

INCREASE OF THE EFFECTIVENESS OF SCHOOL PE CLASSES THROUGH SPORT PREFERENCES SURVEY: CONTEXTUAL PREDICTION OF DEMANDED SPORT ACTIVITIES

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Submitted in January, 2013

BACKGROUND: An effort to promote participation in any type of PA is more effective when it is aimed at needs, interests and preferences of particular target group. Current evidence emphasizes the insufficiency of PA in all age groups.

OBJECTIVE: The purpose of the study was to analyze and describe the structure of sport activity preferences of high school students and to contribute to prospective improvement of sports and physical activity programs.

METHODS: Two standardized questionnaires were used – 1. sport preferences questionnaire, 2. international physical activity questionnaire (IPAQ). The research sample ($N = 333$) consisted of high school students from the Czech Republic.

RESULTS: Our results confirm that the differences between girls and boys are not as great as they were few decades ago. There is a visible dynamic in the development of sport preferences structure. Despite this fact there is a spectrum of sports that are constantly preferred – soccer, volleyball, aerobics and swimming. Acquired results indicate that the range of PA amount in girls varies from 2,372 MET-min./week (15 year old girls) to 4,467 MET-min./week (17 year old girls), while acquired results in boys varies from 2,535 MET-min./week (16 year old boys) to 4,973 MET-min./week (17 year old boys). The results, if properly applied, could increase the total amount of PA in high school students and improve the effectiveness of school PE.

Keywords: Adolescence, sport, lifestyle, sports program, physical education, effectiveness.

INTRODUCTION

Historical evidence shows that sports and recreational activities are evolving simultaneously with human development. Each kind of activity, both sport and recreational, was founded for a different purpose.

According to kinesiology authors, lifestyle is one of the most important factors having an immense impact on people's health. In addition, there have been changes in the lifestyle of children and youth (Andersen et al., 1999; Biddle et al., 2009; Dunn et al., 1999; Lajunen et al., 2009; U. S. Department of Health and Human Services, 2000). This change is obvious also among leisure-time activities. Movement is an essential element for human beings influencing the structure of leisure-time activities. That is precisely why we suppose that physical activity (PA) makes up a large part of the content of leisure time in children and youth.

This shows that there should be an increasing interest in wider range of physical activities by corresponding facilities, material and technical issues, equipment, locations, spaces and programs.

An effort to promote participation in any type of PA is more effective when it is aimed at needs, interests and preferences of particular target group. The research gap needs to be approached as the area of sport preferences in the context with PA. School, as an educational mediator, has a unique chance to influence and motivate children and youth towards active and healthy lifestyle (Lowry, Wechsler, Kann, & Collins, 2001; Pate et al., 2005; Sallis et al., 1997).

Current evidence emphasizes the insufficiency of PA in all age groups (Frömel, Novosad, & Svozil, 1999). Detailed examination of the structure of PA and sport preferences structure in high school students should be one of the most important components for improvement of the current situation. That is confirmed by various surveys in specific areas of preferences of physical or sport activities (Booth, Bauman, Owen, & Gore, 1997; Burgeson, Wechsler, Brener, Young, & Spain, 2003; Burke, Carron, & Eys, 2005;

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Tammelin, Näyhä, Hills, & Järvelin, 2003; Wilson & Spink, 2009). These components should be progressively tested and perceived by students and the general youth population as lifelong physical activities. Previous studies in the area of sport preferences were not systematically conducted.

Generally, we can distinguish preferences as the active preferences and passive preferences. Active physical activity preferences are those activities which are realized already, while passive preferences are activities we want to participate in or realize and implement into our lives.

The purpose of the study was to analyze the structure of sport preferences of high school students and to contribute to prospective improvement of sports and PA programs. An emphasis was given to the age factor with the possibility of anticipating future development in sport preferences area.

METHODS

Innovative approach of the study

The whole study was conducted online. Two standardized questionnaires were used – 1. sport preferences questionnaire, 2. international physical activity questionnaire (IPAQ). These two questionnaires were the essential part of the tool for exploring the area of sport preferences with a potential for innovative changes in PA programs. Both of them are accessible in the INDARES system (International Database for Research and Educational Support), available on www.INDARES.com.

