthy individuals as a stress stimulus that affects the functional activity of the cardiovascular system.

4.2.3. Changes during the static oblique body position with Head down -45° (M2T2) versus oblique body position with Head up +45° (M2T1)

Static oblique position of the body with Head up (M2T1) +45°

The position is characterized by balanced sympathetic and vagus activity (LF/HF, Rel. Power LF : Rel. Power HF (Graph 4, 5, 6). See research question 2.3.

Comparation of static oblique position with head down -45° (M2T2) and static oblique body position with Head up +45° (M2T1)

- a significant increase parasympatetic activity (Power HF, Relative Power HF); (Graph 3, 6)
- sympathetic activity does not change significantly (Power LF, Relative Power LF); Graph 2, 5)
- a significant increase in favor of the parasympathetic activity (Ratio LF/HF). (Graph 4)

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- a significant reduction of the Heart rate, (Graph 7)
- a significant increase of the systolic and diastolic blood pressure. (Table 1, 2). See research question 2.3.

The reaction of heart rate, blood pressure and the activity of the autonomic nervous system in the oblique position with head down, draws attention to the existence of integrated regulatory mechanisms of cardiovascular system, that sensitively regulate functional relations between the activity of baroreceptors, heart rate and blood pressure.

4.2.4. Dynamic changes of oblique position with head up and head down +- 45° (M2T2) versus Static oblique position with head down -45° (M2T3).

Dynamic changes of the oblique positions head up, head down ± 45° are characterized by:

- a significant increase of the total spectral power (Total power); (Chart 1)
- a significant increase in sympathetic activity (Power LF,); (Chart 2)
- a significant increase in sympathovagal balance (LF/HF) in favor of sympathetic activity.
- a significant reduction in parasympathetic activity (Rel. Power HF).
- Heart rate (SF/min). does not change significantly; (Chart 7).
- Blood pressure values during dynamic changes in body position could not be measured by the digital tonometer. See research question 2.4.

During dynamic body position changes +- 45 ° there are cyclic changes in blood redistribution in the upper and lower part of the body. Rhythmic changes of body positions activate baroreceptors and lead to changes in blood pressure. These rapid blood pressure changes could not be measured by a clasic digital tonometer.

5 CONCLUSIONS

The regulation of the heart rate variability modulated by the right vagosympathetic in the sinoatrial node area very sensitively responds to changes on the body position.

During changes in the horizontal and vertical position of the body, typical changes in sympathetic and vagal activity, heart rate and blood pressure occur in healthy individuals.

A number of cardiovascular mechanisms (intra and extra mechanisms) are activated during the body position changes. The coherence of these regulatory mechanisms creates a high level of adaptation plasticity in a healthy person (Vojáček, Kettner, 2017).

During the oblique static position of the body with head down -45° (interval M2T2), there is an opposite reaction of heart rate and blood pressure. (The heart rate decreases, peripheral blood pressure in the upper body increases.

During weightlessness, these short-term regulatory mechanisms of the cardiovascular system during inverted body positions (Head down position, -45°, - 90°) and dynamic changes of body position have not been investigated yet.

The results of the study can be used in therapeutic practice when applying spinal traction on an auto-traction couchette. However, it is necessary to respect the contraindications in individuals with cardiovascular, cardiorespiratory and other internal diseases.

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7 CONTACTS

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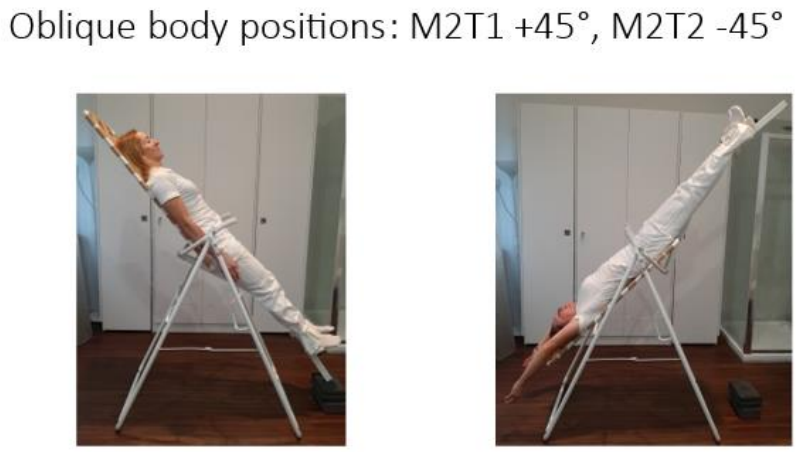
Attachments

Autotraction positioning couch



CASE ANALYSIS

A HEALTHY WOMAN: AGE 22.3 YEARS; HEIGHT 168 CM; WEIGHT 63 KG; BMI 22.8; NON-SMOKER, MEDICATION 0; REGULAR PHYSICAL ACTIVITY 4 TIMES A WEEK FOR APPROXIMATELY 60 MIN. (RUNNING AND FITNESS).

Graphic records of SAHRV results (measurement M1, M2, M3)

Figure 1 State pre (measurement M1): interval T1 – supine position, T2 – standing position, T3 – 2nd supine position

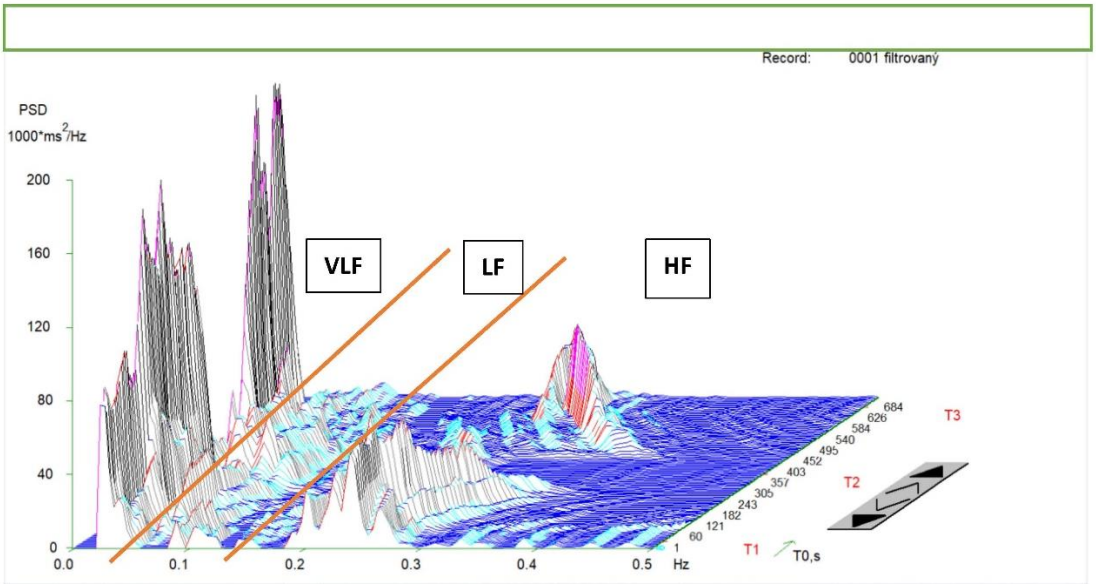


Figure 2. State during application of oblique body positions (measurement M2): T1 – oblique body position with head up +45°, T2 position with head down -45°, T3 dynamic changes of the body positions +- 45°, change interval 5 sec.

