

Academic and sport achievements of the physical culture and sports university students

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Abstract

- Purpose:** It is widely used a paradigm about the interdependence between the academic and sport achievements of students. The aim of this research was to create a model for studying relationships between academic and sport achievements of the sports and physical culture university students.
- Material:** Totally 259 (168 male and 91 female) bachelor students of 18–23 years old studied Physical Culture and Sports were involved into the investigation. All the students were good healthy, and they participated in the sport training and competitions, according to the common program. Interdependence between the semester control scores and scores of the sport achievements were studied in the frames of correlation models of parameter and non-parameter statistics. Distribution of scores was studied using Kolmogorov – Smirnov method. One-way ANOVA for repeated measures was used to determine differences between students' scores and educational disciplines' scores.
- Results:** Almost non-significant weak interdependence between results of semester control and sport achievements was noticed ($p > 0.05$, $0.174 \leq r_s \leq 0.284$). There were no statistically significant and tight correlation between semester control scores of educational disciplines and corresponding sport achievements scores ($|r_s| \leq 0.376$). Contrary, in 73% of educational disciplines pairs the semester control scores showed significant and tight correlation ($p < 0.001$, $0.385 \leq r \leq 0.895$).
- Conclusions:** A well-known paradigm about significant relationship between academic and sport achievements of students was not confirmed with the results of this research and should be studied more profoundly.
- Keywords:** bachelor, education, scores, correlation, testing, model.

Introduction

In the sports and physical culture pedagogy, there is a well-known paradigm regarding the academic and sport achievements. It is widely used an idea about the interdependence between the academic and sport achievements of students. Quantitative methods for assessment of the motivation factors for professional sport activity were developed regarding the problem [1]. The investigation of the relationship between academic and sport motivation orientations of the physical education college students led to a positive statistically significant result [2, 3]. There is a positive correlation between the motivation of achievement and the tendency towards studying physical education [4, p. 432]. Sierra-Diaz et al. published a systematic review and meta-analysis of psychosocial factors related to physical education motivates students to practice physical activities and sports through models-based practice. They described implementation of cooperative learning, constraint-led approach, games-cantered approach, sport education model, hybridizations, autonomy-supportive climate and their impact on the students' motivation [5].

There are a lot of research on the problem of sport achievements motivation and physical education involvement. Burgueno et al. examined the influence of an intervention based on Sport Education Model, in comparison with traditional teaching model, on

motivational regulation in high school students in Physical Education class [6, p. 87]. Self-determined motivation and state of flow in an extracurricular program of small-sided games were studied [7] and adopting of a models-based approach to teaching physical education was investigated [8]. Corresponding research are based on the constraint-led approach to sport and physical education pedagogy and spread a wide range of pupils and students in different ages [9]. Navarro-Paton et al. derived a relation between motivation and enjoyment in physical education classes in children from 10 to 12 years old [10]. Influence of a sport education season on motivational strategies in high school students taking into account a self-determination theory-based perspective was investigated by Medina et al. [11]. Kolovelonis and Goudas determine the relation of physical self-perceptions of competence, goal orientation, and optimism with students' performance calibration in physical education [12].

The way to increase the motor and sport competence among children was found using the contextualized sport alphabetization model [13, 14]. Associations among basic psychological needs, motivation and enjoyment within Finnish physical education students were studied by Huhtiniemi et al. [15]. Hartwig et al. created a monitoring system to provide feedback on student physical activity during physical education lessons [16].

In all the presented above publications, academic and sport motivations orientations of students were studied using questionnaires' methods. Academic motivation scale

and sport motivation scale were applied to measure the data for correlation analysis. These results are useful and practical, but do not obtain a straight consideration of the paradigm about academic and sport achievements of students because they are subjective, i.e. produced by subjects. The results present what subjects know, what they want, plan, consider etc. Contrary, we did not find research operated with objective data measured academic and sport achievements of students. Such results should not be depended on the subjects, i.e. students.

Research hypothesis. There is a significant straight correlation between academic and sport achievements of the sports and physical culture university students.

Purpose. The aim of this research was to create a model for studying relationships between academic and sport achievements of the sports and physical culture university students.