INDARES.com is a complex on-line system focused on recording, analyzing, and comparing data concerning PA of its users. The purpose of INDARES.com project is to support education and research in the field of PA. It also aims at increasing users' knowledgebase in PA issues and at providing means to improve their lifestyle. The user-friendly and well-arranged interface of the system assures that anybody can easily manage it (Křen, Chmelík, Frömel, Fical, & Kudláček, 2008).

Research sample

We used a randomized selection for the survey. The research sample ($N = 333$) consisted of high school students in the Czech Republic. Involved schools carried out sport preferences and PA surveys (mostly during PE classes). There were 216 girls and 117 boys (girls – weight [in kilograms] – 59.06 ± 9.57 ; height [in centimeters] – 167.58 ± 6.31 ; BMI – 20.98 ± 2.89 ; age [years] – 16.66 ± 1.12 ; boys – weight [in kilograms] – 71.31 ± 12.00 ; height [in centimeters] – 179.06 ± 7.37 ; BMI – 22.27 ± 4.18 ; age [years] – 16.72 ± 1.14). The major inclusion/exclusion criterion was completion of both questionnaires. The reason for the disproportion

between girls and boys was probably due to a higher level of responsibility in girls (Kusák & Dařílek, 2001; Singer, Murphey, & Tennant, 1993).

Data collection

Questionnaire #1: Sport preferences questionnaire

The sport preferences questionnaire was originally developed by the Center for Kinanthropology Research, Faculty of Physical Culture, Palacký University, Olomouc, Czech Republic. The content of the questionnaire was assessed by experts from different fields. The final list of all activities was created after careful consideration of the main trends in PA and sport (curricula, PA programs, Olympic Games, traditional sports). The structure of sport activity preferences was examined in eight areas – 1. individual sports, 2. team sports, 3. conditioning (fitness) activities, 4. water sport activities, 5. outdoor (recreational) sport activities, 6. martial arts, 7. rhythmical and dancing activities and 8. sport activities – overall.

The main standardization indicator was test-re-test method with Spearman correlation coefficient (r_s). The most balanced results between the first and the second measurement were found in the area of team sports (.81 and .76). The biggest discrepancies in the ranking between the two measurements were found in the areas of rhythmic and dancing activities (.62 and .68) and martial arts (.68 and .61) (Sigmund, Mitáš, Kudláček, & Frömel, 2007).

Respondents were asked to mark the order of the first five sport activities according to their preferences. If they preferred less than five activities or none of them, they were asked to mark just as many activities as they preferred (they were not required to mark any). In this case, the software warned them of unwanted skipping or omitting some category, but they were allowed to continue. Throughout the survey, participants chose their most favorite group of sport activities and the most favorite activity overall. Completion of the survey lasted approximately 10 minutes, depending on the size of the group. Created tool/software enabled researchers to work with the most important characteristics in the form of parameters. The software works with frequency and ranking characteristics (e.g., respondent can mark up to five activities in each category, however if respondent marks the first three places instead of five in the category with 17 activities, the rest of the activities would be assessed by the averaged placing, which is 10.5).

Questionnaire #2: International Physical Activity Questionnaire (IPAQ)

IPAQ questionnaire belongs to methods working with self-evaluation ("self-report population surveys") (International Physical Activity Questionnaire, 2011). It is

based on determination of the intensity of PA. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. The purpose of the IPAQ is to provide a set of well-developed instruments that can be used internationally to obtain comparable estimates of PA. IPAQ questionnaire is standardized for individuals in age range of 15–69. The coefficient of reliability of IPAQ questionnaire is .80 (Craig et al., 2003).

IPAQ questionnaire evaluates PA in complex way and covers following:

- recreational, sport and leisure-time PA,
- job related PA,
- transportation PA,
- housework, house maintenance, and caring for family.