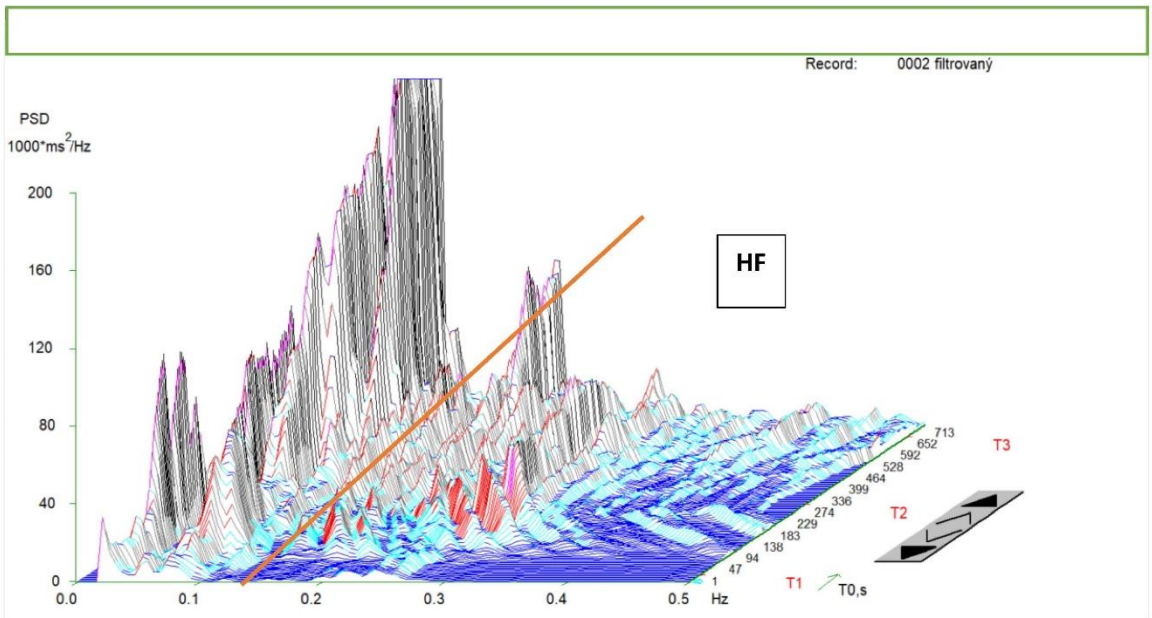


Figure 3 Status after application of oblique body positions (measurement M3): T1 supine position, T2 standing position, T3 2nd supine position.

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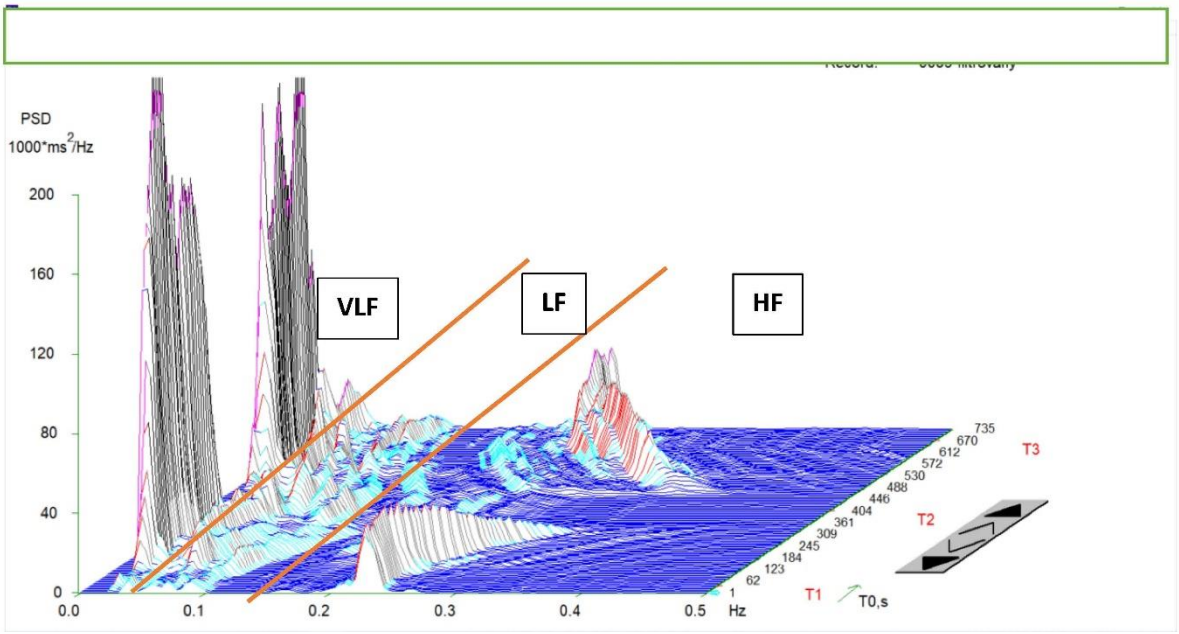


Statistical output protocols of SAHRV (measurement M1, M2, M3)

