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Competencies of Physical Education Teachers for Injury Prevention

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Abstract

The main attention in the publication is paid to the competencies of physical education teachers for sport injuries and their prevention. The scientific newness is characterized by the felt lack of scientific works for the analysis of these issues. The sample of the research consisted of 126 physical education teachers (54 women (43 per cent) and 72 men (57 per cent)). The teachers were also divided into groups according to the experience of pedagogical work: 57 teachers (45 per cent) had the pedagogical experience of up to 10 years and the pedagogical experience of 69 teachers (55 per cent) exceeded 10 years. For the revelation of this issue, the Questionnaire of the competencies of physical education teachers for injury prevention was used that had been compiled on the basis of scientific literature (Raiziėnė, 2014; Vercruyssen et al., 2016). The data of the research showed most competencies of physical education teachers for sport injuries of students and their prevention differed statistically significantly depending on the gender among teachers and their pedagogical experience. Teachers with the pedagogical experience of up to 10 years state that students encounter injuries during their lessons more often. The direction of further research should be modelling of programs about the competencies in the field of injury prevention.

Keywords: sports injuries, teachers, competence, education, prevention.

1. Introduction

Students are an important part of the society, so more attention should be paid to the nurturance of health because most of them do not reach the recommended level of physical activity. Constantly growing encouragement of the healthy way of life in the society also increases the need of physical education teachers to hold physical education lessons more effectively. The school environment is one of the places where students have a big likelihood of injuries. Regular physical activity affects positive physical, psychological and social changes in students, increase their self-confidence and decrease the symptoms of stress or depression (Starc, Strel,

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2012). However, every serious injury of a student is related with possible psychological and social problems or economic factors (Carmeli et al., 2003; Costa e Silva et al., 2017).

A physical education teacher has a big influence in the life of a healthy and active student (Barnes et al., 2019); it is also indicated physical education specialists play an important role in injury prevention (Bianchi et al., 2019). The research shows (Strukčinskienė et al., 2015) every fifth child suffers injuries at school. One of the main reasons is that students spend much time at school, so it is important to create and ensure safe and healthy environment of learning (Collard et al., 2010; Costa e Silva et al., 2017).

The newest research (Bissett et al., 2020) notices a big problem in injury prevention, i.e., physical education specialists have an insufficient competency in order to ensure stable psychological health of a student and provide him/her with psychological assistance if necessary.

Sport injuries can be foreseen, but it is impossible to avoid them in the activity of physical education; however, the risk and seriousness of injuries can be reduced if the strategies of injury prevention are known (Emery, Pasanen, 2019; Räisänen et al., 2018). According to Strukčinskienė et al., (2015), even 68 per cent students mostly suffer injuries during physical education lessons. If a student suffers this kind of injury, it can affect his/her health, so both physical education teachers and the society must pay attention to it and take effective programs of injury prevention during lessons. Although there is no teacher that wants his/her students to suffer injuries during physical education lessons, it occurs and can cause negative consequences on a student's health or even life. Scientists Gutiérrez-Castañón et al. (2018), Göpfert et al. (2018), Strukčinskienė et al. (2015) analysed the kind of injuries and ways of their prevention during physical education lessons, but the number of this kind of studies is not sufficient.

For example, Jankauskienė and Miežienė (2011) state the main fields, which teachers mostly accentuate and speak about them with their students, are encouragement of bad habit prevention, healthy nutrition as well as communication and cooperation. Just 4.3 per cent respondents state they lack knowledge about accident prevention (including injuries). For these reasons, taking into account the problem of students' injuries during physical education lessons, it is important to examine their spread, analyse the reasons, which cause injuries during lessons, in order to avoid them or reduce their number. Thus, the role of physical education teachers is important because a competent teacher can assess the athletic preparation of students, choose exercises and proper inventory and foresee a possible risk of injuries (Vercruyse et al., 2016).