Completion of the questionnaire takes approximately 10 minutes depending on the size of the group. The main indicator for data presentation in our study is MET-minutes/week. METs are multiples of the resting metabolic rate and a MET-minute is computed by multiplying the MET score of an activity by the minutes performed (details available from www.ipaq.ki.se).

Data analysis

Data were analyzed using the statistical programs, Statistica 6.0 CZ (StatSoft CR, 2008) and SPSS PC 17.0 software (SPSS CR, 2008). Basic statistical methods such as descriptive statistics, nonparametric Kruskal-Wallis, Spearman correlation coefficient and “effect size” coefficient were used for data analysis. Kruskal-Wallis ANOVA was used for determination of mutual

associations. In case the differences were significant we used Mann-Whitney U-test for more detailed insight to the research sample. Spearman correlation coefficient was used for determination of the association between dependent and independent variable. As a complementary characteristic of the “effect size” was the coefficient η^2 . Coefficient η^2 is suitable among others just for Kruskal-Wallis ANOVA (with the categorization $\eta^2 = .01$ small effect, $\eta^2 = .06$ medium effect, $\eta^2 = .14$ large effect; Morse, 1999).

RESULTS

According to each age category in both girls and boys, no significant differences in PA categories were found (Table 1). Considering the effect size, the biggest differences in girls were found in “walking” ($H = 9.86$, $p = .04$, $\eta^2 = .04$) and in boys in vigorous PA ($H = 4.77$, $p = .44$, $\eta^2 = .05$) and in total PA ($H = 4.28$, $p = .50$, $\eta^2 = .05$). There is an increasing trend of the level of PA in both boys and girls across the human’s life ranged from 15 to 18 years.

Regarding each age category and structure of sport preferences, possible development or stability of preferred activities was discovered. There was a similar top three positions in individual sports across each age category in both girls and boys – swimming, cycling and downhill skiing (Table 2). The delineation of the development shows a decline in the popularity of track and field (athletics) and cross-country skiing. A positive shift was found in snowboarding.

There was an apparent accumulation of popularity of baseball and softball in girls, but also obvious decline of popularity of basketball (Table 3). Floorball

Table 1
The level of physical activity according to age – girls, boys (MET-min./week)

	15 years		16 years		17 years		≥ 18 years	
	Girls (n = 34)		Girls (n = 72)		Girls (n = 53)		Girls (n = 57)	
	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>
Vigorous PA	90*	810	375	1,530	540	1,440	540	1,260
Moderate PA	695*	1,650	928	140	1,670	2,145	770	1,890
Walking	858*	1,122	1,510	2,013	2,046	2,478	1,749	2,079
Total PA	2,372*	3,691	3,742	5,080	4,467	4,614	3,219	4,837
	Boys (n = 29)		Boys (n = 44)		Boys (n = 26)		Boys (n = 18)	
	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>	<i>Mdn</i>	<i>IQR</i>
Vigorous PA	1,440	1,290	675	2,205	960	2,520	1,935	3,780
Moderate PA	1,560	3,060	1,151	1,945	1,205	2,180	2,017	3,015
Walking	1,435	2,343	1,320	2,227	1,303	1,947	1,353	3,168
Total PA	5,220	6,365	4,270	5,351	4,567	3,530	6,564	8,735

Note. *Mdn* = median, *IQR* = interquartile range, PA = physical activity, * minimal values.

Table 2

Structure of sport preferences – individual sports (ranking). Individual sports – factor age