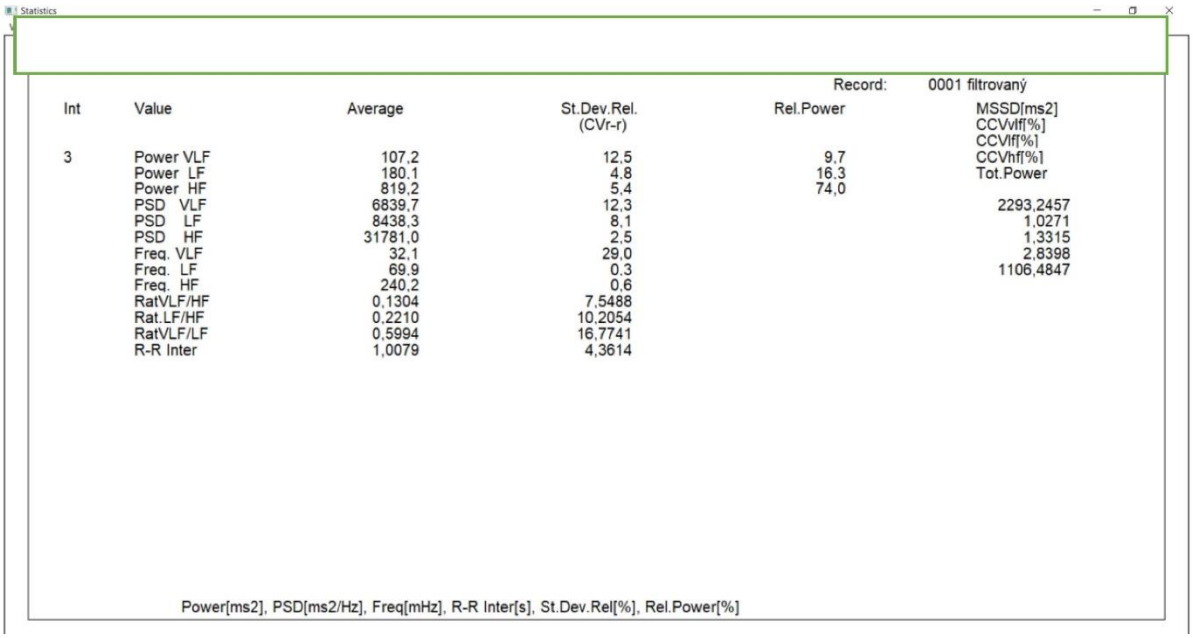
Figure 4. Measurement M1 Status pre: 1- supine position, 2 - standing position, 3 - 2nd supine position

Statistics

Record: 0001 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
1	Power VLF	1085,4	3,9	28,0	
	Power LF	321,3	17,5	8,3	
	Power HF	2464,7	1,3	63,7	
	PSD VLF	83032,6	9,2		5682,2561
	PSD LF	14423,0	12,9		3,2332
	PSD HF	53206,0	5,0		1,7592
	Freq. VLF	26,7	3,4		4,8721
	Freq. LF	69,2	28,5		3871,4556
	Freq. HF	240,9	0,8		
	RatVLF/HF	0,4404	3,9951		
	Rat.LF/HF	0,1305	17,7660		
	RatVLF/LF	3,4562	13,9996		
	R-R Inter	1,0190	7,0670		
2	Power VLF	258,3	16,2	11,7	
	Power LF	1411,5	2,0	64,1	
	Power HF	533,6	3,3	24,2	
	PSD VLF	17491,7	10,5		903,3564
	PSD LF	36699,9	2,9		2,1526
	PSD HF	13968,8	9,4		5,0320
	Freq. VLF	24,4	10,6		3,0940
	Freq. LF	67,9	0,6		2203,4223
	Freq. HF	228,8	1,3		
	RatVLF/HF	0,4822	12,9252		
	Rat.LF/HF	2,6464	1,7268		
	RatVLF/LF	0,1826	14,4322		
	R-R Inter	0,7466	8,3616		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

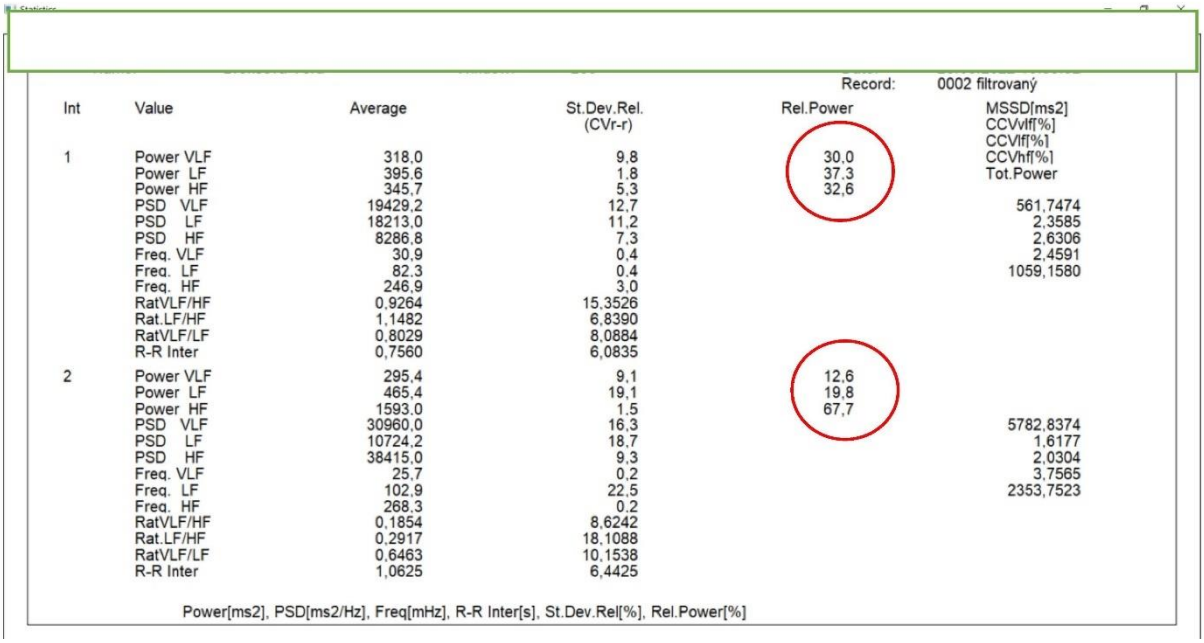


Record: 0001 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
3	Power VLF	107,2	12,5	9,7	
	Power LF	180,1	4,8	16,3	
	Power HF	819,2	5,4	74,0	
	PSD VLF	6839,7	12,3		2293,2457
	PSD LF	8438,3	8,1		1,0271
	PSD HF	31781,0	2,5		1,3315
	Freq. VLF	32,1	29,0		2,8398
	Freq. LF	69,9	0,3		1106,4847
	Freq. HF	240,2	0,6		
	RatVLF/HF	0,1304	7,5488		
	Rat.LF/HF	0,2210	10,2054		
	RatVLF/LF	0,5994	16,7741		
	R-R Inter	1,0079	4,3614		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Figure 5. Measurement M2: Obligue body positions 1 - static position +45°, 2 - static position -45° 3 - dynamic changes of oblique positions +-45°



