Original Article

Popularity of school Physical Education and its effect on performed number of steps

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Abstract:

Physical Education is the most favourite school subject for secondary and high students in the Czech Republic despite being a compulsory subject till their 19 years of age. Still we are persuaded that there exists a group of students who do not like PE. The main goal of the study is to find out whether popularity of PE is reflected in the number of steps performed in lessons. Second aim is to investigate the differences in pupils' attitude towards PE lesson (PEL) with regard to their gender, school level and liking PE. Pupils from secondary (SS) and high schools (HS) completed the questionnaire "Diagnosis of a PE lesson" at the end of PEL and randomly selected 10 pupils in each class monitored their number of steps. Boys who liked more PE manifested significantly more steps/min and had significantly more positive attitude toward PEL. Girls from SS who liked PE performed comparable number of steps as those who did not like PE. However, they demonstrated significantly more positive attitude toward PEL. High school girls preferring PE performed significantly more steps per minute and showed significantly more positive attitude. Popularity of PE is closely and positively associated with performed steps and the attitude toward PE lessons regardless of gender and type of school. In boys (girls, respectively) with age there is increase (decrease, respectively) in average number of steps performed in PEL. Also the popularity of PE is decreasing regardless of gender and type of school; in girls there is bigger drop.

Key Words: pedometers, questionnaire, attitude, gender, school

Introduction

Popularity is a social phenomenon that dictates who or what is best liked or sometimes it is defined as the state or condition of being liked, admired or supported by many people. Popularity in general is connected more with culture but can be also directed towards objects. In our contribution, we perceive popularity similar to "liking" and the group of objects means a school subject. Popularity is a collective perception and reflects the consensus towards school subjects when rating popularity (Scott & Judge, 2009). In our study, we differentiate the popularity of Physical Education (PE) as a school subject and attitude toward just finished PE lesson. Popularity or favouring the subject is a longer-term state, which is affected by numerous factors like for example the personality of teachers, previous experience with PE, attitude towards physical activity or situation in class, whereas attitude investigated through a questionnaire is related to fulfilling the agenda and satisfaction in a specific PE lesson.

Physical Education at schools in the Czech Republic is the only compulsory subject where all pupils have the possibility to exercise. In order to get into the topic of school subject popularity it is vital for us to establish the popularity of PE compared to other subjects in the Czech Republic. The level of popularity was researched at various schools using questionnaires. In 2003/4 an extensive survey of popularity and difficulty of school subjects has been conducted throughout Czech Republic (n=6408 pupils) (Höfer, Pulpán, & Svoboda, 2005). It placed PE onto a second place, after Information Technologies at primary schools and on a first place in all types of high schools. As for difficulty, PE was rated as an easy subject. Even though PE is a favourite subject, it may happen due to its lower difficulty, it is necessary to offer an interesting programme. The content should motivate pupils towards active lifestyle.

Researchers have confirmed that daily PE at the school level has had a significant long-term positive effect on the exercise habit (Fairclough, Stratton, & Baldwin, 2002; Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999). PE should focus mainly on developing basic physical knowledge and motivation toward including physical activity into everyday agenda (MacNamara, et al., 2011; Morgan, Pangrazi, & Beighle, 2003). Movement is quite natural for young pupils but there sometimes need to be applied motivational tool for older pupils and adolescents because popularity of PE is open to debate. A well designed and attractive programme with a long-term goal should be the main motivation in PE (Soares, Antunes, & Van Den Tillaar, 2013). The biggest problem appears to be motivation of girls to participate in physical activities (Gibbons, Humbert, & Temple, 2010). Some reasons for participation in primary physical activity were already investigated (Vašíčková, Hřebíčková, & Groffík, 2014). Individual physical activities can work as motivational units, where

the teacher can affect mostly extrinsic motivation. During the work with students it is helpful to change extrinsic motivation into intrinsic as it will manifest in active lifestyle later on. Strategies for support of inner motivation include the possibility of free choice from two or more options (Alderman, Beighle, & Pangrazi, 2006) and PE lessons are taught in a supportive and cooperative environment with specific, positive teacher feedback (Fairclough, Hilland, Stratton, & Ridgers, 2012). If an individual works on a chosen physical activity, which brings him/her satisfaction, we assume that this will be reflected in popularity of Physical Education as a school subject. If a student participates in a favourite subject, we assume that also the activity itself, either physical or psychological would be of higher frequency. We can also assume that popularity of PE will be reflected in attitude toward a finished PE lesson. We suppose that those who like PE will have more positive attitude toward PE lesson than those who do not like PE. The main objective of the study is to find out whether popularity of PE is manifested in performed number of steps in lessons. Boys tend to prefer PE as a school subject but in girls with aging PE loses its position. Second aim of this study also is to investigate the differences on attitude toward PE lesson of the school students with regard to their gender, school level and liking PE.

