Croatian Journal of Education
Vol: 14 (4/2012), pages: 855-880
Original scientific paper
Paper submitted: 1st February 2012
Paper accepted: 14th February 2012

Secondary School Students and their Knowledge about Health-related Physical Fitness and Sport

Marjeta Kovač, Bojan Leskošek and Gregor Jurak
Faculty of Sport, University of Ljubljana

Abstract

This study evaluated physical education knowledge according to gender, secondary school programme, year of study and type of knowledge. The results of multivariate analysis of variance show that the programme of study had the highest impact (20.2% of the variance) on both dependent variables (conceptual and specific knowledge), the impact of gender was about half as high (11.7% of the variance), whereas the impact of the year of study was much lower (3.5% of the variance). The students from grammar school programmes had more knowledge than students from the other two secondary school programmes. Males scored higher than females, especially on specific knowledge. In technical and vocational programmes, there is no impact of the year of study on the knowledge exhibited by female students. As a result, physical education teachers should have more knowledge and skills in order to educate students about health-related physical fitness. They will need to acquire special didactic competences, particularly when teaching girls in technical and vocational secondary schools.

Key words: *gender; physical education knowledge; secondary school*

Introduction

The important goal of the physical education [PE] curriculum is to provide students with the knowledge, attitudes and skills that will allow them to develop habits of engaging into healthy activities and to motivate them to continue appropriate activities in pursuit of physical fitness throughout their lives (Hardman, 2008; Himberg, Hutchinson, & Roussell, 2003; Mohnsen, 2003). In order to accomplish this goal, the cognitive, affective and motor domains of learning must be addressed (Himberg et al., 2003).

Many authors think that the cognitive domain has long been emphasised as a critical component of PE (Ayers, 2004; Mohnsen, 2003; Solmon, 2006). Learning in PE lessons is not limited to motor-skill acquisition and improved motor performance. Rather, it should facilitate the acquisition of knowledge, skill comprehension or mastery through study or experience, with the purpose of becoming a physically educated person (Biddle & Chatzisarantis, 1999; Dexter, 1999; Hardman, 2008; Mohnsen, 2003). The importance of this knowledge lies in the potential relationship between knowing and doing; this interactive relationship supports conceptual fitness learning and lifetime physical activity (Dale & Corbin, 2000; Dale, Corbin, & Cuddihy, 1998; Murray, Suprapiboonchai, Wilson, Rodriguez, & Eldridge, 2008; Placek et al., 2001).

For this paper, PE knowledge is defined as being both conceptual and specific. Conceptual knowledge is represented with both particular general and crucial information, which students can structure later with the help of their own experience in a manner to be used in different ways and in various specific situations, connected to health-related physical fitness, type of physical activity and how to become fit. Specific knowledge, related to the characteristics of sports included in the PE curriculum, is represented by the technique, safety in practising sports and tactical principles in sport games.

Understanding what and how to do by the appropriate use of principles, how these principles interact with physical activity choices, and how to develop an individual fitness programme based on these principles has an important effect on improving the physical fitness of young people (Dexter, 1999; Solmon & Lee, 1997). Simultaneously, it also facilitates the free-time physical activity of an individual (Dale et al., 1998; Ferguson, Yesalis, Pomrehn, & Kirkpatrick, 1989; Jurak, 2006; Murray et al., 2008).

Despite the large amount of information about the levels of knowledge in various academic subjects (Tinklin, 2003), data about the PE knowledge of boys and girls is limited. Various national documents, e.g. The National Physical Education Standards in USA (Himberg et al., 2003; Hardman, 2008; Mohnsen, 2003), define the amount and type of knowledge of PE that every student should acquire or be capable of understanding and using.

Dexter (1999) supported theories of the role of sport knowledge in sport performance in his study on the relationships between sport knowledge, sport performance and academic ability. He found that an average sport performance, academic ability and gender were important explanatory variables for sport knowledge, yet only academic ability was an important explanatory variable for the concept of PE knowledge. Males scored higher on sport knowledge than females, after taking into account sport performance and academic ability.

Vašíčková, Neuls and Frömel (2010) found that the PE knowledge of Czech secondary school students differs according to the type of school (grammar school students scored better than vocational students) and classes (students from higher classes scored better than the first year students). Gender differences were not found to be statistically significant.

At the end of compulsory primary school education Slovenian students possess more specific PE knowledge related to the characteristics of sports and less conceptual PE knowledge about health-related physical fitness and its benefits associated with a physically active lifestyle. Analyses of individual tasks included in the external assessment reveal that students have problems identifying and defining components of fitness and the purpose of specific exercises. Girls acquired higher levels of knowledge in tasks of conceptual knowledge, while the boys did so in tasks of specific knowledge (National Examination Centre of Slovenia, 2009). Furthermore, other researchers have shown that young people have many misconceptions about physical activity and fitness concepts (e.g., Hopple & Graham, 1995; Placek et al., 2001; Vašíčková et al., 2010).

The main purpose of the study was to analyse the differences between the PE knowledge of secondary school students according to gender, secondary school programme, year of study and the type of knowledge (conceptual, specific).

Methods

Respondents

The respondent sample included 771 students from 11 secondary schools. Schools which were chosen were from three Slovenian cities: the capital and two smaller towns. The schools had adequate and comparable material conditions. The number of respondents from particular secondary school programmes was selected in proportion to the number of enrolled students on a national level basis. Students of the first (15-year-olds) and third (17- year-olds) years of three different types of educational programmes (grammar school, professional/technical and vocational school) were assessed in September 2004 at the beginning of the school year. A detailed structure of the sample is shown in Table 1. Written consent was obtained from parents or guardians for the participation of students in the research.

Table 1. *Structure of the sample by gender and educational programme.*

Gender	Programme	Year of study		
		1st	3rd	Total
Male	Grammar school	80	71	151
	Technical	122	103	225
	Vocational	22	26	48
	Total	224	200	424
Female	Grammar school	86	68	154
	Technical	77	76	153
	Vocational	25	15	40
	Total	188	159	347

Measurements

The sample of measured variables included the data on the type of secondary school programme, gender, year of study and the PE knowledge, which was tested by the use of a questionnaire. All students answered identical questionnaires in study rooms; the time available was 30 minutes.

The questionnaire consisted of 30 tasks designed by the experts of the National Examination Centre of Slovenia to evaluate the knowledge of various areas from the PE curriculum at the end of compulsory primary school education. The majority of tasks were in multiple-choice form (choosing the correct answer among four possible options), while only two tasks required a short written answer. In three questions, it was found that the possibility of students answering them correctly did not increase with their knowledge; therefore, they were later excluded. Fourteen tasks were used to assess conceptual PE knowledge (the understanding of the importance of an active lifestyle and health-related physical fitness; the understanding of basic principles of fitness, such as frequency, intensity, time and type; the effects of various types of exercise on balanced physical development, motor efficiency, correct body posture and well-being; how to monitor physical fitness), while 13 were used to assess specific knowledge about different sports included in the PE curriculum.

Statistics

Measurement characteristics of the tasks and the assessment of the students' knowledge were evaluated independently for conceptual and specific PE knowledge in accordance with the item response theory (Embertson & Reise, 2000). Prior to selecting the most suitable model, all three classic methods used for dichotomous data (1-PL, 2-PL in 3-PL) were tested. On the basis of Bayes' and Akaike's information criterion and the degree of conformity of data to model, a two-parameter logistic model (2-PL) was selected, which models the possibility of subject *s* to answer correctly item *i* depending on the degree of difficulty of the task (α_i), the discrimination of the task (β_i) and the level of knowledge of an individual (θ_s) as:

$$P(X_{is}=1|\theta_s, \beta_i, \alpha_i)= \frac{\exp[\alpha_i(\theta_s - \beta_i]}{1+ \exp[\alpha_i(\theta_s - \beta_i]}$$

In accordance with the stated model, the knowledge of an individual was assessed using the JML method (Joint Maximum Likelihood). All the calculations related to the item response theory were carried out in the R software environment (R Development Core Team, 2008) with the use of an Ltm library (Rizopoulos, 2006).

Further data analysis was carried out with the SPSS 15.0 statistical package. Basic parameters of the distribution of variables (mean, standard deviation) were calculated. Multivariate analysis of variance (MANOVA) was used to test the differences between the programme, gender and the year of study (1st vs 3rd year) of the students. In order to test the significance of the entire model, Wilks' Lambda was used. The amount of explained variance for the entire system of dependent variables was estimated with a η^2 separately for all main effects (programme, gender, year of study) and all their 2- and 3-way interactions. Univariate tests were also carried out for each dependent variable individually. Simultaneously, F-tests for the entire model and for all main effects and their interactions were used. The amount of explained variance was estimated with a partial η^2 for multivariate ANOVA model and with ω^2 for univariate ANOVA models.

Results

All the classic item response theory [IRT] models for dichotomous data (i.e., 1-PL, 2-PL and 3-PL) models were examined. In the end, the 2-PL model was selected, as it has relatively low information criteria (Akaike's Information Criterion AIC=10862, Bayesian Information Criterion BIC=10983), its model fit was statistically significantly better than with the Rasch (1-PL) model, and not significantly worse than with the 3-PL model; the latter also proved to be unstable.