Record: 0002 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
1	Power VLF	318,0	9,8	30,0	
	Power LF	395,6	1,8	37,3	
	Power HF	345,7	5,3	32,6	
	PSD VLF	19429,2	12,7		561,7474
	PSD LF	18213,0	11,2		2,3585
	PSD HF	8286,8	7,3		2,6306
	Freq. VLF	30,9	0,4		2,4591
	Freq. LF	82,3	0,4		1059,1580
	Freq. HF	246,9	3,0		
	RatVLF/HF	0,9264	15,3526		
	Rat.LF/HF	1,1482	6,8390		
	RatVLF/LF	0,8029	8,0884		
	R-R Inter	0,7560	6,0835		
2	Power VLF	295,4	9,1	12,6	
	Power LF	465,4	19,1	19,8	
	Power HF	1593,0	1,5	67,7	
	PSD VLF	30960,0	16,3		5782,8374
	PSD LF	10724,2	18,7		1,6177
	PSD HF	38415,0	9,3		2,0304
	Freq. VLF	25,7	0,2		3,7565
	Freq. LF	102,9	22,5		2353,7523
	Freq. HF	268,3	0,2		
	RatVLF/HF	0,1854	8,6242		
	Rat.LF/HF	0,2917	18,1088		
	RatVLF/LF	0,6463	10,1538		
	R-R Inter	1,0625	6,4425		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

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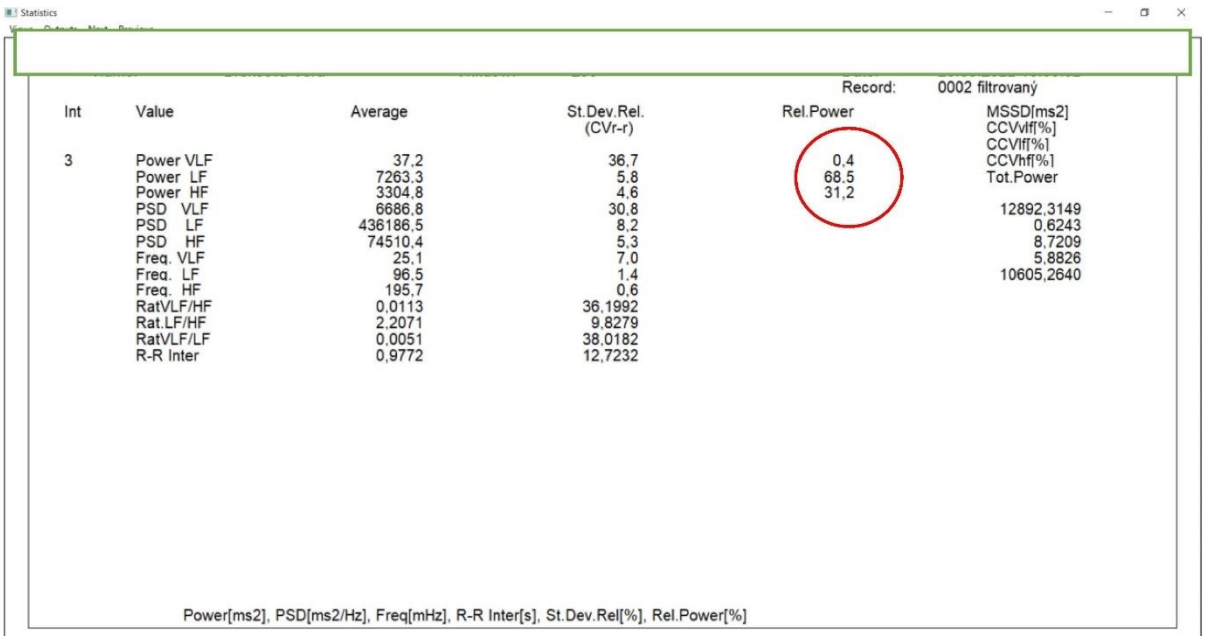
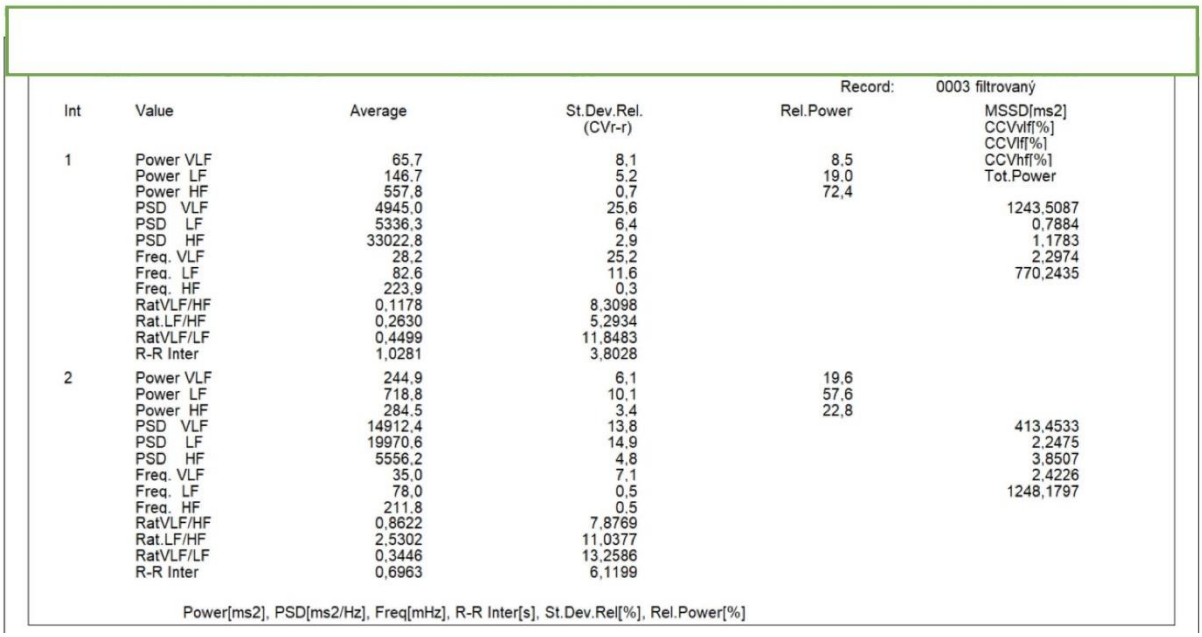