Material and Methods

Participants

Totally 259 bachelor students of 18–23 years old studied Physical Culture and Sports were involved into the investigation. They were 168 male students with body length 177.2±4.7 cm and body mass 74.1±3.8 kg (M±SD) and 91 female students with body length 164.7±4.2 cm and body mass 61.2±3.1 kg). All the students were good healthy, and they participated in the sport training and competitions, according the common program [17]. This study was approved in advance by Ethical Committee of Lviv State University of Physical Culture. Students voluntarily provided written informed consent before participating. The procedures followed were in accordance with the ethical standards of Helsinki Declaration on human experimentation.

Procedure

Results of the winter semester control of 2019 – 2020 academic year were taken into consideration. Academic achievements were determined as scores of 100 points academic scale regarding all the educational disciplines [18, p. 2]. Sport achievements were determined as scores of 100 points sport scale [19, p. 4].

Statistical analysis

Interdependence between the semester control scores

and scores of the sport achievements were studied in the frames of correlation models of parameter (Pearson [20]) and non-parameter (Spearman [21]) statistics. Statistical significance of correlation was determined using t-Student parameter. Distribution of scores was studied using Kolmogorov – Smirnov method [22]. One-way ANOVA for repeated measures was used to determine variations between students’ scores and between educational disciplines’ scores [23].

Statistical elaboration of scores was done using on-line package of computer programs Social Science Statistics [24] and Data Analysis Adon of MS Excel [25].

Results

Because sport scale scores did not meet normal distribution in all of the four years ($p \leq 0.039$), relationship between academic and sport scores was determined using Spearman correlation coefficient [21] (Table 1).

Between the semester control average scores and corresponding sport achievements scores, weak (1st, 2nd, and 3rd years) and very weak (4th year) correlation was noticed ($0.174 \leq r_s \leq 0.284$). On the second and fourth years, significance of correlation was low ($p > 0.165$), and on the first year – a little beat lower than it is widely used ($p > 0.05$). Only on the third year, quit weak significant correlation was noticed on the near sufficient level $p = 0.054$ (see table 1). Totally, on the four bachelor years, almost non-significance interdependence between results of the semester control and sport achievements was noticed. Besides the average scores, correlation analysis was done between sport achievements scores and separate educational disciplines scores (Table 2).

Statistically significant correlation between sport achievements scores and semester control scores was noticed for Kinesiology, Physiology of sports, and Biochemical basis of sports ($p < 0.022$). The tightness of correlation for these three educational disciplines was low (see Table 2). One can turn his attention to the clear superiority of the correlation tightness of sport achievements scores with scores of medicine and biology educational disciplines (Kinesiology, Physiology of sports, and Biochemical basis of sports) relatively the sport disciplines (Theory and methods of sports,

Table 1. Average score of the semester control / Scores of sport achievement

Statistics*	Year			
	1	2	3	4
n	48	52	64	43
90 th percentile	99.0 / 51.0	98.0 / 60.0	89.0 / 50.0	93.0 / 50.0
Me	91.5 / 30.0	90.0 / 30.0	80.0 / 30.0	87.0 / 20.0
10 th percentile	81.8 / 0.0	82.9 / 10.0	66.0 / 20.0	76.0 / 10.0
D	0.255 / 0.253	0.147 / 0.285	0.162 / 0.245	0.139 / 0.214
p(D)	0.085 / 0.006	0.227 / 0.001	0.079 / 0.001	0.372 / 0.039
r _s	0.284	0.203	0.263	0.174
p(r _s)	0.062	0.166	0.054	0.277

* n – number, Me – median, D – Kolmogorov – Smirnov statistics, p – significance; r_s – Spearman coefficient

Theory and methods of physical education, Introduction into specialty, Defence of the coaching practice, and Organization of physical culture).

Because the semester control disciplines scores distributions were rather similar to normal distribution ($p \geq 0.079$, see Table 1), the analysis of relationships between scores of separate educational disciplines was undertaken using Pearson correlation model [20] (Tables 3-6).

Rather significant correlation ($0.001 \leq p < 0.01$) on the second year was noticed between results of Psychology of sports and Theory and methods of sports ($p=0.004$), results of Pedagogics and Theory and methods of sports ($p=0.001$), and between results of Theory and methods of gymnastics and Theory and methods of sports ($p=0.006$, see Table 4).