Table 2. *Basic item parameters.*

Item	% missing	% correct	R_{PB}	β	SE_{β}	α	SE_{α}
1	1.0%	68.9%	0.39	-1.09	0.17	0.84	0.14
2	4.2%	62.7%	0.52	-0.58	0.11	1.08	0.16
3	1.2%	47.4%	0.46	0.15	0.10	0.81	0.13
4	0.9%	58.2%	0.39	-0.62	0.17	0.58	0.12
5	11.7%	86.3%	0.28	-3.22	0.78	0.61	0.16
6	13.9%	54.7%	0.48	-0.19	0.11	0.89	0.15
7	1.9%	88.2%	0.30	-2.36	0.37	1.00	0.20
8	4.7%	60.1%	0.44	-0.51	0.11	0.94	0.15
9	3.6%	45.6%	0.40	0.33	0.15	0.56	0.11
11	2.1%	77.5%	0.41	-1.37	0.18	1.11	0.18
12	3.2%	30.6%	0.39	2.27	0.69	0.37	0.11
13	2.3%	72.1%	0.36	-1.83	0.39	0.55	0.12
14	25.0%	85.3%	0.26	-2.45	0.53	0.77	0.19
15	3.0%	66.3%	0.40	-1.28	0.27	0.56	0.12
17	6.6%	47.8%	0.51	0.14	0.10	0.85	0.14
18	1.0%	25.3%	0.34	2.13	0.47	0.54	0.12
19	40.6%	53.5%	0.58	0.00	0.07	2.04	0.41
20	0.4%	57.3%	0.33	-0.87	0.33	0.35	0.10
21	2.6%	51.5%	0.39	-0.09	0.11	0.73	0.12
22	0.4%	44.1%	0.42	0.41	0.14	0.62	0.12
23	2.7%	64.4%	0.33	-2.15	0.82	0.28	0.10
24	1.6%	81.3%	0.38	-1.90	0.28	0.89	0.16
25	11.4%	44.4%	0.36	0.79	0.36	0.30	0.11
26	0.0%	92.5%	0.36	-2.15	0.24	1.60	0.29
27	0.6%	65.9%	0.43	-0.84	0.14	0.93	0.14
28	4.3%	56.8%	0.43	-0.44	0.14	0.65	0.12
30	1.8%	83.8%	0.38	-1.91	0.26	1.02	0.17

Legend: % missing – percentage of missing values, % correct – percentage of correct answers, R_{PB} – point-biserial correlation with the total score, β – difficulty parameter, SE_{β} – standard error of β, α – discrimination parameter, SE_{α} – standard error of α; items 10, 16 and 29 were excluded.

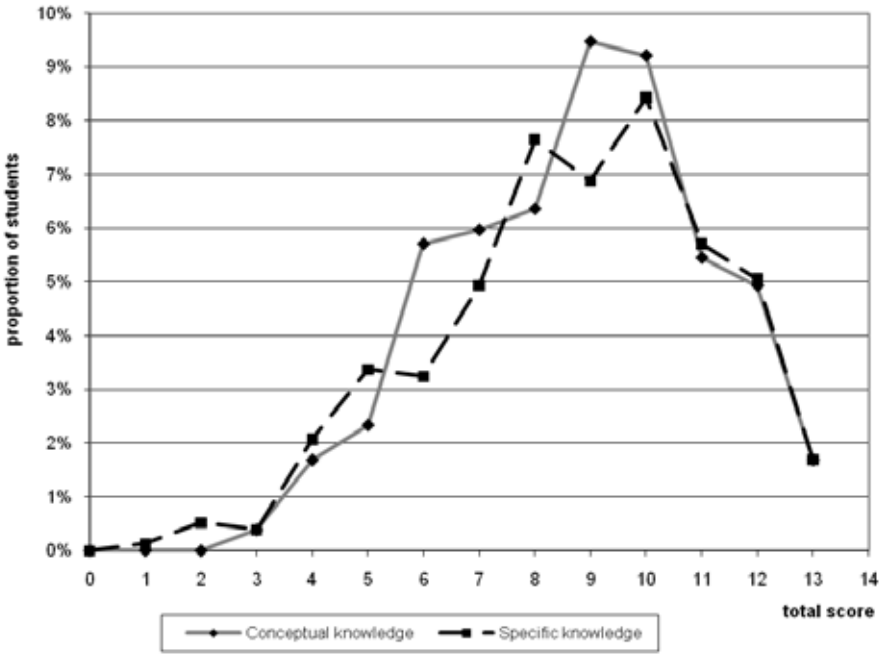

Figure 1. *Distribution of total score for conceptual and specific knowledge.*

Basic item parameters (Table 2, Figure 1) show that most of the tasks were relatively easy, i.e. with negative difficulty parameter (β), amounting to more than half of the correct answers in the sample. The highest proportion of missing values were with Tasks 15 and 19, which were the only open-ended (sentence completion) questions in the questionnaire.

Sample distribution of both sub-scales (Table 3) reveals significant differences between the types of programmes.

Table 3. *Basic distribution parameters of the subscales.*

Knowledge subscale	Gender	Year of study	Programme	Mean	SD	n
Conceptual	Male	1st	Grammar school	0.27	0.64	80
			Technical	-0.30	0.62	122
			Vocational	-0.66	0.71	22
		3rd	Grammar school	0.67	0.50	71
			Technical	0.02	0.65	103
			Vocational	-0.13	0.61	26
	Female	1st	Grammar school	0.20	0.60	86
			Technical	-0.30	0.60	77
			Vocational	-0.94	0.49	25
		3rd	Grammar school	0.46	0.57	68
			Technical	-0.42	0.71	76
			Vocational	-0.79	0.77	15

Specific	Male	1st	Grammar school	0.43	0.43	80
			Technical	-0.08	0.62	122
			Vocational	-0.58	0.71	22
		3rd	Grammar school	0.78	0.45	71
			Technical	0.11	0.65	103
			Vocational	-0.22	0.63	26
	Female	1st	Grammar school	0.01	0.60	86
			Technical	-0.55	0.52	77
			Vocational	-0.99	0.67	25
		3rd	Grammar school	0.34	0.62	68
			Technical	-0.53	0.65	76
			Vocational	-0.98	0.73	15

Girls and boys in grammar schools show significantly higher conceptual and specific PE knowledge both at the start of and after two years of secondary school education, compared to other students, who attend the other two types of education programmes. The worst results were achieved by boys and girls from vocational schools. According to gender, the PE knowledge of boys in secondary school is higher in comparison with girls, particularly the specific knowledge related to different sports.

In multivariate variance analysis (Table 4), all three main effects (programme, gender and year of study) revealed significant ($p<0.001$) simultaneous effects on both dependent variables (conceptual and specific knowledge).

Table 4. *Multivariate test (Wilks' λ) and explained variance for the model effects.*

Effect	λ	F	p	Partial η^2
Programme	0.638	95.64	<0.001	0.202
Gender	0.883	50.43	<0.001	0.117
Year of study	0.965	13.64	<0.001	0.035
Programme*gender	0.992	1.52	0.194	0.004
Programme*year of study	0.986	2.61	0.034	0.007
Gender*year of study	0.989	4.32	0.014	0.011
Programme*gender*year of study	0.996	0.81	0.516	0.002

The highest effect (20.2% of the variance) was explained by the programme of study. The influence of gender was about half as high, whereas influence of the year of study was much lower. All 2- and 3-way interaction effects were small, with only two (programme*year of study, gender*year of study) being significant at a 5% level.

Univariate ANOVA (Table 5) revealed that all three main effects and their interactions account for approximately a third of the total variance of dependent variable when measured with an unbiased estimate (ω^2). The proportion of explained variance was somewhat greater in specific than in conceptual knowledge. Most of those proportions are attributable to the programme of study; all other effects except the effect of gender on specific knowledge are small or even negligible. All interaction effects (Figure 2) account for below 1% of total variance.

Table 5. *Univariate F-test significances and proportions of explained variance for the full model and model effects*

Source of variation	Dependent variable	Mean Square	F	p	ω^2
Full model	score1 (conceptual)	11.60	30.39	<0.001	0.295
	score2 (specific)	14.51	41.30	<0.001	0.365
Programme	score1 (conceptual)	52.05	136.34	<0.001	0.260
	score2 (specific)	54.72	155.74	<0.001	0.286
Gender	score1 (conceptual)	9.59	25.12	<0.001	0.030
	score2 (specific)	34.61	98.51	<0.001	0.112
Year of study	score1 (conceptual)	8.12	21.27	<0.001	0.026
	score2 (specific)	5.46	15.54	<0.001	0.019
Programme*gender	score1 (conceptual)	0.89	2.33	0.098	0.003
	score2 (specific)	0.41	1.16	0.314	0.000
Programme*year of study	score1 (conceptual)	1.27	3.32	0.037	0.006
	score2 (specific)	1.18	3.37	0.035	0.006
Gender*year of study	score1 (conceptual)	3.12	8.17	0.004	0.009
	score2 (specific)	0.98	2.80	0.095	0.002
Programme*gender*year of study	score1 (conceptual)	0.44	1.15	0.318	0.000
	score2 (specific)	0.29	0.84	0.433	0.000