Record: 0002 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
3	Power VLF	37,2	36,7	0,4	12892,3149
	Power LF	7263,3	5,8	68,5	0,6243
	Power HF	3304,8	4,6	31,2	8,7209
	PSD VLF	6686,8	30,8		5,8826
	PSD LF	436186,5	8,2		10605,2640
	PSD HF	74510,4	5,3		
	Freq. VLF	25,1	7,0		
	Freq. LF	96,5	1,4		
	Freq. HF	195,7	0,6		
	RatVLF/HF	0,0113	36,1992		
	Rat.LF/HF	2,2071	9,8279		
	RatVLF/LF	0,0051	38,0182		
	R-R Inter	0,9772	12,7232		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

Figure 6. Status after (measurement M3): 1 supine position, 2 standing position, 3 2nd supine position



Record: 0003 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
1	Power VLF	65,7	8,1	8,5	1243,5087
	Power LF	146,7	5,2	19,0	0,7884
	Power HF	557,8	0,7	72,4	1,1783
	PSD VLF	4945,0	25,6		2,2974
	PSD LF	5336,3	6,4		770,2435
	PSD HF	33022,8	2,9		
	Freq. VLF	28,2	25,2		
	Freq. LF	82,6	11,6		
	Freq. HF	223,9	0,3		
	RatVLF/HF	0,1178	8,3098		
	Rat.LF/HF	0,2630	5,2934		
	RatVLF/LF	0,4499	11,8483		
	R-R Inter	1,0281	3,8028		
2	Power VLF	244,9	6,1	19,6	413,4533
	Power LF	718,8	10,1	57,6	2,2475
	Power HF	284,5	3,4	22,8	3,8507
	PSD VLF	14912,4	13,8		2,4226
	PSD LF	19970,6	14,9		1248,1797
	PSD HF	5556,2	4,8		
	Freq. VLF	35,0	7,1		
	Freq. LF	78,0	0,5		
	Freq. HF	211,8	0,5		
	RatVLF/HF	0,8622	7,8769		
	Rat.LF/HF	2,5302	11,0377		
	RatVLF/LF	0,3446	13,2586		
	R-R Inter	0,6963	6,1199		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

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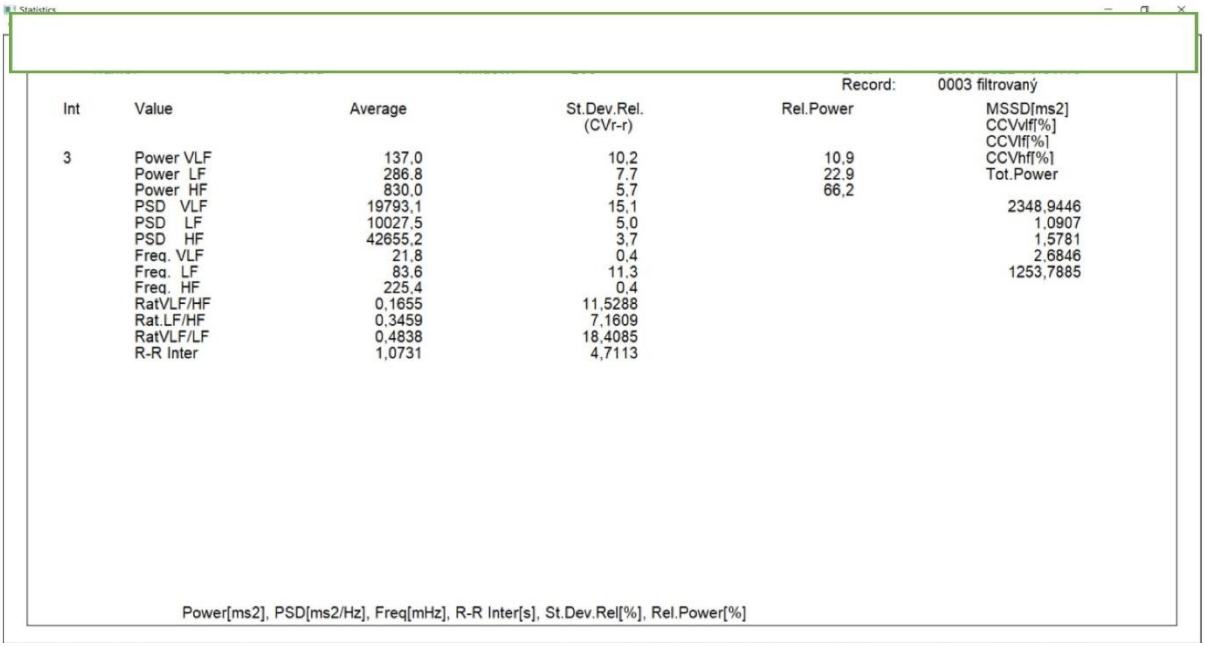

Record: 0003 filtrovaný

Int	Value	Average	St.Dev.Rel. (CVr-r)	Rel.Power	MSSD[ms2] CCVvlf[%] CCVlf[%] CCVhf[%] Tot.Power
3	Power VLF	137,0	10,2	10,9	
	Power LF	286,8	7,7	22,9	
	Power HF	830,0	5,7	66,2	
	PSD VLF	19793,1	15,1		2348,9446
	PSD LF	10027,5	5,0		1,0907
	PSD HF	42655,2	3,7		1,5781
	Freq. VLF	21,8	0,4		2,6846
	Freq. LF	83,6	11,3		1253,7885
	Freq. HF	225,4	0,4		
	RatVLF/HF	0,1655	11,5288		
	Rat.LF/HF	0,3459	7,1609		
	RatVLF/LF	0,4838	18,4085		
	R-R Inter	1,0731	4,7113		

Power[ms2], PSD[ms2/Hz], Freq[mHz], R-R Inter[s], St.Dev.Rel[%], Rel.Power[%]

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SPORT AS AN ESSENTIAL PART OF YOUTH WELLNESS

Adam KYSELICA, Gabriela BOJANOVSKÁ

Abstract

This article examines the motivation of youth to participate in organized sport, and conversely, also explores the reasons for youth dropping out of organized sport. Along with motivation, the article also examines the numbers and percentages of youth who attend organized sport, who had been part of but no longer continue in organized sport and who has never been in organized sport. The data were collected by an online questionnaire that was distributed to primary schools and first grade of gymnasiums.

