

*The journal represents original scientific researches of scientists from the East-European region.*

*The Journal welcomes articles on different aspects of physical education, sports and health of students which cover scientific researches in the related fields, such as biomechanics, kinesiology, medicine, psychology, sociology, technologies of sports equipment, research in training, selection, physical efficiency, as well as health preservation and other interdisciplinary perspectives.*

*In general, the editors express hope that the journal "Physical Education of Students" contributes to information exchange to combine efforts of the researchers from the East-European region to solve common problems in health promotion of students, development of physical culture and sports in higher educational institutions.*

**PES**  
PHYSICAL  
EDUCATION  
OF STUDENTS

**PES**

**PHYSICAL  
EDUCATION  
OF STUDENTS**

ISSN 2308-7250

**2024  
06**



**Key title:** Physical Education of Students

**Abbreviated key title:** Phys. educ. stud.

ISSN 2308-7250 (online)

**Publisher:** IP Iermakov S.S.

Certificate to registration:

R40-05489,-26.09.2024, No 2783.

Frequency - 6 numbers in a year.

e-mail: sportart@gmail.com

<http://www.sportedu.org.ua>

### Indexing:

#### Web of Science Core Collection

[Emerging Sources Citation Index (ESCI)]

<https://mjl.clarivate.com/home>

#### DOAJ (Directory of Open Access Journals)

<http://www.doaj.org>

**ERIH PLUS** (The European Reference Index for the Humanities and the Social Sciences)

<https://dbh.nsd.uib.no>

#### WorldCat

<http://www.worldcat.org>

**Open Science Directory** (EBSCO information services)

<http://www.opensciencedirectory.net>

**PBN** (Polish Scholarly Bibliography)

<https://pbn.nauka.gov.pl/core/#/home>

**Scilit** - <http://www.scilit.net>

**OpenAIRE** - <https://www.openarchives.org/>

#### Open Ukrainian Citation Index (OUCI)

<https://ouci.dntb.gov.ua/en/editions/3lDkV60E/>

**MIAR** - <http://miar.ub.edu/issn/2308-7250>

**BASE** (Bielefeld Academic Search Engine)

<http://www.base-search.net>

#### Google Scholar

<http://scholar.google.com.ua>

#### Academic Journals Database

<http://journaldatabase.org>

#### V.I.Vernadskiy National Library of Ukraine

<http://www.nbu.gov.ua>

#### Researchgate

[https://www.researchgate.net/journal/2075-5279\\_Physical\\_Education\\_of\\_Students](https://www.researchgate.net/journal/2075-5279_Physical_Education_of_Students)

#### Hinari Access to Research for Health

<http://extranet.who.int/hinari/en/journals.php>

#### PKP Index

<http://index.pkp.sfu.ca/index.php/browse/index/2236>

## EDITORIAL BOARD

### Editor-in-chief:

Sergii Iermakov Doctor of Sciences in Pedagogy, Professor, Kharkiv State Academy of Design and Arts (Kharkiv, Ukraine).

### Deputy Editor:

Wladyslaw Jagiello Doctor of Sciences in Physical Education and Sport, professor, Gdansk University of Physical Education and Sport (Gdansk, Poland).

### Editorial Board:

Michael Chia PhD, Professor, Faculty of Physical Education and Sports, National Institute of Education Nanyang Technological University (Singapore)

Marc Lochbaum Professor, Ph.D., Department of Kinesiology and Sport Management, Texas Tech University (Lubbock, USA)

Romualdas Malinauskas Doctor of Pedagogical Sciences, Professor, Lithuanian Academy of Physical Education (Kaunas, Lithuania)

Gaetano Raiola Associate professor Sport sciences and methodology, Department of Political and Communication Sciences, University of Salerno (Salerno, Italy)

Tetiana Yermakova Doctor of Pedagogical Sciences, Kharkiv State Academy of Design and Arts (Kharkiv, Ukraine).

Olga Ivashchenko Doctor of Pedagogical Sciences, Associate Professor, H. S. Skovoroda Kharkiv National Pedagogical University, Ukraine (Kharkiv, Ukraine)

Mourad Fathloun Ph.D. Physical Education and Sport, Research Unit Evaluation and Analysis of Factors Influencing Sport Performance (Kef, Tunisia)

Bahman Mirzaei Professor of exercise physiology, Department Exercise Physiology University of Guilan (Rasht, Iran)

Ratko Pavlović Ph.D., Full prof., Faculty of Physical Education and Sport, University of East Sarajevo (Sarajevo, Bosnia and Herzegovina-Republic of Srpska)

Vladimir Potop Doctor of Sciences in Physical Education and Sport, Professor, Department of Physical Education and Sport, National University of Science and Technology Polytechnic Bucharest, University Center Pitești (Pitesti, Romania)