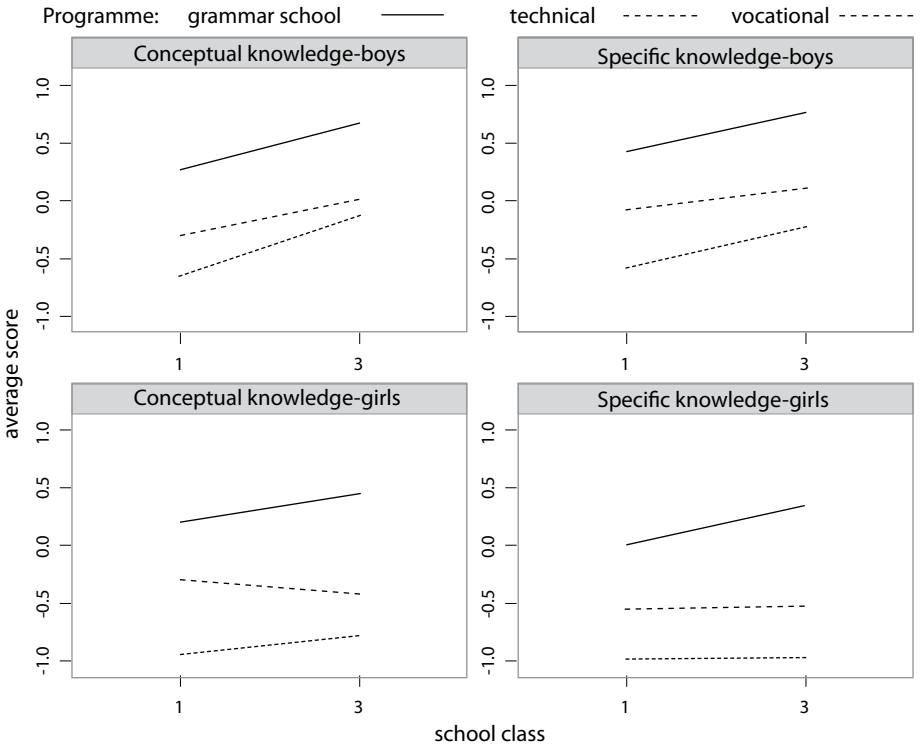

Figure 2. *Interaction plots of knowledge scores by type of knowledge, gender, school class and school programme*

Discussion

Secondary school education in Slovenia includes the population between the age range 15 and 18. In this period, young people attain general education in grammar schools or prepare for work in technical/professional and vocational schools. Students attending grammar schools and technical/professional schools (both programmes last four years) had three PE lessons per week, amounting to 105 lessons throughout the school year. Students attending vocational schools (lasting three years) had two PE lessons per week (70 lessons in the entire school year). A school lesson lasts for 45 minutes.

The PE curriculum for individual secondary school programmes was designed in the same goal-oriented manner, with teachers conveying similar PE knowledge. The selection of sports that PE teachers include in the lessons is also similar (Kovač & Novak, 2001). Secondary school PE teachers had comparable competences, as they had all been educated at the same faculty. Students in PE lessons were separated into groups according to their gender; girls were taught by female teachers and boys by male teachers. In grammar and vocational schools, an average class consisted of up to 20 students, whereas the number of students in technical programmes was approximately 30.

It is acknowledged that students attending different secondary school programmes differ in their physical fitness and physical activity levels (Jurak, 2006; Leskošek, Kovač, & Strel, 2007; Westerståhl, Barnekow-Bergkvist, & Jansson, 2005), academic achievements (Flere, Tavčar Krajnc, Klanjšek, Musil, & Kirbiš, 2010; Selcuk, 2005; Westerståhl et al., 2005), perceived health level (Westerståhl et al., 2005), socio-economic factors of their environment and particularly in the education level and support of their parents (Flere & Lavrič, 2005; Flere et al., 2010; Jurak, 2006; La Torre et al., 2006; Powers, 2003; Selcuk, 2005; Westerståhl et al., 2005).

Consequently, the largest differences in knowledge were to be expected as a result of the type of programme (20% of the variance; see Table 4), with students of both genders in the grammar school programmes showing the best knowledge in both the first and third years of study. The same results were found by Vašíčková et al. (2010) among Czech secondary school students. Differences in the results of the first year students of both genders, attending different secondary school programmes, could be attributed to the fact that students enter secondary school according to their primary school final results. The best primary school students enter grammar school programmes, whereas the least successful primary school students enter vocational programmes (Flere & Lavrič, 2005). Flere et al. (2010) reported that students from grammar school programmes in general have more knowledge in all subjects and they also have different studying habits. They come from more favourable socio-economic environment (Flere et al., 2010; Vašíčková et al., 2010; Westerståhl et al., 2005). They are also more fit (Leskošek et al., 2007; Westerståhl et al., 2005) and participate in sport more often in their free time (Jurak, Kovač & Strel, 2002; Westerståhl et al., 2005). Consequently, it is understandable that they show significantly higher conceptual

and specific knowledge, both at the start of and after two years of secondary school education, in comparison with other students who attend the other two types of education programmes. These findings support the results of Dexter's study (1999) in which he claims that academic ability is important for obtaining PE knowledge.

Although the students attending technical/professional secondary school programmes have a similar PE curriculum (Kovač & Novak, 2001) and the same amount of PE lessons as students in grammar school, and despite the fact that students from both programmes have to complete four years of education and graduate at final exams, significant differences can be noticed between the students in these two programmes, both at the start of the secondary school education and after two years of studying.

Significantly lower level of knowledge than shown by students from grammar schools and technical/professional schools was shown by vocational school students at the beginning of and after the first two years of secondary education. The least successful primary school students enter vocational programmes in which they receive one-third fewer PE lessons. Students from socially deprived environment usually enrol in vocational schools. They are mostly non-motivated for education and have low levels of self-respect (Flere et al., 2010; Westerståhl et al., 2005). They are also less fit, and among this group many health risk factors are considered (Leskošek et al., 2007; Westerståhl et al., 2005). Jurak (2006) found that their lifestyle was characterised by sporadic sports activity (only a few times a year, besides PE lessons), regular smoking and coffee drinking, irregular eating habits, frequent use of alcohol and staying out late at night. These students more frequently take medications against general sickness, stomach cramps and other types of pain.

The knowledge of students in technical programmes, examined in the present research, is closer to their peers in vocational schools; a similar phenomenon has also been noticed in other academic subjects (Flere et al., 2010). It is possible to conclude that the reasons can be found in larger and less homogenous groups in technical schools, as well as in the adjustment of lessons in vocational schools to the characteristics of the class.

In this study the impact of gender on PE knowledge was statistically significant, but low (around 12% of the variance; see Table 4), especially on conceptual knowledge. Contrary to the findings of Keating et al. (2009) and Vašíčková et al. (2010), but similar to those of Dexter (1999), Lynn, Irwing & Cammock (2001) and Slovenian primary schools students (National Examinations Centre, 2009), the PE knowledge of boys in secondary school is higher in comparison with the PE knowledge of girls, particularly in the specific knowledge related to different sports. Studies have shown that boys are more motivated for sport and participate in extra-curricular sports activities more often than girls (Dexter, 1999; Jurak, 2006; Riddoch et al., 2004; Silva et al., 2010), miss PE lessons less often than girls (Jurak & Kovač, 2011), watch sport events on a more regular basis (Jurak et al., 2002) and engage in competitions where particularly specific knowledge about sport is acquired (Dexter, 1999; Jurak, 2006; Silva et al., 2010). Unlike

boys, girls are more task-oriented, indicating that they are motivated by learning new skills and the understanding of the learning processes (Ames & Archer, 1988; Silva et al., 2010; Sirard, Pfeiffer, & Pate, 2006).

Measurements were carried out at the beginning of the school year; thus, for the first-year students the knowledge tested was actually the knowledge carried over from primary school. Both groups of students (1st and 3rd year of study) completed the same questionnaires; it was expected that the third-year students would show greater knowledge due to having studied longer and consequently having greater understanding not only of the PE, but also of other PE-related subjects (e.g. biology, physics and chemistry). Nevertheless, it is surprising to observe that the year of study had the lowest impact on students' knowledge (3.5% of the variance; see Table 4). Despite the fewer number of PE lessons in vocational schools in Slovenia (70 per year), the differences between the students in grammar school programmes and students in vocational school programmes did not increase (apart from the specific knowledge of the girls), but have remained at the approximately same level. In contrast, the differences between the students in grammar school programmes and students in technical school programmes have increased, but the differences between vocational and technical secondary school students have decreased.

It is troubling though to find that the conceptual PE knowledge of girls from technical schools was lower in the third year, compared to the first year students. Therefore, it can be concluded that the teachers in technical schools do not pay sufficient attention to contents related to a healthy lifestyle and the effects of suitable exercise onto the body. The low level of the concepts of health-related fitness and a lack of knowledge, or at best an incomplete understanding was reported also by Placek et al. (2001) with 6th year primary school students. In addition, the large class sizes of PE lessons in technical schools (up to 32) cause dissatisfaction during exercising as well as reduced ability. The feeling of lesser ability also causes a lowered degree of motivation in girls when exercising (Biddle & Chatzisarantis, 1999).