A modern physical education teacher is responsible for effective and safe participation of students in lessons, so it is relevant to pay more attention to these issues. For this reason, it is especially important for physical education specialists to be able to provide qualitative services, which would ensure their safety and effectiveness (Craig, Eickhoff-Shemek, 2009).

Study hypothesis – physical education teachers lack competencies for sport injuries and their prevention.

The aim of the study was to assess the competences of physical education teachers related with injury prevention.

The significance of research. It can be stated there have been no works to date, which aim would have been to reveal the way physical education teachers assess their competencies in the field of injury prevention. Thus, the aim of this work is to assess if physical education teachers provide enough information to their students about injuries during lessons and if they feel a need for this kind of knowledge.

2. Methods

Sample and Procedure. As the aim of the research was to ascertain the competencies of physical education teachers from different Lithuanian schools for injury prevention, a sample was compiled that consisted of pedagogues from Lithuanian cities. The researched were selected randomly according to tables of random numbers from the total list of comprehensive schools of Lithuanian cities.

126 physical education teachers participated in research and their age ranged between 22 and 65 (age mean – 39.4 ± 10.3). 54 women (43 per cent) and 72 men (57 per cent) participated in the research. All the researched had higher university education.

Physical education teachers were also divided into groups according to the pedagogical experience: adapting physical education teachers with the pedagogical experience of up to 10 years belonged to the first group and the pedagogues, who were self-confident and were able to make responsible work activity-related decisions independently and whose pedagogical experience exceeded 10 years, belonged to the group of experienced physical education teachers. 57 teachers (45 per cent) had the pedagogical experience of up to 10 years and the pedagogical experience of 69 teachers (55 per cent) exceeded 10 years.

Before the survey, the research participants were familiarized with the research and its aim personally, the importance of each participant and the anonymity of the research data were explained. The following principles of the research ethics were observed during the survey: voluntary agreement to participate in the research, anonymity with that it was tried to get answers from each respondent and efforts to avoid any answers affected by outsiders or their attitudes. The research was organized after agreeing and coordinating with the administration and physical education teachers of each school in advance. Oral agreements with the research were obtained. The teachers were surveyed at the educational institutions, in separate quiet rooms (for example, in classrooms or sport halls), after physical education lessons.

Instruments. In order to assess the competencies of physical education teachers for injury prevention, suffered injuries and their type, the Questionnaire of the competencies of physical education teachers for injury prevention was used. This questionnaire was compiled on the basis of scientific literature (Raizienė, 2014; Vercruyse et al., 2016). The contents of the questionnaire consisted of social, demographic and research object questions. The social and demographic questions reflected the age and gender of the researched as well as experience of pedagogical work.

The diagnostic part of the research consisted of 19 statements, which were divided into 4 subscales (Table 2):

- *Ability of physical education teachers to avoid students' injuries;*
- *Ability of physical education teachers to work with students;*
- *Theoretical knowledge of physical education teachers about injury prevention;*
- *Skills of physical education teachers in the field of injury prevention.*

The statements of the questionnaire were assessed in the 5-point Likert scale, from 1 – absolutely disagree to 5 – absolutely agree. For the assessment of internal consistency of the questionnaire scales, the Cronbach alpha coefficient was used that is based on the correlation of independent questions and helps to assess if all the questions of the scale reflect the researched sample sufficiently and enables specifying the number of necessary questions in the scale (Pukėnas, 2009). If the questionnaire is compiled correctly, the meaning of the Cronbach alpha coefficient must exceed .60. The Cronbach alpha of this questionnaire is - .684 and it complies with the desirable internal consistency of the questionnaire.