Material & methods

Setting- PE student teachers have to attend two three to four week long practical blocks of teaching in schools within their master study program. They choose the school either according to their temporary address or it is assigned to them within the city of Olomouc (according to cooperation of the Faculty with selected schools). Student teachers should follow the program of PE in certain school. First, they observe the teacher who is in charge of their practice and then they “teach” a real PE lesson under supervision of the teacher.

Participants, instruments and data collection

During these practices in spring and autumn 2012 and 2013 pupils from secondary and high schools completed the questionnaire “Diagnosis of PE lesson” at the end of a randomly selected PE lesson. Completing the questionnaire took 5 minutes and pupils apart from basic information stated their preferences of PE lesson by answering YES-NO simple question “Is Physical Education your favourite subject?”. The questionnaire then comprised of 24 questions (maximum is 24 points) that are divided into six dimensions (4 question forms each dimension, maximum is 4 points) and one additional dimension (8 selected questions, maximum is 8 points) (Frömel, et al., 2014). Positive answers are often expressed in percentage (or in mean values) and demonstrate the attitude of a pupil toward a finished PE lesson. Randomly selected 10 pupils in the lesson where student teachers applied the questionnaire obtained pedometer YAMAX SW700 to monitor their step counts during the whole lesson. In each practice batch there are between 40-60 PE student teachers so it means 400-600 person-data from the pedometers. Pupils had to reset pedometers and student teachers wrote down exact start time and stop time at the end. Participation in wearing pedometer and completing the questionnaire was voluntary.

Statistical analysis -The number of steps was recalculated to unit of measurement - per minute during basic statistical analysis. For comparative reason, pupils were divided according to gender, type of school (secondary and high schools) and their expressed popularity of PE lessons. Data set was checked for extreme values; we agreed to count a minimum of 10 steps/min and maximum 100 step/min, which equals to 450-4,500 steps/min. For analysis of the differences in number of steps per minute we used One-way ANOVA test and for analysis of points in the questionnaires we used Mann-Whitney U test. For comparison of uneven samples effect size coefficient d was also used (Cohen, 1988; Tolson, 1980).

Results

From four practices we obtained and analysed 1714 questionnaires and the same amount of data from pedometers. We analysed only data from those pupils who both monitored their steps and filled the questionnaire. Descriptive data of the sample are displayed in Table 1.

Table 1 Characteristics of data set according to practice

Variables	Values	2012				2013				Total
		spring		autumn		spring		autumn		
		N	%	N	%	N	%	N	%	
Gender	Male	272	47.4	316	63.3	173	55.8	162	48.9	923
	Female	302	52.6	183	36.7	137	44.2	169	51.1	791
School	Secondary school	273	47.6	215	43.1	141	45.5	175	52.9	804
	High school	301	52.4	284	56.9	169	54.5	156	47.1	910
Content	Track & Field	40	7.0	49	9.8	9	2.9	38	11.5	136
	Gymnastics	12	2.1	0	0	18	5.8	0	0	30
	Fitness	10	1.7	40	8.0	18	5.8	36	10.9	107
	Basketball	177	30.8	188	37.7	87	28.1	130	39.3	582
	Volleyball	144	25.1	51	10.2	20	6.5	36	10.9	251
	Soccer	49	8.5	68	13.6	39	12.6	30	9.1	186
	Other games	124	21.6	93	18.6	109	35.2	61	18.4	387
	Not analysed	18	3.1	10	2.0	10	3.2	0	0	38
TOTAL		574		499		310		331		1714