We also found that there is no impact of the year of study on girls' specific PE knowledge in technical and vocational programmes. Girls in vocational secondary school programmes are also the least physically active (Jurak et al., 2002; Westerståhl et al., 2005). It is important that both types of knowledge (conceptual and specific) are related and interconnected, so that students can use their acquired knowledge (e.g. when, how and in what way to exercise) in certain processes or routines during their participation in physical activity and sport; i.e. better knowledge assures higher motivation of young people for particular activities (Biddle & Chatzisarantis, 1999; Dale & Corbin, 2000; Ferguson et al., 1989).

Conclusion

The important goal of a PE curriculum is to provide students with the knowledge, attitudes and skills that will allow them to develop habits of engaging into healthy

activities and to motivate them to continue appropriate activities in pursuit of physical fitness throughout their lives. Because cognitive knowledge about PE influences the future participation of young people in sport (Ferguson et al., 1989; Placek et al., 2001) as well as facilitating safer and (for the individual) better adapted exercising (Himberg et al., 2003), PE teachers will have to pay more attention to the level of the PE knowledge that students possess, particularly when teaching in technical and vocational programmes. Higher levels of knowledge can be a good foundation for changes in their behaviour, which will make the students more active (Solmon & Lee, 1997; Murray et al., 2008).

The school system should neutralise some of the social inequalities among young people. For many students in vocational schools physical education represents their only physical activity (Jurak et al., 2002). Therefore, educational authorities should consider increasing PE lessons in vocational secondary school programmes due to their social deprivation, low level of physical fitness and low level of their knowledge.

The findings of Silva et al. (2010) show that Portuguese secondary school female students have lower overall participation in sports than boys, but higher participation than boys in the school sports context. This indicates that school sports make a strong contribution to girls' activity levels. We suggest that special attention should be given to the contribution of extra-curricular school sport programmes for girls.

Learning is cumulative in nature (Shuell, 1986), so teachers have to be aware of students' level of prior knowledge as new learning is being "built" upon the current knowledge base. The prior knowledge helps the student to attend effectively to the environment, encode the key aspects of experience, and store information in an interconnected manner that can be accessed in different ways via multiple cues (Baker-Ward, Ornstein, & Principe, 1997). It is essential that PE teachers examine what students know and understand related to the concepts of physical activity and the contributions of different sports, so that they can build on their current understanding. This understanding can help teachers increase opportunities for students' learning and eventually help to seamlessly blend the cognitive, affective and psychomotor aspects of PE. In this sense, we suggest that specific tests for each secondary school programme be prepared.

The process of developing physically educated individuals includes addressing cognitive development. Since knowledge in the cognitive domain is critical in student performance, teachers need the skills that develop such knowledge in students (Ayers, 2004). PE teachers should have more knowledge and skills to educate students about healthy lifestyle and exhibit different didactic competences in order to make lessons more efficient and adapted to the characteristics of different groups of secondary school students. As we know that Slovenian PE teachers working in secondary school programmes have fewer competences for using modern didactic approaches than teachers from primary schools (Kovač, Sloan, & Starc, 2008) and the PE teacher trainees (Kovač, Starc, Strel, & Jurak, 2005), the authorities should prepare additional in-service teacher training for them.

The lower level of knowledge of girls in technical and vocational schools is particularly noticeable, so it is also important that girls who are less active, particularly those from technical and vocational programmes (Jurak et al., 2002; Westerståhl et al., 2005), acquire more PE knowledge. As a result, teachers should convey knowledge to the girls in an interesting way (e.g. project work, portfolio) and the lessons should be organised in smaller groups, so that the motivational behaviour is also determined with classroom-contextual factors (Lazar & Kulinna, 2002).

These research results can provide some information for understanding the differences in PE knowledge according to different groups of secondary school students. When teaching, PE teachers can work to change some cognitive insights and affect the behaviour of their students. In the future research, teacher behaviour, didactic approaches, curricula, and facilities/equipment needs might be examined in relation to PE knowledge by gender and by secondary school programmes.

Acknowledgements

The data were drawn from the study "Analysis of some correlation between physical fitness and other dimensions of psychosomatic status of Slovenian children and youth aged between 6 and 19 in the period of 1970-1983-1993/1994-2003/2004" (No. L5-6448-C). The study is supported by the Ministry of Education and Sport of Slovenia.

References

Ames, C. & Archer, J. (1988). Achievement goals in the year of study room: Students' learning strategies and motivational processes. *Journal of Educational Psychology, 80*(3), 260–267.

Ayers, S.F. (2004). High School Students' Physical Education Conceptual Knowledge. *Research Quarterly for Exercise and Sport, 75*(3), 272–287.

Baker-Ward, L., Ornstein, P.A., & Principe, G.F. (1997). Revealing the representation: Evidence from children's reports of events. In P. van den Broek, P. Bauer & T. Bourg (Eds.), *Developmental Spans in Event Comprehension and Representation: Bridging fictional and actual events* (pp. 79–107). Mahwah, NJ: Erlbaum.

Biddle, S. & Chatzisarantis, I. (1999). Motivation for a physically active lifestyle through physical education. In Y.V. Auweele, F. Bakker, S. Biddle, M. Durand & R. Seiler (Eds.), *Psychology for Physical Educators* (pp. 5–26). Champaign, IL: Human Kinetics.

Dale, D. & Corbin, C.B. (2000). Physical activity participation of high school graduates following exposure to conceptual or traditional physical education. *Research Quarterly for Exercise and Sport, 71*(1), 61–68.

Dale, D., Corbin, C.B., & Cuddihy, T.F. (1998). Can conceptual physical education promote physically active lifestyles? *Paediatric Exercise Science, 10*, 97–109.

Dexter, T. (1999). Relationships between sport knowledge, sport performance and academic ability: Empirical evidence from GCSE Physical Education. *Journal of Sports Sciences, 17*(4), 283–295.

Embertson, S.E. & Reise, S.P. (2000). *Item Response Theory for Psychologists.* London: Lawrence Erlbaum Associates.

Ferguson, K.J., Yesalis, C.E., Pomrehn, P.R., & Kirkpatrick, M.B. (1989). Attitudes, knowledge, and beliefs as predictors of exercise intent and behavior in schoolchildren. *Journal of School Health, 59*(3), 112–115.

Flere, S. & Lavrič, M. (2005). Social inequality and educational expansion in Slovenia. *Educational Studies, 31*(4), 449–464.

Flere, S., Tavčar Krajnc, M., Klanjšek, R., Musil, B., & Kirbiš, A. (2010). Cultural capital and intellectual ability as predictors of scholastic achievement: a study of Slovenian secondary school students. *British Journal of Sociology of Education, 31*(1), 47–58.

Hardman, K. (2008). Physical education in schools: a global perspective. *Kinesiology, 40*(1), 5–28.

Himberg, C., Hutchinson, E.G., & Roussell, J.M. (2003). *Teaching Secondary Physical Education.* Champaign, IL: Human Kinetics.

Hopple, C. & Graham, G. (1995). What children think, feel, and know about physical fitness testing. *Journal of Teaching in Physical Education, 14,* 408–417.

Jurak, G. (2006). Sports vs. the "cigarettes & coffee" lifestyle of Slovenian high school students. *Anthropological Notebooks, 12*(2), 79–95.

Jurak, G., Kovač, M., & Strel, J. (2002). Differences in spending summer holidays of Slovenian children and youth in different periods of schooling. *International Journal of Physical Education, 39*(2), 34–43.

Jurak, G. & Kovač, M. (2011). Vpliv šolanja v gimnazijskih športnih oddelkih na pogostost in na značilnosti opravičevanja pri športni vzgoji.Frequency and characteristics of excuses given by students attending special sports classes of secondary school to avoid participating in physical education class. *Zdravstveno varstvo*, *50*(2), 95–105.

Keating, X.D., Chen, L., Guan, J., Harrison, L., & Dauenhauer B. (2009). Urban Minority Ninth-grade students' health-related fitness knowledge. *Research Quarterly for Exercise and Sport, 80*(40), 747–755.

Kovač, M, & Novak D. (2001). *Srednješolsko izobraževanje – kurikuli za različne srednješolske programe – športna vzgoja [Secondary school education – curricula for different secondary school programmes – physical education].* Ljubljana: Ministrstvo za šolstvo in šport.

Kovač, M, Sloan, S., & Starc, G. (2008). Competencies in physical education teaching: Slovenian teachers' view and future perspectives. *European Physical Education Review, 14*(3), 299–323.

Kovač, M., Starc, G., Strel, J., & Jurak, G. (2005). Kompetence učiteljev športne vzgoje in študentov Fakultete za šport [Competences of the physical education teachers and of the students at the Faculty of Sport]. *Šport, 53*(3), 2–7.

La Torre, G., Masala, D., De Vito, E., Langiano, E., Capelli, G., Ricciardi, W., & PHASES collaborative group (2006). Extra-curricular physical activity and socioeconomic status in Italian adolescents. *BMC Public Health /on line/.* Retrieved on 21 October 2007 from: www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1431521

Lazar, R.E. & Kulinna, H.P. (2002). Experiences with health-related fitness portfolios in physical education. *Physical Education & Sport Pedagogy, 7*(1), 63–78.

Leskošek, B., Kovač, M., & Strel, J. (2007). A comparison of the physical characteristics and motor abilities of boys and girls attending different high school programmes. *Acta Universitatis Carolinae Kinanthropologica, 42*(2), 85–101.

Lynn, R., Irwing, P., & Cammock, T. (2001). Sex differences in general knowledge. *Intelligence, 30*(1), 27–39.