Table 1. Characteristics of the factor analysis

	Statements	F1	F2	F3	F4
7	Students often suffer complicated injuries during the physical education lessons, which are held by me	.889			
8	Students often suffer dislocations during the physical education lessons, which are organized by me	.881			
11	Students often suffer bone fractures during the physical education lessons, which are organized by me	.867			
9	Students often suffer contusions during the physical education lessons, which are held by me	.741			
6	Students often suffer injuries during the physical education lessons, which are held by me	.582			
10	Students often suffer tendon and muscle strains during the physical education lessons, which are organized by me	.465			
13	I perform/demonstrate the main warming-up exercises together with students		.764		

14	I constantly accentuate why it is important to perform warming-up exercises		.740		
12	I speak with students about the most frequent sport injuries		.655		
15	I answer willingly to all the students' questions that are related with injury prevention		.650		
17	I always make sure a student performs a certain exercise/act correctly		.593		
2	I lack knowledge about sport injury prevention in the training of students			.794	
16	I often give examples why it is important to perform exercises for injury prevention			.652	
1	During the studies, I obtained knowledge and skills about injuries and their avoidance			.612	
5	If I held classes, the likelihood of injuries during physical education lessons would be lower			.444	
19	I think students' injuries during physical education lessons are affected by poor material-technical facilities of the school				.787
4	When I started working at school as a physical education teacher, I took additional interests in the ways of sport injury prevention				.665
3	When I started working at school, I thought I should get more knowledge about sport injuries and their prevention				.624
18	I think students' injuries during physical education lessons are affected by irrational organization				.589

In order to determine the internal reliability of the subscales, the internal compatibility index (**Cronbach α**) was calculated. It was determined the meanings of the questionnaire subscales ranged between .658 and .879 (Table 2).

Table 2. Internal compatibility of the statements of the subscales

Subscale	Quantity of statements	Statement serial number	Cronbach α
Ability of physical education teachers to avoid students' injuries	6	6, 7, 8, 9, 10, 11	.879
Ability of physical education teachers to work with students	5	12, 13, 14, 15, 17	.797
Theoretical knowledge of physical education teachers about injury prevention	4	1, 2, 5, 16	.684
Skills of physical education teachers in the field of injury prevention	4	3, 4, 18, 19	.658

Statistical Analysis. For the statistical analysis of the research data, the version of program SPSS 24.0 (**Statistical Package for Social Science**) was used. As the research data complied with the normal distribution (checked according to the Kolmogorov – Smirnov test) and the Student's *t* criterion was chosen that enabled comparing the differences of means between the groups for independent samples; the differences between the variables of the research were considered statistically significant unless the error exceeded 5 per cent ($p < .05$). On assessing the results of this research, the effect size of the **Cohen's *d*** criterion coefficient was calculated. Usually, the effect size of **Cohen's *d*** between 0.2 and 0.5 is considered low, between 0.5 and 0.8 – average and above 0.8 – large. The arithmetic mean (***M***) and the average standard deviation (***SD***) were also calculated.

3. Results

On presenting the results of this research, we analysed the following components of the subscales of physical education teachers: “Ability of physical education teachers to avoid students’ injuries”, “Ability of physical education teachers to work with students”, “Theoretical knowledge of physical education teachers about injury prevention” and “Skills of physical education teachers in the field of injury prevention”.

In order to compare the competencies of physical education teachers in the aspect of gender, means and standard deviations were calculated and the Student’s *t* test was applied for the determination of the reliability of differences between the independent samples. It is to mention the competencies of physical education female and male teachers have statistically reliable differences according to the obtained indexes of the analysed components of the subscales (Table 3).

Table 3. Assessment of the competencies of physical education teachers about injury prevention according to gender (*M ± SD*)

Subscales	Physical education teachers	n	M	SD	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Ability of physical education teachers to avoid students' injuries	Women	54	2.76	.44	-3.11*	.002	.54
	Men	72	3.00	.44			
Ability of physical education teachers to work with students	Women	54	3.30	.51	-7.34*	.001	1.29
	Men	72	3.91	.43			
Theoretical knowledge of physical education teachers about injury prevention	Women	54	2.73	.65	-4.21*	.001	.76
	Men	72	3.26	.75			
Skills of physical education teachers in the field of injury prevention	Women	54	3.11	.84	-5.54*	.001	.98
	Men	72	3.84	.64			

Notes: (*M ± SD*) – mean and standard deviation; Cohen's *d* – effect size; * - *p* < .005

On the basis of the Student's *t*-test, it was determined for the independent samples that students suffered different injuries during the physical education lessons held by male teachers more often: *t* (124) = -3.11; *p* < .005; Cohen's *d* = .54. The following means of the effect size were determined in the subscale “Ability of physical education teachers to avoid students’ injuries: 2.76 ± .44 points for female teachers and 3.00 ± .44 points for male teachers.