	Girls (N = 216)				Boys (N = 117)			
	15	16	17	≥ 18	15	16	17	≥ 18
Track and field (running activities)	9	9	12	8	4	8	12	6
Badminton	4	7	7	6	10	10	13	4
Bowling (ninepins, pool games, petangue)	8	8	6	4	11	4	9	9
Ice-skating (figure skating, speed skating)	6	4	5	10	14	11	11	14
Cycling (speed, terrain, indoor)	2	3	1	2	1	2	2	3
Golf (minigolf)	15	15	14	13	8	12	8	11
Canoeing, rowing	13	14	15	15	15	13	16	13
Combined sports (triathlon, modern pentathlon)	17	17	17	17	12	17	14	16
Cross-country skiing (biathlon, Nordic combination)	3	13	16	14	7	15	15	17
Swimming	1	1	2	1	2	1	4	1
Sport gymnastics	16	12	13	16	17	16	17	15
Squash (ricochet, racquetball)	11	16	8	9	13	14	7	8
Shooting, archery	12	11	11	12	6	6	10	2
Table tennis	10	10	10	11	5	9	1	7
Tennis (soft tennis)	7	5	4	5	9	7	3	12
Downhill skiing (alpine, acrobatic, speed)	3	2	3	3	3	3	5	5
Snowboarding	5	6	9	7	16	5	6	10

Note. Dominant sport activities and delineation of popularity are in boldface.

Table 3

Structure of sport preferences – team sports (ranking). Team sports – factor age

	Girls (N = 216)				Boys (N = 117)			
	15	16	17	≥ 18	15	16	17	≥ 18
Baseball, softball	6	7	6	3	7	8	6	5
Basketball	3	3	5	5	1	4	4	6
Curling	14	12	11	12	12	14	14	9
Floorball (field hockey, hockey-ball)	4	4	4	2	4	2	2	2
Soccer	5	5	7	7	2	1	1	1
Frisbee	7	6	3	6	10	10	10	12
Handball (dodgeball)	2	2	2	4	3	5	8	11
Lacrosse	13	13	12	13	8	13	13	8
Ice hockey (in-line hockey)	8	9	10	9	6	6	5	10
Foot volleyball	10	10	9	11	11	7	7	13
Rugby	11	14	14	14	13	11	9	3
Water polo (“water versions” of other sports)	9	8	8	8	9	12	12	14
Volleyball (beach, wandering ball)	1	1	1	1	5	3	3	4
American football	12	11	13	10	14	9	11	7

Note. Dominant sport activities and delineation of popularity are in boldface.

and handball seemed to be permanently preferred activities. The very first place in each age category belonged to volleyball. Top team sports in boys are as expected soccer, floorball and basketball. There was lower popularity of handball, water polo or “water versions” of other sports and an increasing popularity of rugby.

There seemed to be higher popularity of yoga in girls in conditioning (fitness) activities, but lower popularity of aerobics. The most popular activities in boys were running (jogging) and power exercise. In contrast, there was a decreasing trend in conditioning walking (Nordic walking) and health exercise. In “martial arts”, kick-box (thai-box) was first place in both girls and boys. The most preferred rhythmic and dancing activities were Latin-american dance and modern dance (i.e. break dance, disco, hip-hop). The most popular activity in this category in boys was martial dance (capoeira). In contrast, a negative shift was found in folk dance (country). Team sports dominated in the overall ranking of sport activities in both girls and boys (Table 4).

DISCUSSION

School institutions should respect wishes and interests of students and contribute to the optimal development of healthy lifestyle. The active contribution of high school is often minimal. The orientation on the adolescent phase of human development is crucial because the attitude towards PA is created during childhood and adolescence. Schools have a unique opportunity to influence and support PA of youth (McKenzie, Crespo, Baquero, & Elder, 2010; Wallhead & Buckworth, 2004).

The structure of sport preferences has to be seen as a complex process reflecting interactions between situational factors (socioeconomic characteristics), motivational factors (reasons for taking part in sport) and needs, which are satisfied by realization of particular

activities. Interconnection between all factors – age, socioeconomic status, structured PA, location/residence, etc. – was not considered enough in the previous surveys. The combination of sport preferences survey and PA survey is according to our opinion right way how to promote healthy and active lifestyle (through the popular and preferred activities).

According to the purpose of the study we analyzed and described the structure of sport preferences of the group of high school students and we created a tool for exploring the area of sport preferences. The complex approach of the INDARES project proved the potential to react flexibly on prospective changes in sport preferences of the students. Sport preferences survey seems to be very useful tool for creation of PA programs. It can make the work of teachers easier and help them with their professional preparedness – mainly through the provided feedback about their own curriculum/program. Explanation of the structure of sport preferences can consecutively help in planning and managing of the school PE programs and thus make insufficiently financed areas more visible. On the contrary, areas which are unprofitable (i.e., activities that students do not participate in; that do not bring any benefits and do not participate on promotion of healthy lifestyle) should be demoted.