Mohnsen, B. (2003). *Concepts of physical education: What every student needs to know.* 2nd ed. Reston: NASPE.

Murray, T.D., Suprapiboonchai, K., Wilson, J., Rodriguez, R., & Eldridge, J. (2008). Modifying student knowledge about moderate to vigorous physical activity (MVPA) in high school physical education. *Medicine & Science in Sports & Exercise, 40*(5), 410–411.

Placek, J.H., Griffin, L.L., Dodds, P., Raymond, C., Tremino, F., & James, A. (2001). Middle school students' conceptions of fitness: The long road to a healthy lifestyle. *Journal of Teaching in Physical Education, 20*(4), 314–323.

Powers, J.M. (2003). An analysis of performance-based accountability: factors shaping school performance in two urban school districts. *Educational Policy, 17*(5), 558–585.

R Development Core Team (2009). *R: A Language and Environment for Statistical Computing (R Foundation for Statistical Computing).* Retrieved on 10 January 2009 from: www.R-project.org.

National Examinations Centre (2009). National Knowledge Assessment /on line/.

Retrieved on 10 April 2009 from: http://www.ric.si/mma_bin.php/$fileI/2008011610154336/$fileN/Letno%20porocilo%20npz2007.pdf

Riddoch, C.J., Andersen, L.B., Wedderkopp, N., Harro, M., Klasson-HeggebØ, L., Sardinha, L.B. et al. (2004). Physical activity levels and patterns of 9- and 15-yr-old European children. *Medicine & Science in Sports & Exercises, 36*(1), 86–92.

Rizopoulos, D. (2006). Ltm: An R Package for Latent Variable Modelling and Item Response Theory Analyses. *Journal of Statistical Software, 17*(5), 1–25.

Selcuk, R.S. (2005). Socioeconomic Status and Academic Achievement: A Meta-Analytic Review of Research. *Review of Educational Research, 75*(3), 417–453.

Shuell, T.J. (1986) Cognitive conceptions of learning. *Review of Educational Research, 56*(4), 411–436.

Silva, P., Sousa, M., Aires, L., Seabra, A., Ribeiro, J., Welk, G. et al. (2010). Physical activity patterns in Portuguese adolescents: The contribution of extra-curricular sports. *European Physical Education Review, 16*(2), 171–181.

Sirard, J.R., Pfeiffer, K.A., & Pate, R.R. (2006). Motivational factors associated with sports program participation in middle school students. *Journal of Adolescent Health, 38*(6), 696–703.

Solmon, M.A. & Lee, A.M. (1997). Development of an instrument to assess cognitive processes in physical education year of studies. *Research Quarterly for Exercise and Sport, 68*(2), 152–60.

Solmon, M.A. (2006). Learner Cognition. In D. Kirk, D. Macdonald & M. O'Sullivan (Eds.), *Handbook of Physical Education* (pp. 226–274). London: SAGE Publications Ltd.

Tinklin, T. (2003). Gender Differences and High Attainment. *British Educational Research Journal, 29*(3), 308–325.

Vašíčková, J., Neuls, F., & Frömel, K. (2010). Comprehensive test in school physical education at secondary schools in the Czech Republik – Standardization and verification. *Acta Universitatis Palackianea Olomucensis, Gymnica, (40)*4, 7–14.

Westerståhl, M., Barnekow-Bergkvist, M., & Jansson, E. (2005). Low physical activity among adolescents in practical education. *Scandinavian Journal of Medicine & Science in Sports, 15*(5), 287–297.

Marjeta Kovač
Faculty of Sport, University of Ljubljana
Gortanova 22, 1000 Ljubljana, Slovenia
marjeta.kovac@fsp.uni-lj.si

Bojan Leskošek
Faculty of Sport, University of Ljubljana
Gortanova 22, 1000 Ljubljana, Slovenia
bojan.leskosek@fsp.uni-lj.si

Gregor Jurak
Faculty of Sport, University of Ljubljana
Gortanova 22, 1000 Ljubljana, Slovenia
gregor.jurak@fsp.uni-lj.si

Srednjoškolski učenici i njihovo znanje o važnosti tjelesne spreme i sporta za zdravlje

Sažetak

Ovo istraživanje ispitalo je znanje tjelesne i zdravstvene kulture prema spolu, srednjoškolskom obrazovnom programu, godini učenja i vrsti znanja. Rezultati multivarijatne analize varijanci pokazali su da je obrazovni program imao najveći utjecaj (20,2 % varijance) na obje zavisne varijable (konceptualno i specifično znanje), utjecaj spola bio je jednako značajan (11,7% varijance), dok je utjecaj godine učenja bio prilično slabiji (3,5% varijance). Učenici koji pohađaju gimnazijske obrazovne programe imali su veće znanje od učenika iz druga dva srednjoškolska obrazovna programa. Muški učenici imali su bolje rezultate od učenica, posebno u specifičnim znanjima. U tehničkim i strukovnim obrazovnim programima nije primijećen utjecaj razreda koji učenice pohađaju na znanje koje su pokazale.

Shodno tomu, nastavnici tjelesne kulture trebali bi imati više znanja i vještina da bi obrazovali učenike o učinku tjelesne spreme na zdravlje. Oni će morati usvojiti posebne didaktičke kompetencije, pogotovo kada poučavaju učenice u tehničkim i strukovnim srednjim školama.

***Ključne riječi**: spol; srednja škola; znanje tjelesne kulture*

Uvod

Važan cilj kurikula tjelesne i zdravstvene kulture jest pružiti učenicima znanje, stavove i vještine koje će im omogućiti razvijanje navika uključivanja u zdrave aktivnosti te motivirati ih da se nastave baviti zdravim aktivnostima da bi postigli što bolju tjelesnu spremu tijekom svojega života (Hardman, 2008; Himberg, Hutchinson i Roussell, 2003; Mohnsen, 2003). Da bi se taj cilj postigao, moraju se razmotriti kognitivne, afektivne i motorne domene učenja (Himberg i sur., 2003).

Mnogi autori smatraju da se kognitivna domena dugo naglašavala kao manje ključna komponenta tjelesne i zdravstvene kulture (Ayers, 2004; Mohnsen, 2003; Solmon, 2006). Učenje tijekom sati tjelesne i zdravstvene kulture nije ograničeno

samo na usvajanje motoričkih vještina i ostvarivanje boljih motoričkih sposobnosti. Štoviše, ono bi trebalo pomoći usvajanju znanja, razumijevanju vještina i ovladavanju vještinama kroz učenje ili iskustvo, a sa svrhom stvaranja osobe obrazovane u području tjelesne i zdravstvene kulture (Biddle i Chatzisarantis, 1999; Dexter, 1999; Hardman, 2008; Mohnsen, 2003). Važnost ovog znanja leži u mogućoj vezi između znanja i aktivnosti; ova interaktivna veza podržava konceptualno učenje o tjelesnoj spremi i cjeloživotnu tjelesnu aktivnost (Dale i Corbin, 2000; Dale, Corbin i Cuddihy, 1998; Murray, Suprapiboonchai, Wilson, Rodriguez i Eldridge, 2008; Placek i sur., 2001).

U ovom radu znanje tjelesne i zdravstvene kulture podrazumijeva i konceptualno i specifično znanje. Konceptualno znanje podrazumijeva i određene opće i ključne informacije koje učenici kasnije mogu obraditi uz pomoć vlastitog iskustva na način koji se može primijeniti u raznim posebnim situacijama, a koji je povezan sa zdravstvenim aspektom tjelesne spreme, vrstom tjelesne aktivnosti te načinima na koje se može postići tjelesna sprema. Specifično znanje, povezano s karakteristikama sportova uključenih u kurikulum tjelesne i zdravstvene kulture obuhvaća tehniku, sigurnost u bavljenju sportom i taktičke principe sportova.

Razumjeti što i kako činiti pravilnom primjenom principa, razumjeti kako ti principi međusobno utječu na izbor tjelesnih aktivnosti te kako razviti program postizanja tjelesne spreme pojedinca temeljen na ovim principima ima važan učinak na poboljšanje stupnja tjelesne spreme mladih ljudi (Dexter, 1999; Solmon i Lee, 1997). U isto vrijeme to olakšava izbor tjelesnih aktivnosti pojedinaca u njihovo slobodno vrijeme (Dale i sur., 1998; Ferguson, Yesalis, Pomrehn i Kirkpatrick, 1989; Jurak, 2006; Murray i sur., 2008).

Usprkos velikoj količini informacija o stupnjevima znanja u različitim obrazovnim predmetima (Tinklin, 2003), podatci o stupnju znanja koje učenici i učenice posjeduju u području tjelesne i zdravstvene kulture su malobrojni. Razni nacionalni dokumenti (npr. Američki nacionalni obrazovni standardi tjelesne i zdravstvene kulture (Himberg i sur., 2003; Hardman, 2008; Mohnsen, 2003) definiraju razinu i vrstu znanja iz tjelesne i zdravstvene kulture koje bi svaki učenik trebao usvojiti ili biti sposoban razumjeti i koristiti.