After assessing the means of the subscale “Ability of physical education teachers to work with students” in points, a statistically significant difference was determined between female and male teachers; it shows male teachers pay more attention to warming-up and correct performance of exercises during physical education lessons – *t* (124) = -7.34; *p* < .001; Cohen's *d* = 1.29. On assessing the statistical indexes of this subscale, the following means were determined: 3.30 ± .51 points for female teachers and 3.91 ± .43 points for male teachers.

On analysing the statistical indexes of the subscale “Theoretical knowledge of physical education teachers about injury prevention”, a statistically significant difference was determined between different groups of the researched: male teachers had better theoretical knowledge about injury prevention during physical education lessons compared with female teachers: *t* (124) = -4.21; *p* < .001; Cohen's *d* = .76. The following means of these indexes are provided: 2.73 ± .65 points for female teachers and 3.26 ± .75 for male teachers.

We also tried to compared the statistical indexes of the subscale “Skills of physical education teachers in the field of injury prevention” and the data of our research shows a statistically significant difference between the groups of physical education teachers: male teachers had better skills in the field of injury prevention during physical education lessons (3.84 ± .64 points) compared with female teachers (3.11 ± .84 points): respectively, - *t* (124) = -5.54; *p* < .001; Cohen's *d* = .98.

Table 4 shows the assessment of the competencies of physical education teachers for injury prevention in the aspect of pedagogical experience. The analysis of the results of this research shows the statistical indexes between the groups of teachers with the pedagogical experience of up to 10 years and teachers, whose pedagogical experience exceeds 10 years, are significantly different **in the subscale “Ability of physical education teachers to work with students”**: $t(124) = 13.88$; $p < .001$; Cohen's $d = 1.28$. It can be noticed from the statistical indexes provided in Table 4 that students suffer from different injuries in the group of teachers with lower pedagogical experience ($2.58 \pm .36$) compared with the lessons of teachers with higher experience.

Table 4. Assessment of the competencies of physical education teachers for injury prevention according pedagogical experience ($M \pm SD$)

Subscales	Pedagogical experience	n	M	SD	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Ability of physical education teachers to avoid students' injuries	up to 10 years	57	2.58	.36	13.88*	.000	1.28
	exceeding 10 years	69	1.81	.27			
Ability of physical education teachers to work with students	up to 10 years	57	2.95	.48	-13.46*	.000	2.40
	exceeding 10 years	69	3.97	.36			
Theoretical knowledge of physical education teachers about injury prevention	up to 10 years	57	2.82	.54	-2.21*	.003	.39
	exceeding 10 years	69	3.03	.52			
Skills of physical education teachers in the field of injury prevention	up to 10 years	57	3.07	.31	1.58	.11	.28
	exceeding 10 years	69	2.95	.53			

Notes: ($M \pm SD$) – mean and standard deviation; Cohen's d – effect size; * - $p < .005$

It was also tried to determine and compare the indexes of the assessment of teachers with different pedagogical experience in the subscale “Ability of physical education teachers to work with students”.

On analysing the results of teachers with different pedagogical experience, a statistically significant difference was determined: it means teachers with the pedagogical experience of up to ten years pay more attention to warming-up and correct performance of exercises during physical education lessons – $t(124) = -13.46$; $p < .001$; Cohen's $d = 2.40$. The following indexes of means are provided: $2.95 \pm .48$ points for teachers with the pedagogical experience of up to ten years and $3.97 \pm .36$ points for teachers with the pedagogical experience that exceeds ten years.