There is no constituent element explaining diversity of sport preferences structure across the population. Data can provide approximate prediction of demanded activities in national, regional and local level. Data can also serve as a certain form of supervision of the current PA facilities and programs use. The awareness of this fact can create foundation for development of new facilities and for innovations of current facilities. The purpose of this study was not to describe the actual conditions in particular area. It is necessary to highlight that the study is focused on sport preferences.

The amount of PA has increasing tendency in both girls and boys, which is not identified with previous surveys proclaiming decreasing tendency of the amount

Table 4

Structure of sport preferences – sport activities – overall (ranking). Categories of sport activities – factor age

	Girls (N = 216)				Boys (N = 117)			
	15	16	17	≥ 18	15	16	17	≥ 18
Individual sports	3	4	1	1	2	2	2	2
Team sports	1	1	2	3	1	1	1	1
Conditional activities	6	5	5	5	5	5	4	4
Water sport activities	5	6	6	6	4	6	6	6
Outdoor sport activities	2	3	4	2	3	4	3	3
Martial arts	7	7	7	7	7	3	5	5
Rythmical and dancing activities	4	2	3	4	6	7	7	7

Note. Dominant sport activities and delineation of popularity are in boldface.

of PA (Gordon-Larse, McMurray, & Popkin, 1999; Harrel et al., 2005; Lowry, Wechsler, Kann, & Collins, 2001; Pate et al., 2005; Sallis et al., 1997; Sallis, 2000; van Mechelen, Twisk, Post, Snel, & Kemper, 2000). In contrast, Aaron et al. pointed out that there is positive trend in boys (Aaron et al., 1993), compared to a negative trend in girls. Age factor is more significant in men than in women, which is supported also by research of Sallis (2000) or van Mechelen et al. (2000).

It is necessary to mention that the acquired results are typical for the specific sample, living in given socio-economics conditions and influenced by many factors such as culture, traditions and habits, current needs and values, family and peers. The issue of gender is to a certain extent unknown. We have to respect this fact in order to create corresponding conditions and facilities, which will lead to satisfied needs of students.

Results also indicate that differences in sport activities between boys and girls are not so obvious. This fact together with knowledge of sport preferences structure is important for all teachers, coaches, lecturers and leading managers. There is also possibility of including co-educational PE classes (in countries without co-educational PE classes) or refreshing of the PE programs (in countries with co-educational PE classes). We cannot talk about ideal cooperation and maximal effort without knowing this specific structure. It is obvious in all spheres of human life. This study, in contrast with previous studies from the area of sport preferences shows visible dynamic in the development of the structure of sport preferences (Frömel, Novosad, & Svozil, 1999; Kudláček, 2008; Kudláček & Frömel, 2012; Rychtecký, 2006). Despite this fact, there is a range of sports that are constantly preferred (soccer, volleyball, aerobic, swimming) and probably will be preferred in the future. School health professionals and PE teachers should respect preferences of developing motor abilities in school PE, which is typical for contemporary conception. From this perspective, the student is in the center of the pedagogical (academic) focus (Frömel, Formánková, & Sallis, 2002; Jones & Ward, 1998; Leibinger, Hamar, & Szegner, 2007; Virgilio, 2000). Discrepancies between preferences, sensitive phases of human development and goals should be treated by popular content and interesting forms of presentation.

Results cannot be generalized due to the small sample and particular specifications (age, culture, environment, size of the town). Further, there was an insufficient coverage of IT technology and limited access to the internet in some regions/schools. The schools volunteered to be part of the study and some contact persons (mostly PE teachers) were not flexible with survey distribution. Finally, the results could be affected by the effect of newness.