Javier Cachón-Zagalaz Doctor of Sciences in Physical Education and Sport. Department of Didactics of Musical Expression, University of Jaén (Jaén, Spain)

Umberto Cesar Corrêa Full Professor at the School of Physical Education and Sport at the University of São Paulo and Member of the Motor Behavior Laboratory (S.Paulo, Brazil)

Domenico Tafuri Professor, Department of Motor and Wellness Sciences, University of Naples "Parthenope" (Naples, Italy)

Francesca Latino Professor, Faculty of Human Sciences, Pegaso University (Naples, Italy)

## CONTENTS

<b>Arne Sørensen, Pål Lagestad.</b> Student teachers' reflections of advantages, disadvantages, and learning related to lecturers' different pedagogical methods .....	313
<b>Bekir Furkan Tüzer, Havva Demirel.</b> Exercise addiction in individuals who exercise regularly ...	327
<b>Małgorzata Bronikowska, Krzysztof Pezdek, Sara Wawrzyniak, Marlena Łopatka, Michał Bronikowski.</b> Active discussion vice versa passive observation: a comparative study on developing sport-related moral competencies in amateur and professional sport students .....	336
<b>Artur Kalina, Roman Maciej Kalina, Artur Kruszewski, Michał Kruszewski.</b> Universal test of possibility of action based on motor potential (UTPA-MP) – health and survival applications...	346
<b>Maria Zadarko-Domaradzka, Edyta Nizioł-Babiarz, Zbigniew Barabasz, Emilian Zadarko.</b> Relationship between leisure-time physical activity and components of somatotype among university students .....	362
<b>Fatih Yaşartürk, Gürkan Elçi, Sercan Kural, Yusufcan Keskin.</b> Analysis of the relationship between leisure satisfaction and life satisfaction among students participating in outdoor recreational activities .....	371
<b>Sema Arslan Kabasakal.</b> Exercise addiction, muscularity-oriented eating and beliefs about sports nutrition supplements in students who regularly exercise .....	382
Information .....	389

# Student teachers' reflections of advantages, disadvantages, and learning related to lecturers' different pedagogical methods

Arne Sørensen<sup>ABDE</sup>, Pål Lagestad<sup>ACDE</sup>

Faculty for Teacher Education and Arts, Nord University, Norway

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Improving the quality of teaching in higher education is essential. Equally important is obtaining a detailed understanding of students' reflections on their educational experiences. The purpose of this study was to evaluate students' reflections related to their learning and the advantages and disadvantages of different pedagogical methods.

**Material and Methods** A mixed-methods design was employed, including questionnaires and follow-up interviews with students. A 15-credit course in a master's degree program in physical education was conducted using different teaching methods over three consecutive years. After completing the course, 59 students filled out a questionnaire that measured their reported learning outcomes from eight different pedagogical methods. Once the quantitative data was analyzed, seven students were randomly selected for individual in-depth interviews.

**Results** The quantitative data revealed that students generally reported good learning outcomes across all pedagogical methods. No gender differences were found in any of the eight methods. The main results from the in-depth interview analyses showed that students identified both advantages and disadvantages in all methods. According to students' reflections, all methods contributed to learning, and a combination of lectures and practical activities produced especially good outcomes.

**Conclusions** The results of this study highlight the importance of using a variety of methods when planning and executing university teaching. It is also essential to be aware of the disadvantages of each method and to work on minimizing them. Additionally, lecturers are encouraged to conduct research on their own teaching practices to improve the quality of education.

**Keywords:** student teacher, pedagogical methods, experienced learning, advantages, disadvantages

## Introduction

The effectiveness of teaching methods in higher education is an important issue for educators and the education system as a whole. One of the key aspects of this issue is how students perceive different pedagogical approaches and methods. Therefore, exploring their perspectives becomes especially relevant for improving the quality of education.

In this context, the responsibility for facilitating optimal learning is a highly challenging yet intriguing endeavor, with few established guidelines on how to achieve it [1]. Teachers should attempt to develop an understanding of the main factors that contribute to the highest possible learning outcomes [2]. It has been argued that the purpose of teaching is to support learning, and that students should be offered a diversity of appropriate learning activities to increase deep learning [3]. Furthermore, a wide range of available teaching methods exist, but choosing the best one or the optimal combination can be markedly challenging [4].