On assessing the statistical indexes of the subscale “Theoretical knowledge of physical education teachers about injury prevention” in the aspect of pedagogical experience of the researched, it was determined teachers with higher pedagogical experience had better theoretical knowledge about injury prevention than teachers with lower pedagogical experience: $t(124) = -2.21$; $p < .005$; Cohen's $d = .39$. Respective means of the indexes of this subscale – ($3.03 \pm .52$ points and $2.82 \pm .54$ points).

Although the teachers with lower pedagogical experience in the subscale “Skills of physical education teachers in the field of injury prevention” were assessed with higher points ($3.07 \pm .31$ points) than those with the pedagogical experience that exceeds ten years ($2.95 \pm .53$ points), there was no statistically significant difference between the researched of these groups on applying the Student's t criterion: $t(124) = -1.52$; $p > .11$; Cohen's $d = .28$.

4. Discussion

During the research, we paid special attention to the dependence of the competencies of physical education teachers for injury prevention on the age of the researched and their pedagogical experience. Thus, we will define the data of the research about the knowledge of teachers with different sexes (women and men) and different pedagogical experience (up to 10 years and exceeding 10 years) about injury prevention as well as frequency and type of injuries during physical education lessons.

On discussing the results of the research, we will analyse the indexes of the statements from different subscales: **“Ability of physical education teachers to avoid students’ injuries”**, **“Ability of physical education teachers to work with students”**, **“Theoretical knowledge of physical education teachers about injury prevention”** and **“Skills of physical education teachers in the field of injury prevention”**.

To review the results, it can be noticed male teachers agree more often statistically significantly that students often suffer injuries, tendon and muscle strains, different contusions during the lessons held by them than during the lessons held by female teachers. These results are also supported by similar research of other authors (Waryasz et al., 2016) and they showed that customers of personal trainers suffered tendon and muscle strains, different contusions as well as frequent lumbar muscle and tarsal strains and tendon inflammations **more often. However, Mikalonytė, Kemeryte-Riaubiene (2017) and Cai et al. (2020) state sport-doing students suffer complicated injuries, such as bone fractures or different dislocations, during trainings much more seldom. Nevertheless, Emery and Pasanen (2019) state the risk of muscle and bone injuries is higher in sport both for younger and older adolescents. These results coincide with our results according to the type of injuries, but we failed to find any scientific studies analysing the attitude of female and male teachers to the frequency and type of students’ injuries during physical education lessons.**

Other results reveal that although male teachers perform the main warming-up exercises together with students more often than female teachers, accentuate the importance of warming-up constantly and try to make sure their students perform a concrete exercise/act correctly, it enables supposing that physical education teachers must improve their knowledge in the field of injury prevention. According to Coles (2017), there are many of reasons that can cause sport injuries and it is necessary to know preventive measures of injuries in order to avoid them or at least reduce the risk of occurrence. Taking into account the conclusions of further research, correct warming-up is a popular choice among sport pedagogues in order to reduce the risk of injuries (Mikalonytė, Kemeryte-Riaubiene, 2017).

The research revealed male teachers gave examples more often why it was important to perform exercises for injury prevention, so the likelihood of injuries was lower during the physical education lessons held by them; moreover, they agree more often they obtained knowledge and skills about sport injuries and their avoidance during the studies. However, female teachers state more often statistically significantly they lack knowledge about sport injury prevention in the education of students. Nevertheless, similar conclusions about this aspect are also made by Bissett et al. (2020): most sport pedagogues do not have any competencies to provide necessary assistance to a sport-doing person and it increases the likelihood of injuries during the practice.