Table 2 describes the differences in group of boys and girls according to their liking PE as a school subject. Percentage representation of boys who like PE decreases with age, the difference of 10.9% is statistically significant ($p<0.01$). Boys from secondary schools who liked more PE manifested significantly more steps/min than those who do not like PE as a school subject ($d=0.33$ – small effect). Boys from high school who liked more PE manifested significantly more steps/min than those who do not like PE as a school subject ($d=0.23$ – small effect). Overall, boys who like PE manifested significantly more steps/min than those who do not like PE as a school subject ($d=0.25$ – small effect). Percentage representation of girls who like PE rapidly decreases with age, as the difference between primary and high school girls amounts to 18.1%, thus being statistically significant ($p<0.01$). Girls from secondary schools who liked PE performed almost equal number of steps as those who do not like PE. There is very small difference that is not significant on certain level in favour of girls liking PE ($d=0.12$ – no effect). High school girls preferring PE (35.2%) performed significantly more steps/minute than girls who do not like PE ($d=0.23$ – small effect). Girls who like PE manifested significantly more steps/min than those who do not like PE as a school subject ($d=0.22$ – small effect).

Table 2 Differences between number of steps per minute and attitude toward PE (in points) in boys according to popularity of PE

Gender	School	Popularity	N	%	Steps/min M±SD	F	Attitude M±SD	Z
BOYS	Secondary	Like PE	309	68.5	58±19	11.93**	16.1±3.9	4.01**
		Dislike PE	142	31.5	52±19		14.3±4.5	
	High	Like PE	272	57.6	61±18	5.95*	16.1±3.9	2.18*
		Dislike PE	200	42.4	57±17		15.2±4.4	
	Total	Like PE	581	62.9	60±18	14.43**	16.1±3.9	4.17**
		Dislike PE	342	37.1	55±18		14.8±4.5	
GIRLS	Secondary	Like PE	188	53.3	48±17	1.12	17.2±3.7	5.57**
		Dislike PE	165	46.7	46±16		14.9±4.2	
	High	Like PE	154	35.2	45±16	5.91*	16.8±3.7	3.65**
		Dislike PE	284	64.8	42±16		15.4±3.8	
	Total	Like PE	342	43.2	47±16	9.74**	17.0±3.7	6.7**
		Dislike PE	449	56.8	43±16		15.2±4.0	

Note: N – number of pupils; M – mean; SD – standard deviation; F – one-way ANOVA; Z – Mann-Whitney U test. Statistical significance: * $p<0.05$; ** $p<0.01$

Figure 1 shows the difference in steps per minute in boys and girls from secondary and high schools according to liking PE and also that high school boys performed more steps per minute in PE lessons than those in secondary schools. Secondary schools girls in PE lessons manifested more steps than those in high school PE lessons. This finding is in contrast to what we found out in boys.

Fig.1 Number of average steps/min in boys in PE lesson according to PE popularity

There were also statistically significant differences found in the total attitude toward PE lesson in boys ($d=0.27$ – small effect) and according to type of school (Table 2). In secondary schools, boys liking PE had significantly more positive attitude toward the lessons than those who do not like PE as a subject ($d=0.38$ – small effect); significant difference was also found in high school boys ($d=0.20$ – small effect) (Table 3). There are evident differences in all dimensions in favour of boys who like PE and on both school levels. The biggest difference was found out in attitudinal and emotional dimensions.

Table 3 Attitudes toward PE lesson in boys according to PE popularity within dimensions (in mean points)

Dimension	Secondary school boys				High school boys			
	Like PE N=309	Dislike PE N=142	Z	p	Like PE N=272	Dislike PE N=200	Z	p
Cognitive	2.38	2.15	1.61	0.11	2.44	2.29	1.20	0.23
Emotional	3.32	2.89	3.91	0.00	3.32	2.99	4.09	0.00
Health	2.67	2.46	1.87	0.06	2.59	2.43	1.73	0.08
Social	2.08	1.99	1.08	0.28	2.16	2.04	1.03	0.31
Attitudinal	3.04	2.46	4.74	0.00	3.03	2.72	2.56	0.01
Creativity	2.57	2.34	2.06	0.04	2.61	2.69	1.28	0.20
Pupil's role	4.66	4.33	2.02	0.04	4.82	4.47	2.17	0.03
Total	16.05	14.29	4.01	0.00	16.14	15.16	2.18	0.03