CONCLUSIONS

In effort to incorporate the survey of PA with sport preferences survey, we tried to anticipate the development of sport-preferences in girls and boys. The results indicate that differences of sport activities between boys and girls are not so obvious. Despite certain dynamics in the development of the structure of sport preferences, there is a range of sports that are constantly preferred (soccer, volleyball, aerobics and swimming) and probably will be preferred in the future. The online form of surveys in the school environment was effective and feasible. Both surveys are the fundamental parts of the INDARES project. Further development and increased popularity of the whole system is necessary. The survey of PA confirmed that boys are more active than girls.

The present study offers longitudinal monitoring of sport preferences in context with PA because of its posting into the virtual/internet environment, which enables easy and flexible repetitions of the survey.

Acquired data can serve as a form of supervision of the current PA facilities and programs utilization. The data could be used to create foundation for development of new facilities and for innovations of the current facilities. They could also contribute to create better conditions for improvement of lifestyle of children, youth and also adults. Last but not least, the sport preferences survey contributed to the creation of better and more flexible PA programs tailored to student/school needs. A better understanding of the specific area could help in preparation and formulation of these programs in a substantial way and thus make teachers' work easier.

ACKNOWLEDGMENTS

This study was supported by the Center for Kinanthropology Research within Institute of Active Lifestyle at the Faculty of Physical Culture, Palacký University, Olomouc. The main initiative for this support came from the grant of the Ministry of Education, Youth and Sports of the Czech Republic "Physical Activity and Inactivity of the Inhabitants of the Czech Republic in the context of Behavioral Changes" (No. MSM 6198959221).

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ZVÝŠENÍ EFEKTIVITY ŠKOLNÍ TĚLESNÉ VÝCHOVY PROSTŘEDNICTVÍM VÝZKUMU SPORTOVNÍCH PREFERENCÍ: KONTEXTUÁLNÍ PŘEDPOVĚĎ POPTÁVANÝCH SPORTOVNÍCH AKTIVIT

(Souhrn anglického textu)

ÚVOD: Všechny snahy o podporu účasti na jakémkoliv druhu pohybové aktivity (PA) jsou efektivnější, pakliže jsou zacíleny na potřeby, zájmy a preference konkrétní cílové skupiny. Současný stav poznání a bádání poukazuje na nedostatečnou evidenci v této oblasti PA, a to u všech věkových skupin.

CÍLE: Hlavním cílem této studie bylo zanalyzovat a popsat strukturu sportovních preferencí u souboru středoškolských studentů a přispět tak k případnému zlepšení sportovních programů a programů s akcentem na pohybovou aktivitu.

METODY: Ve vlastním výzkumu byly použity dva standardizované dotazníky: 1. dotazník sportovních preferencí, 2. mezinárodní dotazník k pohybové aktivitě – dlouhá verze (IPAQ – long). Výzkumný soubor byl tvořen 333 respondenty z různých škol na území České republiky.

VÝSLEDKY: Zjištěné výsledky potvrzují trend, který poukazuje na fakt, že rozdíly mezi děvčaty a chlapci nejsou tak významné, jako tomu bylo dříve (před 10–15 lety). Ve vývoji struktury sportovních preferencí existuje viditelná dynamika. Přesto se zde stále objevuje určité spektrum sportovních aktivit, které jsou preferovány stabilně – patří mezi ně fotbal, volejbal, aerobik a plavání. V oblasti PA jsme zjistili, že množství PA u děvčat variuje od 2 372 MET-minut/týden u 15letých děvčat do 4 467 MET-minut/týden u 17letých děvčat. Ve stejných charakteristikách u souboru chlapců byly pak zjištěny hodnoty pohybující se v rozmezí od 2 535 MET-minut/týden u 16letých chlapců do 4 973 MET-minut/týden u 17letých chlapců. Výzkum tohoto charakteru v kombinaci dvou výzkumných nástrojů skýtá potenciál, který může vést k zásadnímu navýšení celkového množství PA středoškolských studentů a k celkovému zlepšení a zefektivnění školní tělesné výchovy.

Klíčová slova: adolescence, sport, životní styl, sportovní program, tělesná výchova, efektivita.