During the analysis of statistical indexes of the subscale “Skills of physical education teachers in the field of injury prevention”, we revealed male teachers agreed more often that injuries of students during physical education lessons are affected by irrational organization and poor material-technical facilities of the school. During the analysis of scientific literature, it was noticed the competency of sport pedagogue in the aspect of gender was not analysed sufficiently, but Boerner et al. 2019, notice in their works customers recognize they trust women’s competency and knowledge in the field of injury prevention more often. Meanwhile, Ivarsson et al. (2016) proved it was recommended to practice the stress management-oriented training of psychological skills additionally in order to avoid any risk of sport injuries that could be caused by suffered psychological stress. Moreover, it is emphasized stress-caused reactions have a statistically significant impact on the suffering of a sport injury. It is also stated in the works of Bissett et al. (2020) sport pedagogues encounter injuries of sportspeople more often and they do not usually have any proper competencies to help them, so it is suggested paying more attention to the development of the competency of sport pedagogues in the field of injury prevention.

During the research, we also tried to assess the indexes of statements of the subscales of the competencies of physical education teachers for injury prevention in the aspect of pedagogical experience. Nevertheless, it was determined during our research the knowledge of teachers about injury prevention and their frequency and type among students depended on their pedagogical experience.

Physical education teachers with higher pedagogical experience agree more often that students suffer complicated injuries, such as tendon or muscle strains, contusions or bone fractures, during their lessons more seldom. These teachers also state they perform the main

warming-up exercises with students more often, accentuate constantly why warming-up is important and they try to make sure almost constantly that a student performs a certain exercise or act correctly. Meanwhile, the indexes obtained with teachers with lower pedagogical experience enable stating that they lack knowledge about sport injury prevention, recognize they did not obtain sufficient knowledge and skills about sport injuries and agree students have a bigger possibility to suffer an injury during their physical education lessons compared with the group of respondents, who have been doing pedagogical work for over ten years.

During the analysis of statements of the subscale **“Skills of physical education teachers in the field of injury prevention”**, it was determined that teachers with lower pedagogical experience that started working at school thought more often they needed more knowledge about sport injuries and their prevention; they also state they take additional interests in the ways of sport injury prevention compared with teachers with higher pedagogical experience, but there are no statistically significant differences.

Limitations and future prospects. We think the performed research defined some directions about the competencies for sport injuries and their prevention for future researchers in order to supplement the available knowledge. Our research was only limited with the results of physical education teachers and they were analysed in the aspect of gender and pedagogical experience. This analysis did not include any teachers of other fields, so the conclusions only include the competencies of this concrete group of teachers for injury prevention. It would be purposeful to perform similar research in the future with physical education teachers from cities and districts. This research is descriptive, but not experimental, so the type of the research prevents from making more exact conclusions, i.e., what reasons affect the differences of competencies in the field of injury prevention depending on the gender and pedagogical experience. Some studies could also be performed in the future in what way students assess the competencies of their physical education teachers in this field, in what way these indexes change or do not change in their opinion. The direction of further research should be modelling of programs about the competencies in the field of injury prevention and check of their effectiveness; additional research about the effect of these programs is also necessary. To sum up, it can be stated that the application of similar research should be developed even more.

5. Conclusion

The statistical data analysis of our research showed the competencies of physical education teachers for injury prevention were different depending on the gender and pedagogical experience. It was determined the points of male teachers in the subscales: **“Ability of physical education teachers to avoid students’ injuries”**, **“Ability of physical education teachers to work with students”**, **“Theoretical knowledge of physical education teachers”**, **“Skills of physical education teachers in the field of injury prevention”** were higher than those of female teachers. It means the competencies of male teachers for injury prevention are assessed better statistically significantly compared with female teachers. However, students suffer different injuries during the lessons held by male teachers more often. Meanwhile, the indexes of teachers with higher pedagogical experience in the subscales: **“Ability of physical education teachers to work with students”**, **“Theoretical knowledge of physical education teachers”** are better compared with teachers with lower pedagogical experience. Nevertheless, teachers with the pedagogical experience of up to 10 years state that students encounter injuries during their lessons more often.

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