Key words

Sport, organized sport, youth, motivation, drop-out.

1 INTRODUCTION

Today's era and its society are characterized by different features than the climate of the previous generation, mainly due to dynamic technological changes. The Internet, mobile telephones, social networks and digital tools have become an integral part of our lives and bring many benefits, but also risks. On the one hand, technology is a tool that allows us to improve communication, speed and efficiency in work, education and entertainment. But on the other hand, they can also bring dangers such as addiction, loneliness, cyber-shaming and loss of privacy. We also encounter the issue of shifts in value orientations, where nowadays in the modern age of consumer electronics, rapid technological development, good availability of all products and food at sometimes unbelievably low prices cause most people to lose the real concept of values (Sekot, 2013).

At the same time, today's society is also experiencing an increase in stress and anxiety. Many people are suffering from various psychological problems, which can be caused by, for example, work stress, financial problems, unemployment or social isolation. At the same time, however, there are also many ways to maintain physical and psychological health, for example through therapy, meditation or, most importantly, sporting activities (Blahutková and Charvát, 2003).

We speak of contemporary society as a sedentary or consumer society, which is marked by a significant decline in physical exertion in all areas of life. This is particularly the case in many professions where most people are sedentary. There is also a decline in physical activity in the home, mainly due to the technological shift that makes all work easier, which is also true for individual forms of exercise (Sekot, 2019).

Today, there are many expert studies and reports that inform us about the risks of a lack of regular physical activity and the undesirable consequences of a sedentary lifestyle. In addition to organised fitness and recreational sports activities, regular walking in particular is considered to be the most acceptable and well-implemented way of compensating for this lifestyle and the risks arising from it. Walking is considered to be the most natural human movement (Sekot, 2008).

Today's society is also often referred to as information society. This term has become important in relation to today's technological innovations and changes in society and has become common in discussions about the challenges of the modern world and what the future will look like (Černý, 2016).

The term "information society" began to emerge in the late 20th century, when technology and the Internet began to become part of our everyday lives. Initially, the term appeared as a description of new technologies, but later it became part of the dis-

cussions about how these technologies could change society. According to Castells (1996), information society refers to a society that becomes dependent on information technology and information. In this society, most economic, political and social activities involve the production, manipulation and also distribution of information based on information technology as well as information networks (Castells, 1996).

The information society has several key characteristics. One of the most important characteristics is the increasing importance of information technology and digital media. These technologies enable fast and effective communication and make information accessible to a wider audience. Another characteristic of the information society is globalisation, which is facilitated by the development of information technology and the Internet. Another characteristic of the information society is the increasing importance of information in the economy. Information is now seen as an important raw material upon which new products and services are created (Duff, 2000).

One of the positive impacts of the information society on the overall society is the improvement of access to information and education. With the development of information technology and the inter- net, information has become more widely and easily accessible. People can quickly find the information they need and gain new knowledge. Another positive impact is the improvement of communication and social interaction. People can easily communicate and share information with people from all over the world, which helps to create global communities (Fuchs, 2014).

In order to define sport, it is necessary to first define what exactly is a physical activity. Physical activity is physical movement that increases energy expenditure, increases heart and respiratory rates, and generally requires energy expenditure above the level of normal rest. Physical activity has a positive impact on an individual's health, is usually of low or moderate intensity, and can include activities such as walking, cycling, swimming, running, as well as housework (Hoeger and Hoeger, 2011).

Sport is a physical activity that also naturally induces physical exertion, but it differs from physical activity mainly because there are competitive elements such as rules, results, and overall patterns of behaviour occur in an organized princip (Pink, 2008).

Sport brings many benefits to people. One benefit already mentioned is the improvement of physical fitness and health. Playing sports helps keep the body fit, increases strength and stamina, improves heart function and boosts immunity. Sport also helps to improve mental health. Playing sports releases endorphins that improve mood and reduce stress and anxiety. Playing sports regularly can also help regulate the sleep cycle and lead to better quality sleep (Tod et al., 2012).

Playing sports helps and teaches acceptance and adherence to given rules, working with other people and especially getting to know oneself. Physical activity and sport improve cognitive functions, develop coordination, operational thinking, tactical thinking and, for example, team or group thinking, which is important for mutual cooperation (Slepička, Hošek and Hátlová, 2009).

Another and very important advantage of playing sport is socialisation through sport. Socialization through sport is a process that involves individuals engaging in sporting activities to learn cooperation, communication and respect for others. Sport is an effective tool for socialization because it allows individuals to establish new friendships and create networks of social ties in today's age where communication is largely moving online (Sekot, 2003).

Organized sport is a phenomenon that plays an important role in our lives. One of the most important benefits of organized sport is the improvement of physical fitness and health. Regular sporting activity can help people reduce their risk of developing a range of health problems, including obesity, diabetes, heart disease and many others. Playing sports regularly also helps to maintain a healthy weight, strengthen muscles and reduce head stress. Another benefit of organised sport is the acquisition of new

experiences and skills. People participate in sporting activities to learn new sports, techniques and strategies, which can have a positive impact on their lives as a whole. For example, athletes learn to work together as a team, communicate, respect rules and discipline. These skills can be valuable not only in sports, but also in their professional and personal lives (Health Care, 2020).

2 OBJECTIVE

The aim of the research is to analyse the motives of sporting youth and the motives of non-sporting youth on the basis of a questionnaire survey. A sub-objective is to determine the proportion of children in schools who play sport or participate in a sporting activity in a sports organisation. We have set also 5 research questions:

RQ1: What percentage of youth participate in organized sport?
RQ 2: What is the most common reason for children to drop out of organized sport?
RQ 3: What motivates children to stay in organized sport?
RQ 4: At what age are children most likely to start organized sport?
RQ 5: How often do children usually have training sessions if they are part of organized sport?

3 METHODOLOGY

3.1. Research sample

The research involved 280 children aged eleven to fifteen years from primary schools with a second level and from multi-year grammar schools. The schools involved in the research were from the Vysočina Region, the South Moravian Region and the Pilsen Region. 4 responses were not valid and were therefore excluded from the research. Thus, the research works with 276 responses in total.

The gender distribution of respondents is almost balanced, with 55% women and 45% men, respectively girls and boys.

Respondents were aged 11-15 years and always completed the questionnaire under the supervision of a teacher during class time. The average age of the respondent was 13.6 years. The median and the mode are 14 years.