Dexter (1999) se složio s teorijama o ulozi znanja o sportu u bavljenju sportom u svojem istraživanju o vezama između znanja o sportu, bavljenja sportom i akademske sposobnosti. Saznao je da su prosječna uspješnost u bavljenju sportom, akademska sposobnost i spol važne eksplanatorne varijable za pojam znanja tjelesne i zdravstvene kulture, a ipak je samo akademska sposobnost bila važna eksplanatorna varijabla za pojam znanja tjelesne i zdravstvene kulture. Učenici su imali bolji rezultat u znanju o sportu nego učenice, nakon što su se bavljenje sportom i akademska sposobnost uzeli u obzir.

Vašíčková, Neuls i Frömel (2010) su ustanovili da se znanje tjelesne i zdravstvene kulture čeških srednjoškolaca razlikuje prema tipu škole (gimnazijalci su imali bolje rezultate nego učenici srednjih strukovnih škola) i godini učenja (učenici viših razreda

imali su bolje rezultate nego učenici prvih razreda). Razlike prema spolu nisu bile statistički značajne.

Na kraju obveznog osnovnoškolskog obrazovanja slovenski učenici posjeduju više specifičnog znanja tjelesne i zdravstvene kulture vezanoga za značajke sportova, a manje konceptualnog znanja tjelesne i zdravstvene kulture koje se odnosi na zdravstveni aspekt tjelesne spreme te njezin dobar učinak na tjelesno aktivan stil života. Analize pojedinačnih zadataka uključenih u vanjsko vrednovanje otkrile su da učenici imaju problema pri prepoznavanju i definiranju sastavnica tjelesne spreme te svrhom pojedinih specifičnih vježbi. Djevojke su usvojile veći stupanj znanja u zadatcima koji se odnose na konceptualno znanje, dok su mladići pokazali veći stupanj znanja u zadatcima koji se odnose na specifično znanje (Slovenski državni ispitni centar, 2009) Nadalje, ostali stručnjaci koji se bave istraživačkim radom pokazali su da mladi ljudi imaju puno krivih pretpostavki o tjelesnoj aktivnosti i pojmovima tjelesne spreme (npr. Hopple i Graham, 1995; Placek i sur., 2001; Vašíčková i sur., 2010).

Glavni cilj istraživanja bio je analizirati razlike između znanja tjelesne i zdravstvene kulture kod srednjoškolaca prema njihovom spolu, srednjoškolskom obrazovnom programu, godini učenja te vrsti znanja (konceptualno, specifično).

Metode

Ispitanici

Uzorak ispitanika sastojao se od 771 učenika iz 11 srednjih škola. Škole odabrane za ovo istraživanje nalaze se u tri slovenska grada – glavnom gradu i dva manja grada. Škole su imale odgovarajuće i slične materijalne uvjete. Broj ispitanika iz određenih srednjoškolskih obrazovnih programa odabran je u skladu s brojem upisanih učenika na državnoj razini. Učenici prvih razreda (petnaestogodišnjaci) i trećih razreda (sedamnaestogodišnjaci) iz triju različitih vrsta obrazovnih programa (gimnazije, stručne/tehničke i strukovne škole) bili su ispitani u rujnu 2004. na početku školske godine. Detaljna struktura uzorka ispitanika prikazana je u Tablici 1. Roditelji ili skrbnici su dali svoj pismeni pristanak za sudjelovanje učenika u istraživanju.

Tablica 1.

Mjerenja

Uzorak mjerenih varijabli obuhvaćao je podatke o vrsti srednjoškolskog obrazovnog programa, o spolu, godini učenja i znanju tjelesne i zdravstvene kulture koje je bilo testirano upitnikom. Svi učenici rješavali su identične upitnike u učionicama. Dopušteno vrijeme bilo je 30 minuta.

Upitnik se sastojao od 30 zadataka koje su izradili stručnjaci Slovenskog državnog ispitnog centra da bi procijenili znanje iz različitih područja kurikuluma tjelesne i zdravstvene kulture na kraju obveznog osnovnoškolskog obrazovanja. Većina zadataka su bili zadatci višestrukog izbora (biranje točnog odgovora između četiri

ponuđene opcije), dok su samo dva zadatka zahtijevala kratak pismeni odgovor. Za tri pitanja utvrđeno je da se sposobnost učenika da točno odgovore na njih nije povećala s njihovim znanjem. Stoga, ta tri pitanja su kasnije isključena. Korišteno je četrnaest pitanja da bi se procijenilo konceptualno znanje tjelesne i zdravstvene kulture (razumijevanje važnosti aktivnog stila života i utjecaju tjelesne spreme na zdravlje; razumijevanje osnovnih principa tjelesne spreme, kao što su učestalost, intenzitet, vrsta i vrijeme; učinak raznih vrsta vježbi na uravnotežen tjelesni razvoj, motoričku učinkovitost, pravilno držanje tijela i opće dobro stanje; kako nadzirati tjelesnu spremu), dok se trinaest zadataka koristilo da bi se procijenilo specifično znanje o različitim sportovima uključenima u kurikulum tjelesne i zdravstvene kulture.

Statistika

Metrijske karakteristike zadataka i ocjenjivanje znanja učenika procijenjeni su neovisno i za konceptualno i za specifično znanje tjelesne i zdravstvene kulture u skladu s teorijom odgovora na zadatke (Embertson i Reise, 2000). Prije odabira najprikladnijeg modela testirane su sve tri klasične metode koje se koriste za dihotomne podatke (1-PL, 2-PL i 3-PL). Na temelju Bayesovog i Akaikeovog informacijskog kriterija i stupnja sukladnosti podataka i modela, odabran je dvoparametarski logistički model (2-PL) koji stvara mogućnost da ispitanik *s* odgovori točno na zadatak *i* ovisno o stupnju težine zadatka (α_i), diskriminaciji zadatka (β_i) I stupnju znanja pojedinca (θ_s) kao:

$$P(X_{is}=1|\theta_s, \beta_i, \alpha_i)= \frac{\exp[\alpha_i(\theta_s - \beta_i]}{1+ \exp[\alpha_i(\theta_s - \beta_i]}$$

U skladu s navedenim modelom, znanje pojedinca bilo je procijenjeno korištenjem metode najveće zajedničke vjerodostojnosti (JML). Svi izračuni koji se odnose na teoriju odgovora na zadatke napravljeni su u R programskom okružju (R Development Core Team, 2008.) uz uporabu Ltm library paketa (Rizopoulos, 2006).

Daljnja analiza podataka izvršena je uporabom SPSS 15.0 statističkog paketa. Izračunati su osnovni parametri distribucije varijabli (srednja, standardna devijacija). Multivarijatna analiza varijance (MANOVA) korištena je da bi se testirale razlike između obrazovnih programa, spola i godine učenja (prvi i treći razred) učenika. Da bi se testirala važnost cijelog modela, primijenjena je Wilksova lambda. Količina objašnjenih varijanci u cijelom sustavu zavisnih varijabli procijenjena je s η^2 zasebno za sve glavne čimbenike i sve njihove dvostrane i trostrane interakcije. Također su bili provedeni i univarijatni testovi posebno za svaku zavisnu varijablu. U isto vrijeme korišteni su F-testovi za cijeli model i za sve glavne čimbenike i njihove interakcije. Količina objašnjene varijance procijenjena je djelomičnim η^2 za multivarijatni ANOVA model i ω^2 za univarijatne ANOVA modele.

Rezultati

Ispitani su svi klasični modeli teorije odgovora na zadatke za dihotomne modele podataka (npr. 1-PL, 2-PL i 3-PL). Na kraju je odabran 2-PL model jer on ima relativno

nizak informacijski kriterij (Akaikeov informacijski kriterij AIC=10862, Bayesov informacijski kriterij BIC=10983). Taj model je statistički značajno pogodniji nego Raschov model (1-PL), ali ne značajno lošiji nego model 3-PL koji se također pokazao i nestabilnim.

Tablica 2.

Dijagram 1.

Osnovni parametri zadataka (Tablica 2, Dijagram 1) upućuju na to da je većina zadataka bila relativno lagana, tj. ti zadatci imali su negativan parametar težine (β), koji je odgovoran za više od polovice točnih odgovora uzorka. Najveći dio nepostojećih vrijednosti zabilježen je kod zadataka 15 i 19, koji su bili jedini zadaci otvorenoga tipa (dopunjavanje rečenice) u upitniku.

Distribucija uzorka obje pod-skale (Tablica 3) otkriva značajne razlike između vrsta obrazovnih programa.

Tablica 3.

Djevojke i mladići iz gimnazija pokazali su znatno veće konceptualno i specifično znanje tjelesne i zdravstvene kulture i na početku i nakon dvije godine srednjoškolskog obrazovanja kada ih usporedimo s ostalim učenicima koji pohađaju preostale dvije vrste obrazovnih programa. Najlošije rezultate pokazali su djevojke i mladići iz strukovnih škola. Prema spolu, znanje tjelesne i zdravstvene kulture koje posjeduju mladići u srednjoj školi je veće kada ih usporedimo sa znanjem kojega su pokazale djevojke, pogotovo specifično znanje koje se tiče različitih sportova.

U multivarijatnoj analizi (Tablica 4) sva tri glavna čimbenika (obrazovni program, spol i godina učenja) otkrila su značajne ($p<0.001$) istovremene utjecaje na obje zavisne varijable (konceptualno i specifično znanje).

Tablica 4.