Note: N – number of pupils; Z – Mann-Whitney U test; p – level of statistical significance

Secondary school girls as well as high school girls who liked PE demonstrated significantly more positive attitude toward the lessons ($d=0.59$ – moderate effect; $d=0.35$ small effect, respectively). At secondary schools, girls manifested significant differences in all dimensions of the questionnaires. In high school girls there was no significant difference in emotional, health and social dimension but the most important difference was in attitudinal dimension (Table 4). It is similar to what we found out in boys. Those, regardless of type of school, who like PE manifested significantly more positive attitude toward PE lessons than those who dislike PE ($Z=6.7$; $d=0.48$ – small effect) (Table 4).

Table 4 Attitudes toward PE lesson in girls according to PE popularity within dimensions (in mean points)

Dimension	Secondary school girls				High school girls			
	Like PE N=188	Dislike PE N=165	Z	p	Like PE N=272	Dislike PE N=200	Z	p
Cognitive	2.53	2.15	3.42	0.01	2.47	2.14	3.18	0.00
Emotional	3.37	3.02	4.12	0.00	3.33	3.20	1.89	0.06
Health	2.70	2.38	2.65	0.01	2.70	2.52	1.32	0.19
Social	2.52	2.16	3.24	0.00	2.36	2.35	0.09	0.93
Attitudinal	3.31	2.78	3.96	0.00	3.25	2.70	4.66	0.00
Creativity	2.76	2.42	3.15	0.00	2.66	2.43	2.09	0.04
Pupil's role	5.06	4.32	4.50	0.00	4.90	4.50	3.65	0.00
Total	17.19	14.90	5.57	0.00	16.77	15.35	2.53	0.01

Note: N – number of pupils; Z – Mann-Whitney U test; p – level of statistical significance

Fig.2 Percentage of pupils who like PE according to school grade (HS-high school)

Figure 2 shows a decreasing trend in percentage popularity of PE as a subject in boys and girls. Moreover, a decrease in older primary school girls can also be observed. It can possibly be attributed to change in environment and conditions, or age. The decline continues in high school. In boys, PE remains a favourite subject for more than 50% pupils.

Discussion

This submission is unique due to its original idea. No researchers have yet investigated the correlation between popularity of PE as a subject and PE level expressed as the number of steps, not to mention the effect of

PE popularity on attitude towards a finished PE lesson. The present study examined whether popularity of physical education as a school subject is manifested in performed number of steps in PE lesson. At the same time, this study also addressed the differences on attitude toward PE lesson of the school students with regard to their gender, school level and liking PE. The popularity of school subjects is closely related to interest. The topic of school subject popularity is examined not only in pedagogical theory, but also for schools. Foster (1926) mentioned some factors that affect the popularity of school subjects which include for example increased number of pupils in class, which was common at that time, “practical” and “useful” subject matter, individual differences, society acceptance and influence (after the World War I), and freedom of subject choice according to their difficulty level. Many authors in the Czech Republic were recently focused on popularity of subjects, including Physical Education (Dopita & Grecmanová, 2008; Grecmanová & Dopita, 2011; Höfer, et al., 2005; Rendl & Škaloudová, 2004). In all mentioned submissions PE can be found in top spot. This occurs in primary as well as high schools. Höfer et al. (2005) focuses on content and difficulty of PE lessons, and finds that PE along with Arts and Music ranks as less difficult. This may be one of the main reasons for high popularity of Physical Education. Our paper shows a decrease in popularity of PE, yet we have no possibility to compare it with other school subjects. A decline in popularity, or more precisely increase in non-popularity may be happening, mostly in Natural sciences (Maths, Chemistry, Physics etc.), (Rendl & Škaloudová, 2004).