On the third year, fairly significant correlation was noticed between results of Foreign language and Economic theory ($p=0.009$). On the fourth year, significant correlation was noticed between results of Defence of the coaching practice and Economy of sports ($p=0.007$, see Table 5) and between scores of Organization of physical culture and Defence of the coaching practice ($p=0.008$, see Table 6).

Statistically sufficient significance correlation ($0.01 \leq p < 0.05$) was noticed on the third year between scores of Foreign language and Theory and methods of physical

education ($p=0.025$), and on the fourth year – between results of Defence of the coaching practice and Common theory of the professional sports ($p=0.012$). Statistically non-sufficient significance correlation ($p \geq 0.05$) was noticed between scores results of Defence of the coaching practice and Theory and methods of sports ($p=0.084$), as well, as between results of Theory and methods of sports and Common theory of the professional sports ($p=0.309$).

Totally, on all the bachelor years (see Tables 3-6), between semester control scores of educational disciplines in prevailing number comparisons (28 from 38 pairs) statistically high significance ($p < 0.001$) of tight correlation ($0.385 \leq r \leq 0.895$) was revealed.

As a result of one-way ANOVA for repeated measures significant differences between individual students' scores and educational disciplines' scores were determined ($p < 0.001$). The biggest relative variation between semester control scores was noticed among educational disciplines in the first year (43.4%): Theory and methods of sports, History of Ukraine, and Introduction into specialty, and the smallest – in the second year (17.5%): Theory and methods of sports, Physiology of sports, Pedagogics, Theory and methods of track and field, and Theory and methods of gymnastics. The biggest relative variation between student's semester control scores was noticed in the second year (82.5%) and the smallest – in the first (56.6%).

Table 2. Correlation between the educational disciplines scores semester control and sport achievements scores

Years	Educational disciplines	r_s	$p(r_s)$
1	Theory and methods of sports	0.283	0.051
	Introduction into specialty	0.123	0.404
	Theory and methods of sports	0.260	0.063
2	Psychology	0.022	0.875
	Pedagogics	0.045	0.751
	Theory and methods of track and field	0.074	0.600
	Theory and methods of gymnastics	0.096	0.500
	Theory and methods of physical education	-0.022	0.861
3	Kinesiology	0.327	0.005
	Physiology of sports	0.270	0.021
	Biochemical basis of sports	0.376	0.001
	Defence of the coaching practice	0.064	0.683
4	Theory and methods of physical education	-0.063	0.686
	Organization of physical culture	0.220	0.156

Table 3. Correlation table of the educational disciplines scores on the semester control of 1st year: r-Pearson \ t-Student

Educational disciplines	Theory and methods of sports	History of Ukraine	Introduction into specialty
Theory and methods of sports	◊	4.268	3.716
History of Ukraine	0.492***	◊	8.803
Introduction into specialty	0.442***	0.759***	◊

◊ $n=59$, *** $p < 0.001$, $t(0.001, 57) = 3.470$

Table 4. Correlation table of the educational disciplines scores on the semester control of 2nd year: r-Pearson \ t-Student

Educational disciplines	Theory and methods of sports	Physiology of sports	Pedagogics	Theory and methods of track and field	Theory and methods of gymnastics
Theory and methods of sports	◊	2.960	3.344	4.522	2.860
Physiology of sports	0.362**	◊	12.300	10.173	15.265
Pedagogics	0.402**	0.850***	◊	7.911	10.722
Theory and methods of track and field	0.511***	0.801***	0.720***	◊	13.408
Theory and methods of gymnastics	0.352**	0.895***	0.815***	0.870***	◊

◊n=60, **p<0.01, ***p<0.001, t(0.01, 58) = 2.663, t(0.001, 58) = 3.466

Table 5. Correlation table of the educational disciplines scores on the semester control of 3rd year: r-Pearson \ t-Student

Educational disciplines	Kinesiology	Foreign language	Economic theory	Physiology of sports	Biochemical basis of sports	Theory and methods of physical education
Kinesiology	◊	3.727	11.028	6.838	5.788	12.327
Foreign language	0.385***	◊	2.648	4.345	7.564	2.287
Economic theory	0.777***	0.284**	◊	6.649	5.249	13.742
Physiology of sports	0.607***	0.437***	0.597***	◊	9.470	5.817
Biochemical basis of sports	0.543***	0.646***	0.506***	0.727***	◊	4.709
Theory and methods of physical education	0.809***	0.248*	0.838***	0.545***	0.466***	◊