Najveći utjecaj (20,2% varijance) objašnjen je obrazovnim programom. Utjecaj spola je otprilike upola tako visok, dok je utjecaj godine učenja puno niži. Utjecaji svih dvostrukih i trostrukih interakcija bili su slabi, sa samo dva od njih (obrazovni program*godina učenja, spol*godina učenja) važna na stupnju od 5%.

Univarijatna analiza varijance ANOVA (Tablica 5) otkrila je da su sva tri glavna čimbenika i njihove interakcije odgovorni za otprilike trećinu ukupne varijance zavisne varijable kada se mjeri nepristranom procjenom (ω^2). Omjer objašnjene varijance bio je nešto veći u specifičnom nego u konceptualnom znanju. Većina tog rezultata može se pripisati obrazovnom programu; svi drugi utjecaji, osim utjecaja spola na specifično znanje, su neznatni ili čak i zanemarivi. Svi utjecaji interakcije (Dijagram 2) odgovorni su za 1% ispod ukupne varijance.

Tablica 5.

Dijagram 2.

Rasprava

Srednjoškolsko obrazovanje u Sloveniji obuhvaća populaciju u dobnom rasponu od 15 do 18 godina. U tom rasponu mladi ljudi stječu opće obrazovanje u gimnazijama ili se pripremaju za rad u tehničkim/stručnim i strukovnim školama. Učenici koji pohađaju gimnazije i tehničke/stručne škole (oba obrazovna programa su četverogodišnja) imali su tri sata tjelesne i zdravstvene kulture tjedno, tj. ukupno 105 nastavnih sati tijekom cijele školske godine. Učenicikoji pohađaju strukovne škole (u trajanju od tri godine) imali su dva sata tjelesne i zdravstvene kulture tjedno (70 školskih sati tijekom cijele školske godine). Školski sat traje 45 minuta.

Kurikul tjelesne i zdravstvene kulture za pojedine srednjoškolske obrazovne programe osmišljen je na isti način, orijentiran prema cilju, a nastavnici prenose slično znanje tjelesne i zdravstvene kulture. Izbor sportova koje nastavnici tjelesne i zdravstvene kulture uključuju u svoje nastavne sate također je sličan (Kovač i Novak, 2001). Srednjoškolski profesori tjelesne i zdravstvene kulture imali su slične kompetencije, budući da su svi bili obrazovani na istome fakultetu. Učenici su na satima tjelesne i zdravstvene kulture podijeljeni u grupe prema spolu. Profesorice poučavaju djevojke, dok profesori poučavaju mladiće. U gimnazijama i strukovnim školama prosječan razred sastojao se od najviše 20 učenika, dok je broj učenika u tehničkim obrazovnim programima bio otprilike 30.

Poznato je da se učenici koji pohađaju različite srednjoškolske obrazovne programe razlikuju po svojoj tjelesnoj spremi i stupnju tjelesne aktivnosti (Jurak, 2006; Leskošek, Kovač i Strel, 2007; Westerståhl, Barnekow-Bergkvist i Jansson, 2005), akademskim postignućima (Flere, Tavčar Krajnc, Klanjšek, Musil, i Kirbiš, 2010; Selcuk, 2005; Westerståhl i sur., 2005), zdravstvenom stanju (Flere, Tavčar Krajnc, Klanjšek, Musil, i Kirbiš, 2010; Selcuk, 2005; Westerståhl i sur., 2005), socio-ekonomskim čimbenicima u svojoj okolini te posebno po stupnju obrazovanja i potpori svojih roditelja (Flere i Lavrič, 2005; Flere i sur., 2010; Jurak, 2006; La Torre i sur., 2006; Powers, 2003; Selcuk, 2005; Westerståhl i sur., 2005).

Kao rezultat toga, najveće razlike u znanju trebale su biti posljedica vrste obrazovnog programa (20% varijance; vidi Tablicu 4), gdje učenici obaju spolova u gimnazijskim programima pokazuju najbolje znanje i u prvoj i u trećoj godini učenja. Iste rezultate dobili su Vašíčková i sur. (2010) kod čeških srednjoškolaca. Razlike u rezultatima učenika prvih razreda obaju spolova koji pohađaju različite srednjoškolske programe mogle bi se pripisati činjenici da se učenici upisuju u srednju školu prema rezultatima nakon završene osnovne škole. Najbolji osnovnoškolci upisuju gimnazijske programe, dok najmanje uspješni osnovnoškolci upisuju strukovne obrazovne programe (Flere i Lavrič, 2005). Flere i sur. (2010) naveli su da učenici iz gimnazijskih obrazovnih programa općenito imaju više znanja svih nastavnih predmeta i da također imaju i drugačije navike učenja. Dolaze iz povoljnijih socio-ekonomskih sredina (Flere i sur., 2010; Vašíčková i sur., 2010; Westerståhl i sur., 2005). Također su i u boljoj tjelesnoj

kondiciji (Leskošek i sur., 2007; Westerståhl i sur., 2005) i češće sudjeluju u sportskim aktivnostima u svoje slobodno vrijeme (Jurak, Kovač i Strel, 2002; Westerståhl i sur., 2005). Stoga je, dakle, razumljivo da pokazuju znatno veće konceptualno i specifično znanje, i na početku i nakon dvije godine srednjoškolskog obrazovanja, u usporedbi s ostalim učenicima koji pohađaju druge dvije vrste obrazovnih programa. Ovi rezultati podupiru rezultate Dexterovog istraživanja (1999) u kojemu on tvrdi da je akademska sposobnost važna za stjecanje znanja tjelesne i zdravstvene kulture.

Iako učenici koji pohađaju tehničke/stručne srednjoškolske obrazovne programe imaju sličan kurikul tjelesne i zdravstvene kulture (Kovač i Novak, 2001) i isti broj sati tjelesne i zdravstvene kulture kao i gimnazijalci, te usprkos činjenici da učenici iz obaju obrazovnih programa moraju završiti četverogodišnje obrazovanje i maturirati na kraju, znatne razlike mogu se uočiti među ovim učenicima i na početku srednjoškolskog obrazovanja i nakon dvije godine učenja.

Znatno niži stupanj znanja nego onaj koji su pokazali učenici gimnazija i tehničkih/stručnih škola pokazali su učenici strukovnih škola na početku i nakon dvije godine srednjoškolskog obrazovanja. Najmanje uspješni učenici osnovne škole upisuju se u strukovne obrazovne programe u kojima imaju jednu trećinu sati tjelesne i zdravstvene kulture manje. Učenici iz društveno prikraćenih sredina obično se upisuju u strukovne škole. Većinom su nemotivirani za obrazovanje i imaju nizak stupanj samopoštovanja (Flere i sur., 2010; Westerståhl i sur., 2005). Također su i u lošijoj tjelesnoj formi, a u ovoj grupi se trebaju uzeti u obzir i mnogi čimbenici opasni za zdravlje (Leskošek i sur., 2007; Westerståhl i sur., 2005). Jurak (2006) je ustanovio da je karakteristika njihovoga stila života sporadična tjelesna aktivnost (samo nekoliko puta godišnje, uz sate tjelesne i zdravstvene kulture), redovno pušenje i ispijanje kave, nepravilne prehrambene navike, česta uporaba alkohola i ostajanje vani dugo noću. Ovi učenici češće uzimaju lijekove protiv mučnine općenito, protiv grčeva u stomaku i drugih vrsta boli.

Znanje učenika tehničkih obrazovnih programa, promatrano u ovom istraživanju, bliže je znanju kojega su pokazali njihovi vršnjaci iz strukovnih škola; sličan fenomen također je uočen i u drugim školskim predmetima (Flere i sur., 2010). Moguće je zaključiti da se razlozi mogu naći u većim i manje homogenim grupama učenika u tehničkim školama, kao i u prilagodbi nastavnih sati u strukovnim školama karakteristikama razreda.

U ovom istraživanju utjecaj spola na znanje tjelesne i zdravstvene kulture statistički je značajan, ali nizak (oko 12% varijance; vidi Tablicu 4), posebno u konceptualnom znanju. Suprotno rezultatima Keatinga i sur. (2009) i Vašíčkove i sur. (2010), ali slično rezultatima Dextera (1999), Lynna, Irwinga i Cammocka (2001) i rezultatima slovenskih osnovnoškolaca (Državni ispitni centar, 2009), znanje tjelesne i zdravstvene kulture mladića u srednjoj školi je veće u usporedbi s djevojkama, posebno u specifičnom znanju koje se odnosi na razne sportove. Istraživanja su pokazala da su mladići motiviraniji za sport i da sudjeluju u izvannastavnim sportskim aktivnostima

češće nego djevojke (Dexter, 1999; Jurak, 2006; Riddoch i sur., 2004; Silva i sur., 2010), da rjeđe izostaju sa sati tjelesne i zdravstvene kulture (Jurak i Kovač, 2011), gledaju sportske utakmice redovitije (Jurak i sur., 2002), te se uključuju u ona natjecanja u kojima se stječe specifično znanje o sportu (Dexter, 1999; Jurak, 2006; Silva i sur., 2010). Za razliku od mladića, djevojke su više orijentirane prema zadatcima, što znači da su one motiviranije učenjem novih vještina i razumijevanjem procesa učenja (Ames i Archer, 1988; Silva i sur., 2010; Sirard, Pfeiffer i Pate, 2006).