110 respondents are studying the first stage of a multi-year grammar school, 166 are studying the second stage of a primary school.

The representation of respondents by region is divided into 4 units. Most respondents were from the South Moravian Region (136 respondents), followed by the Vysočina Region (83 respondents) and the Pilsen Region (56 respondents). One respondent is from the Ústí region, probably a friend of one of the respondents.

The last question, which serves to divide the respondents, focuses on active participation in organized sport.65% of respondents regularly play sport in a club or group, while the remaining 35% of respondents do not play organized sport (figure 1).

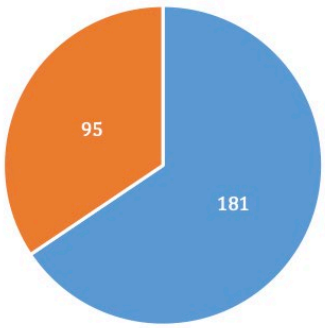

Figure 1. Participation in organised sport (own processing)

3.2 Research methods

The research was conducted in a quantitative form of a non-standardized questionnaire. The questionnaire was developed due to the unavailability of a suitable standardized questionnaire on the same topic.

The questionnaire consisted of 34 questions, of which the first seven questions were named as background information. These were segmentation questions such as gender, age, type of school and others.

The last question in the basic information category was a question asking whether the children play sports in a club, club or club. Or whether they are part of an organized sport. After this question, the questionnaire was divided into two branches according to the answer whether they are part of an organized sport or not. An affirmative answer of attending a club or circle was followed by eighteen questions ranging from joining a club or circle, participating in competitions, tournaments, motivation and demotivation for training to continuing in the club or circle.

In the second branch of the questionnaire, when respondents answered that they were not part of organized sport, they were asked seven questions. The questions were mainly related to their relationship to sport, whether or not they do any physical or sporting activity, or what specific activities they do, whether or not they used to attend a sports club and why they do not attend anymore, and other questions about physical and sporting activities and their motivation or demotivation for sport.

In the non-standardised questionnaire there were most closed answers and some open-ended answers. Thus, this non-standardized questionnaire can be described as semi-structured.

The closed-ended questions will be evaluated using descriptive statistical analysis where the data will be interpreted to obtain relative knowledge and information. Open-ended responses will be categorised and then statistically evaluated. The majority of responses will be evaluated by percentage of responses.

Some of the questions in the questionnaire are just to better understand the important issues and to guide the respondents to these questions, some of the questions in the questionnaire are also used to activate the respondents, hence not all responses will be evaluated in detail.

4 RESULTS AND DISCUSSION

We will devide the results into two categories and two more sub-categories – youth who participate in organized sport and youth who do not participate in organized sport – those who did participate before and those who have never participated.

4.1 Youth participated in organized sport

Once the questionnaire was distributed to the next phase, the first question asked young athletes to participate in more than one sports club or club. 35% of respondents attend more than one sports club or club, leading to opportunities for sports versatility, prevention of one-sided sports load or burnout from the constant pressure to perform. For these respondents, we directed their other responses towards their main sport.

The next question is about the form of organised sport. Respondents are asked whether they attend a sports club (63%), an after-school club (31%) or directly at school (6%). From the results we can see that the vast majority of respondents play sports in a sports club or after-school club, while extra-curricular leisure activities within school are rare.

The respondents who play sports mainly play team sports (61%), which are especially important for younger children in terms of socialisation and integration into a team. 39% of the respondents play individual sports, according to the open-ended question, very often combat sports, which have recently become highly publicised and popular (MMA, boxing, judo, etc.), but also tennis or swimming.

34% of respondents have to commute for sport (Figure 11), which can often be one of the barriers not only for children and young

people as athletes, but also for their parents, who have to drive their children to trainings or commute with them by public transport.

Almost 50% of respondents drive their parents or grandparents to training or take turns commuting with friends' parents. Around 37% of respondents use public transport for commuting. In this question we have 36 double answers, i.e. respondents use more than one form of transport.

The next question points to a possible motivating factor, which is the frequency and frequency of training. 42% of the respondents train 3 or more times a week, which, according to the practice in the Nordic countries, is not suitable for motivating young athletes under 12 or 13 years of age and their future continuation in sport.

Almost 70% of the respondents regularly participate in competitions or matches in their main sport. 30% of the respondents do not participate in any competitions in their sport, so it can be assumed that these are the ones who train only once a week and do sport for fun.

Of those respondents who regularly participate in competitions or matches in their main sport, 58% are actively involved in 12 or more matches, so it can be estimated that they are involved in team sports and are part of a year-round competition. A further 20% or so take part in matches or competitions 6-11 times during the year. The remaining 22% of the respondents then participate in a maximum of 5 competitions or matches throughout the year (Figure 15), so it can be assumed that the pressure to perform is low, and therefore their motivation to stick with the sport longer term.

The next question is very interesting and perhaps one of the most surprising. Motivation to start organized sports is fairly evenly distributed among three basic factors, namely friends (24.5%), parents or grandparents (33.7%), but also the respondent's own initiative (33.7%). For this option, the question arises whether the respondents really came to the club or club on their own, or whether they only perceive it as such in hindsight, even though their parents brought them there at a younger age. Only 1%, i.e. 2 respondents, mentioned school as a factor that led them to organised sport. 7% of the responses were in the "other" option, where a sibling, a summer camp, the interest of the club itself were very often mentioned as strong motivating factors, but only once was direct recruitment by a sports club.

Another important factor is the age at which organised sport starts. Of the 181 respondents, most of them started sport at the age of 7, the median age is also 7, and the arithmetic mean age of starting sport is 7.9 years.

Another question that focuses on the positive motivation for active organized sports. The majority of respondents (80%) answered that they enjoy playing sports in a club or club as such, and that friends, training and coaches are also very important factors, but unfortunately success is also one of the important parts of playing sports for children in our environment. The "other" answers then mention, for example, personal development, travelling to different places for competitions or matches, but also money, which is a really interesting observation at this age, and the question arises whether this is a prospective motivation or whether someone is really already earning money through sport at this young age.

If we reverse the question and try to find out what young sports people do not enjoy about organized sports, there is a positive majority answer that there is nothing that the respondents do not enjoy. However, this is followed by the expected answers, namely sacrificing leisure time or other activities at the expense of training and travelling to matches or competitions. Some of the respondents do not directly enjoy matches or competitions, travelling to them or to training, but also the lifestyle associated with playing sport. The "other" response then echoes the possibilities of coaches, poor teamwork, or little time for school due to the time demands of training coupled with commuting.