◊n=82, *p<0.05, **p<0.01, ***p<0.001, t(0.05, 80) = 1.990, t(0.01, 80) = 2.639, t(0.001, 80) = 3.416

Table 6. Correlation table of the educational disciplines scores on the semester control of 4th year: r-Pearson \ t-Student

Educational disciplines	Defence of the coaching practice	Theory and methods of sports	Organization of physical culture	Common theory of the professional sports	Economy of sports
Defence of the coaching practice	◊	1.757	2.698	2.584	2.821
Theory and methods of sports	0.229	◊	3.866	1.026	5.365
Organization of physical culture	0.339**	0.459***	◊	7.797	10.268
Common theory of the professional sports	0.326*	0.136	0.721***	◊	4.477
Economy of sports	0.353**	0.583***	0.808***	0.513***	◊

◊n=58, *p<0.05, **p<0.01, ***p<0.001, t(0.05,56) = 2.003, t(0.01,56) = 2.667, t(0.001,56) = 3.473

Discussion

According to the aim of this research, a model for studying relationships between academic and sport achievements of the sports and physical culture university students was created using parametric and non-parametric correlation of scores in 100 points scales educational disciplines semester control and regarding sport achievements [18, 19]. Unlike well-known models described sport motivations orientations of students based on the questioning [26, 27], the proposed in this paper model uses scores independent of subjective evaluation of students regarding their individual achievements.

It is interesting to notice that correlation tightness ($r_s=0.270 - 0.376$, $p \leq 0.021$) of sport achievements scores with scores for medicine and biology educational disciplines (Kinesiology, Physiology of sports, and Biochemical basis of sports) was found significantly greater than corresponding correlation tightness ($p > 0.05$) for the sport educational disciplines (Theory and methods of sports, Theory and methods of physical education, Introduction into specialty, Defence of the coaching practice, and Organization of physical culture).

The model has very strong resolution because ANOVA for repeated measures showed significant differences as between individual students' scores and educational disciplines' scores as well ($p < 0.001$). It is will be useful for individual evaluation of academic and sport achievement of Physical Culture and Sports university students as well, as students of another specialities and students at preparatory schools [28, 29]. The model was created and evaluated using results of semester control a sample of male and female students because scales used in the model were intended to male students and female students ignoring gender differences. However, in well-known scientific publications sport motivations orientations of students were studied taking into consideration genders [4, 26]. Therefore, influence of genders should be a research problem for future investigations of the proposed methods.

There were no statistically significant and tight correlation between semester control scores of educational disciplines and corresponding sport achievements scores ($|r_s| \leq 0.376$). Contrary, in 73% of educational disciplines pairs the semester control scores showed significant and tight correlation ($p < 0.001$, $0.385 \leq r \leq 0.895$).

Use of the on-line package of computer programs Social Science Statistics [24] and Data Analysis Adon of MS Excel [25] computer packet as a mathematical instrument of studying relationship between semester

control and sport achievements scores make possible to use this model for teachers of physical culture and coaches which are not familiar with mathematical modelling.

Conclusions

A research hypothesis regarding significant straight correlation between semester control scores of academic and sport achievements of the sports and physical culture university students was rejected on the sufficient statistical level ($p > 0.05$). Therefore, a well-known paradigm in physical culture and sports about significant relationship between academic and sport achievements of students was not confirmed with the results of this research and should be studied more profoundly.

Highlights

There were no statistically significant and tight correlation between semester control scores of educational disciplines and corresponding sport achievements scores ($|r_s| \leq 0.376$). Contrary, in 73% of educational disciplines pairs the semester control scores showed significant and tight correlation.

A well-known paradigm in physical culture and sports about significant relationship between academic and sport achievements of students was not confirmed with the results of this research and should be studied more profoundly.

One can turn his attention to the clear superiority of the correlation tightness of sport achievements scores with scores of medicine and biology educational disciplines ($p \leq 0.021$) relatively the sport disciplines ($p > 0.05$).

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Conflict of Interest

The authors declare that there is no conflict of interest regarding this research.

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