Mjerenja su provedena na početku školske godine. Stoga je, za učenike prvog razreda, znanje koje je bilo testirano u stvari znanje preneseno iz osnovne škole. Obje grupe učenike (prva i treća godina učenja) ispunile su jednaki upitnik. Moglo se očekivati da će učenici trećega razreda pokazati veće znanje jer pohađaju školu i uče duže i kao rezultat toga imaju bolje razumijevanje ne samo tjelesne i zdravstvene kulture, nego i ostalih predmeta u korelaciji s tjelesnom i zdravstvenom kulturom (npr. biologije, fizike i kemije). Svejedno je iznenađujuće primijetiti da je godina učenja imala najmanji utjecaj na znanje učenika (3.5% varijance; vidi Tablicu 4). Usprkos manjem broju sati tjelesne i zdravstvene kulture u strukovnim školama u Sloveniji (70 sati godišnje), razlike između učenika gimnazijskih i učenika strukovnih obrazovnih programa nisu se povećale (osim specifičnog znanja kojega su pokazale djevojke), nego su ostale na otprilike istoj razini. Međutim, razlike između učenika gimnazijskih i učenika tehničkih obrazovnih programa su se povećale, ali razlike između učenika strukovnih i tehničkih srednjih škola su se smanjile.

Međutim, zabrinjavajući su rezultati koji pokazuju da je konceptualno znanje tjelesne i zdravstvene kulture djevojaka iz tehničkih škola bilo niže u trećem razredu, u usporedbi s učenicima prvih razreda. Stoga se može zaključiti da nastavnici u tehničkim školama ne poklanjaju dovoljno pažnje nastavnim sadržajima koji se tiču zdravog stila života i učinka tjelovježbe na tijelo. Nizak stupanj znanja o važnosti tjelesne spreme za zdravlje, kao i nedostatak znanja, ili, u najboljem slučaju nepotpuno razumijevanje, također su zabilježili Placek i sur. (2001) kod učenika šestih razreda osnovne škole. K tomu, veliki razredi na satima tjelesne i zdravstvene kulture u tehničkim školama (do 32 učenika) uzrokuju nezadovoljstvo tijekom vježbanja, kao i smanjenu sposobnost. Osjećaj smanjene sposobnosti također je uzrokovao i niži stupanj motivacije djevojaka za vježbanje (Biddle i Chatzisarantis, 1999).

Također smo saznali da ne postoji utjecaj godine učenja na specifično znanje tjelesne i zdravstvene kulture koje su pokazale djevojke u tehničkim i strukovnim obrazovnim programima. Djevojke u srednjim strukovnim školama su također i najmanje tjelesno aktivne (Jurak i sur., 2002; Westerståhl i sur., 2005). Važno je da su obje vrste znanja (konceptualno i specifično) povezane i isprepletene, tako da učenici mogu koristiti svoje stečeno znanje (kada, kako i na koji način izvoditi tjelesne vježbe) u određenim procesima ili rutinama tijekom bavljenja tjelesnim aktivnostima i sportom; tj., veće znanje osigurava veću motivaciju mladih ljudi za određene aktivnosti (Biddle i Chatzisarantis , 1999; Dale i Corbin, 2000; Ferguson i sur., 1989).

Zaključak

Važan je cilj kurikula tjelesne i zdravstvene kulture pružiti učenicima znanje, stavove i vještine koje će im omogućiti da razviju navike bavljenja zdravim aktivnostima i motivirati ih da nastave bavljenje odgovarajućim aktivnostima tijekom cijelog života da bi postigli tjelesnu spremu. Budući da kognitivno znanje o tjelesnoj i zdravstvenoj kulturi utječe na buduće bavljenje mladih ljudi sportom (Ferguson i sur., 1989; Placek i sur., 2001) a ujedno i olakšava sigurnije i (za pojedinca) bolje prilagođene tjelesne vježbe (Himberg i sur., 2003), nastavnici tjelesne i zdravstvene kulture morat će više pažnje posvetiti stupnju znanja tjelesne i zdravstvene kulture kojega učenici imaju, posebno kada podučavaju u tehničkim i strukovnim obrazovnim programima. Veći stupanj znanja može biti dobra osnova za promjene u ponašanju učenika, što također može učenike učiniti aktivnijima (Solmon i Lee, 1997; Murray i sur., 2008).

Školski sustav trebao bi neutralizirati neke društvene nejednakosti među mladim ljudima. Mnogim učenicima u strukovnim školama tjelesna i zdravstvena kultura predstavlja jedinu tjelesnu aktivnost kojom se bave (Jurak i sur., 2002). Stoga bi stručnjaci koji kroje obrazovni sustav trebali razmotriti mogućnost povećanja broja nastavnih sati tjelesne i zdravstvene kulture u strukovnim srednjoškolskim obrazovnim programima zbog društvene prikraćenosti ovih učenika, te zbog niskog stupnja tjelesne spreme i niske razine znanja.

Rezultati istraživanja Silve i sur. (2010) pokazali su da se portugalske srednjoškolke općenito manje bave sportom nego mladići, ali se unutar škole bave sportom više nego mladići. Ovo upućuje na činjenicu da sport u školi u velikoj mjeri doprinosi stupnju tjelesne aktivnosti djevojaka. Predlažemo da se posebna pažnja pokloni važnosti programa izvannastavnih školskih sportskih aktivnosti za djevojke.

Učenje je po svojoj prirodi kumulativno (Shuell, 1986) pa bi nastavnici trebali biti upoznati sa stupnjem predznanja učenika dok se na bazu postojećeg znanja nadograđuje novo znanje. Predznanje pomaže učenicima prikladno se odnositi prema okolini, razjasniti ključne aspekte iskustva te pohraniti informacije na povezani način tako da se do njih može doći na razne načine korištenjem višestrukih znakova (Baker-Ward, Ornstein i Principe, 1997). Jako je bitno da nastavnici tjelesne i zdravstvene kulture utvrde što učenici znaju i razumiju pod pojmovima tjelesna aktivnost i dobrobit bavljenja raznim sportovima, tako da bi mogli nadograđivati novo znanje na već postojeće razumijevanje. Ovo razumijevanje može pomoći nastavnicima povećati prilike za učenje kod učenika i možda u konačnici pomoći da se stope kognitivni, afektivni i psihomotorni aspekti tjelesne i zdravstvene kulture. U ovom smislu predlažemo da se pripreme posebni testovi za svaki srednjoškolski obrazovni program.

Proces razvoja pojedinaca koji su obrazovani u području tjelesne i zdravstvene kulture podrazumijeva poklanjanje pažnje kognitivnom razvoju. Budući da je znanje u kognitivnoj domeni ključno u radu učenika, nastavnici trebaju posjedovati vještine kojima će razvijati takvo znanje kod učenika (Ayers, 2004). Nastavnici tjelesne i

zdravstvene kulture bi trebali posjedovati više znanja i vještina da bi obrazovali učenike u području zdravog načina života te bi trebali pokazati razne didaktičke kompetencije da bi učinili svoje nastavne sate učinkovitijima i prilagođenima karakteristikama različitih grupa srednjoškolskih učenika. Budući da znamo da slovenski nastavnici tjelesne i zdravstvene kulture koji rade u srednjim školama, posjeduju manje kompetencija u korištenju modernih didaktičkih pristupa nego nastavnici tjelesne i zdravstvene kulture koji rade u osnovnim školama (Kovač, Sloan i Starc, 2008) i kao studenti tjelesne i zdravstvene kulture (Kovač, Starc, Strel i Jurak, 2005), mjerodavni obrazovni stručnjaci trebali bi pripremiti dodatnu stručnu obuku za njih unutar škole.

Niži stupanj znanja djevojaka u tehničkim i strukovnim školama je posebno uočljiv, pa je zbog toga jako važno da djevojke koje su manje aktivne, posebno one koje pohađaju tehničke i strukovne obrazovne programe (Jurak i sur., 2002; Westerståhl i sur., 2005), steknu više znanja tjelesne i zdravstvene kulture. Stoga bi nastavnici trebali prenositi znanje djevojkama na zanimljiv način (npr. kroz projekte i portfolio) a nastava bi se trebala organizirati u manjim grupama jer je motivacijsko ponašanje također određeno čimbenicima razrednog konteksta (Lazar i Kulinna, 2002).

Rezultati ovog istraživanja pružaju neke informacije za razumijevanje razlika u pokazanom znanju tjelesne i zdravstvene kulture među različitim grupama srednjoškolskih učenika. Kada podučavaju, nastavnici tjelesne i zdravstvene kulture mogu promijeniti neke kognitivne uvide i utjecati na ponašanje svojih učenika. U budućim istraživanjima moglo bi se proučiti ponašanje nastavnika, didaktički pristupi, kurikuli i potrebe prostora/opreme u odnosu na znanje tjelesne i zdravstvene kulture prema spolu i srednjoškolskom obrazovnom programu.

Zahvale

Korišteni su podatci iz studije „Analiza nekih korelacija između tjelesne spreme i drugih dimenzija psihosomatskog statusa djece i mladih u Sloveniji u dobnom rasponu od 6 do 19 godina u razdoblju 1970-1983-1993/1994-2003/2004“ (Br. L5-6448-C). Studiju je podržalo slovensko Ministarstvo obrazovanja i sporta.