Analysed Physical Education lessons averaged 46.96 (± 17.45) min in duration with the minimum of 25 min and maximum of 100 min. Normal length of school hour determined by state is 45 minutes but sometimes there are two lessons taught in one block. Different duration is also done by time that was used either for transfer to sport infrastructure or instructional time before exact start of measurement. If we take into account that the pedometer classified steps as “aerobic” (≥ 60 steps/min), (Pillay, Kolbe-Alexander, van Mechelen, & Lambert, 2012) in our analysed sample physical activity of 44% of boys and only 19.3% of girls can be indicated as aerobic (in average) and the rest (56% of boys and 80.7% of girls) performed non-aerobic physical activity in PE lessons. If we compared our data with criteria for steps per minute to determine the percentage of PA in a PE lesson, as stated by Scruggs (2013), then 74.04% pupils do not reach 33% PA in a PE lesson (optimal cut point 63.5 steps/min). Only 25.96% of pupils reach this recommended level, and out of those only 5.95% reach the level of 50% PA in PE lesson (optimal cut point 82.9 steps/min). These criteria should be viewed as tentative as the content and focus of the lesson, PE student teacher personality and other factors.

The attitude of pupils of different age (Metsämuuronen, Svedlin, & Ilic, 2012) and schools (Subramaniam & Silverman, 2007; Zeng, Hipscher, & Leung, 2011) towards PE has been a subject of research from numerous perspectives in multiple countries (Pethkar, Naik, & Sonawane, 2012). Frequent perspectives include one of a teacher (Francis & Grindle, 1998; Tannehill, Romar, O'Sullivan, England, & Rosenberg, 1994), students' gender (Constantinou, Manson, & Silverman, 2009; Luke & Sinclair, 1991; Zaravigka & Pantazis, 2012), practising teachers' perspective (MacDonald, Stodel, & Farres, 2001) or a multicultural study (Tannehill & Zakrajsek, 1993). Student attitude toward PE and physical activity is often researched with qualitative and quantitative tools with various properties of reliability and validity (Silverman & Subramaniam, 1999). In our submission, we utilize statements of pupils recorded using a standardized questionnaire developed 20 years ago and since then widely used in PE research (Frömel, El Ansari, & Vašíčková, 2009; Frömel, Vasendova, & Krapkova, 2000; Frömel, Vasendova, Stratton, & Pangrazi, 2002; Frömel, et al., 2014; Chmelík, Frömel, & Svozil, 2007; Chmelík, Frömel, Svozil, & Maleňáková, 2007; Sigmund, Sigmundová, Frömel, & Vašíčková, 2010). Investigation using a standardized questionnaire brings important information not only to the researchers but also to the broader professional community (Frömel, Novosad, & Svozil, 1999). It offers the possibility to compare the relationship of pupils from different perspectives, but so far no researches paid attention to the popularity of PE related to the particular pupils' attitude toward a just realized teaching unit. Pupils who have more positive attitudes toward physical activity and like school subject of PE are reported to be more likely to participate in physical activity outside of school, sometimes are even members of a sports club (Larsson & Redelius, 2008), and demonstrate higher physical activity amounts than those with less positive attitudes (Portman, 2003; Zeng, et al., 2011). Our submission reveals that positive attitude towards a finished PE lesson is higher in boys and girls that perceive PE as popular subject.

In the study by Engström (2008), he found out in his follow-up study that both the breadth of sport exercise during leisure time and grades in physical education as indicators of sport habitus, had a significant association with later exercise habits (comparing one population of 15-year-old and the same 38 years later). Also very high cultural capital (defined by the social background and grades in theoretical school subject) had a significant impact on active exercising in middle-aged individuals. In Canada, Luke and Sinclair (1991) identified five main determinants of attitude toward school Physical Education that were same regardless of gender. These are: curriculum content, teacher behaviour, class atmosphere, student self-perceptions, and facilities. We did not analyse attitude toward PE according to content that could warrant further survey.

Conclusions

Popularity of PE is closely and positively associated with performed steps and the attitude toward PE lessons regardless of gender and type of school (school level). Even though PE is the most popular subject at schools, its popularity decreases with increasing age of pupils. The difference in popularity is significant in both genders, yet

in girls it is higher and alarming. Generally speaking, boys like PE more than girls (62.9% vs. 43.2%), and this difference is statistically significant. The average number of steps per minute during PE rises with age in boys, and decreases with age in girls. A difference in average number of steps according to popularity was found in all groups. It was not statistically significant only in primary school. Boys have demonstrated 6-16 steps/min more than girls, which is a difference 270-720 steps per PE lesson. Regarding attitude to PE lesson, more positive attitude was found in all groups of girls.

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