The next question is very positive, with the

majority of respondents expressing a positive attitude towards sport in the future. 92% of respondents plan to continue playing organised sport in the future.

The last area we focused on is the influence of idols. In recent times, in our environment, idols have had a very positive effect on young people, motivating them not only to participate in sport but also to lead a healthy lifestyle. It is more than evident that this factor is on the decline, with almost 50% of respondents having no sporting idol or role model (Figure 21). We will therefore focus on the other half who do have an idol and named it in the next follow-up open-ended response. Of the 88 idols named, only 19 are Czech, the rest are usually world-class superstars such as Cristiano Ronaldo, Lionel Messi, Kobe Bryant or Lebron James.

4.2 Youth not participed in organized sport

The basic question for respondents who are not part of organised sport was whether they participate in at least some other form of physical activity. Very positively, 86% of respondents engage in at least some form of physical activity, either with friends, family or on their own. Only 14% (13 respondents) do not participate in any form of organised sport or physical activity. Respondents could choose more than one answer.

Of the 96 respondents, 87 engage in at least one form of physical activity, most often walking, exercising or working out either at home or in a fitness centre, cycling or scooting, running, going to the playground, or engaging in other activities such as inline skating, horse riding or dancing.

Again, we asked about the role of idols among the group of respondents who are not active in organized sport. We can see a big difference compared to their regularly playing sports peers, where only 30% of the respondents have a sports idol. Out of 29 answers, ten idols are mentioned by Czech athletes. For example, the hockey players Mar- tin Nečas, Radek Koblížek or Jaromír Jágr are mentioned, but again the names of world celebrities such as Lionel Messi, Erling Haaland or Michael Jordan also appear.

A key question for the last part of the questionnaire is whether the respondents had previously attended a sports club or club. 80% (77 respondents) had previously participated in some form of organised sport.

4.2.1 Youth participated in organized sport before

The first question for those respondents who had previously participated in organised sport was, of course, the motivation to leave it. 41 answers mention that they did not enjoy organized sport, 27 respondents do other activities than sport, 19 e.g. did not have friends in the club or circle, among other answers we can find e.g. that the respondent only wanted to try sports in a team, the cancellation of the club due to the small number of members, or also the negative influence of coaches or the team.

We also see the question of how long the respondents had previously played sport as important here. 48% of respondents who had tried some form of organised sport had only lasted one or two years. This figure is quite alarming as it shows the importance of intrinsic motivation of children and young people. If a sport or physical activity does not engage them in the first weeks or months, there is a very high likelihood that they will not stick with it.

4.2.2 Youth never participated in sport

Communication with respondents who did not participate in organised sport or physical activity and had no relationship with it is also an important part of the process. Eleven of the 19 respondents do activities other than sport, and the remaining eight see barriers in terms of health, poor transport accessibility from their home, or simply never showed any interest in sport within the family.

4.3 Discussion

Youth participation in organised sport brings many benefits, such as improved physical fitness, increased self-confidence and social relationships, and the opportunity to develop sporting skills. However, recent survey results show that the number of children and young people participating in organised sport is decreasing. Therefore, it is becoming increasingly important to understand what

motivates young people to participate in organised sport and why many young people are leaving this environment.

One of the key factors motivating youth to participate in organized sports is a positive atmosphere and support within the club or team. If children and young people are guided by coaches and parents who are focused on developing sporting skills, while respecting individual needs and goals, they can have a positive experience of sport and a desire to continue to pursue the hobby.

Another factor motivating young people to participate in organised sport is the diversity of sports and activities on offer. If children and young people have the opportunity to try different sports and choose the one that suits them best, they may be more motivated to train regularly and improve their performance. On the other hand, the over-saturation of the environment with a variety of sports to choose from may be one of the factors that prevent young people from staying in sport for longer.

In addition to motivating participation in organised sport, it is also important to understand the factors that lead to youth dropping out of this environment. One of the most common reasons is a lack of motivation and interest in the sport or a lack of support from coaches and parents. Another factor may be unfair treatment or dis- crimination by teammates or coaches.

Last but not least, it is also important to understand those who have never been part of organized sport. Possible reasons may include a lack of financial resources, a lack of information about sporting opportunities and a lack of time due to other interests and responsibilities.

From these findings, it can be concluded that to ensure youth participation in organized sport, it is important to ensure a positive atmosphere, support from coaches and parents, and the diversity of sports activities offered. In addition, it is important to think about ways to reach out to those who have not yet been part of organised sport, for example through promotion and information about the opportunities available. This is the only way to ensure that young people continue to see sport as a positive and beneficial activity and are able to develop healthy habits and a lasting love of exercise and sport.

Returning to the issue of youth motivation in sport, we can observe several trends that are often discussed in professional forums and conferences. We can identify three paths, each with its own specificities. In the North, there is a strong emphasis on all-sport development and late specialisation. There is no pressure on children to achieve and the aim is for them to enjoy sport as much as possible and to develop a positive relationship with it. Targeting one sport comes at the age of 11-12 and leads to versatility, longer-term motivation and prevention of burnout in young people. Another pathway may be southern, where there are usually several preferred sports available to young people interested in sports. In the Balkans, for example, there are usually no more than ten sports that have a large public following, including youth, and the numbers of participants in organised sports are also significantly higher than in the Czech Republic. At the same time, they also have long-standing excellent results in their preferred sports (e.g. football, basketball, handball or water polo). The third way is the liberal option - common in Central Europe - where sport is not restricted too much, there are no fixed prioritised sports and no specific strategy. Unfortunately, Central Europe, and the Czech Republic in particular, is moving in a direction where we can observe a significant decline in youth interest in sport, but also a rapid decline in the number of registered youth members in organized sport.

5 CONCLUSIONS

If we summarise all the results, we can see a reflection of the current situation in organized adult and youth sport.65.7% of the respondents who participate in sport reflect the trend of further development in older young athletes and adults. A major motive is often the positive experience of sport, which according to the results is highly influenced by the sport environment,

coaches and the collective in the sports club. If these factors work within a positive motivation framework, respondents can also manage the negative side of playing sport, such as sacrificing leisure time and other activities. Starting with sport was at a relatively young age, most often between 7-8 years old. Non-sporting youth, on the other hand, started sport very late and thus did not develop a positive relationship with it. Leaving their comfort zone is already difficult for them and they prefer to look for other forms of leisure.

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