Traditionally, lectures are commonly used as a pedagogical strategy at universities [5]. However,

research indicates that lectures make students into passive listeners, and activating students to a substantially greater extent regarding the lectures has been frequently suggested [6, 7, 8, 9]. The purpose of activating the students is to increase their involvement in education, which will enhance their engagement and learning outcomes [10, 11]. Despite increasing knowledge of the importance of adapting teaching to learning outcomes and particular student groups, much of the teaching at universities is still implemented as lectures [5]. Lectures produce cognitive activation and constitute an arena for practicing listening and writing notes [12], and for discussions between students and lecturers on theoretical issues [13]. In previous literature, students have pointed to the importance of small "breaks" for interaction, connect theory to practice, having standing breaks, and taking students' interests into account [14, 15, 16, 17]. For many students, lectures are often experienced as tedious, and it is asserted that higher education should take the above-mentioned suggestions as urgent calls for further improvement of the teaching excellence and student satisfaction [18, 19].

Group work is another pedagogical strategy that is frequently employed by lecturers in

universities [20], and research has proven that the method enhances achievement and persistence [21]. Furthermore, discussions in group work, in which different viewpoints are expressed, have been demonstrated to enrich student learning [20]. However, group work as a pedagogical method in universities presents several challenges [22], as students' diversity of level of effort and difficult group dynamics. Students have also reported some challenges with group work as homework [23]. A study showed that some students felt that they were excluded, some experienced anxiety regarding the task, and some stated that discussions with peer students produced low learning outcomes [24].

Lectures have been demonstrated to be useful for giving students requisite knowledge, which they could then use for further development of problem-solving skills in the subject [25]. Their study determined that lectures should be followed by associated tasks, such as simulations and case studies, to provide optimal teaching of problem-solving skills. This highlights what Bremner [4] described as the "hybrid" practitioner. He asserted that no definitive answer exists regarding whether a teacher- or a learning-centered practice is most effective, but an appropriate combination of them, in relation to the contextual teaching situation constitutes the optimal approach. These arguments are followed by Farashahi and Tajeddin [25], who find that an equitable balance should be achieved of various kinds of pedagogical methods.

Studies have shown that implementing simulations in education will prepare students better for their professional future and give them better multi-competence [11, 25]. It is argued that the experimental learning processes in which students are situated during simulation tasks provide them with the opportunity to utilize theoretical skills in real-life situations. In such situations, students must make decisions and receive information regarding consequences [25]. The students also appreciate engaging in simulation tasks, as it improves their understanding of themes [26].

Reading for exams is vital for academic performance, and a study found that reading quizzes increased exam results by 4% [27]. It is also reported that the number of hours that students spent preparing for exams correlated weakly with the outcome of the exam, and a more important and effective factor was the way that the students worked [28]. This study revealed several activities in which students should not engage when preparing for exams, such as listening to music, using the Internet, and watching television [28].

In recent years, self-determination theory (SDT) has been developed by researchers globally to become a major theory of human behavior [29]. SDT asserts that if students experience support of three basic needs (i.e., competence, relatedness, and

autonomy) during their education, their intrinsic motivation, well-being, and academic effort will improve substantially [30, 31]. Pedagogical education on how to teach to support student autonomy advocates giving student tasks in which they have the possibility to choose how the tasks should be done, when the tasks should be executed, and whether the tasks should be completed at all [30]. If the teacher provides the students with autonomy, it will have positive effects on students' well-being, engagement, and academic achievement [2]. According to SDT, lectures should provide students with autonomy when teachers plan their teaching and prepare tasks for their students.

Research has revealed that gender differences can exist in preferred learning style in universities [32]. For instance, female students have reported higher intrinsic interest in their studies [33], and it is suggested that collaborate work be prioritized over competition in teaching to support female students who are more people-oriented than males [34]. Considering this research, the present study takes gender into account in terms of students' reported learning outcomes in different pedagogical methods.

The purpose of this study was to elucidate how students reflected on their own learning outcomes according to several pedagogical approaches, and what teachers should learn from these reflections. This knowledge is critical to discussions of the factors of which teachers should be aware in their own teaching practices. The research questions of the study were as follows: How do students report their learning according to different teaching methods, and do gender differences exist? What are the students' reflections on the advantages, disadvantages, and learning of teachers' different pedagogical approaches?

## Material and Methods

### *Participants*

The quantitative part of the study (questionnaire) included students from three different classes in a master's degree program in physical education (PE) in three consecutive years (2021, 2022, and 2023). At the time of the data collection, the students were in the middle of their five-year master's program. Moreover, the participants were well-acquainted with the selected teaching methods due to their experiences with them during previous years of study at the university. The participants received a verbal orientation about the purpose of the study. They were also informed that participation in the study was voluntary, and that they could withdraw from the study at any time without consequence. All the students that participated provided written consent in accordance with regulations of the Norwegian Center for Research Data.

In November 2021, five females and nine males filled out the questionnaire (77.8% of the class), eight females and 15 males (100% of the class) filled out the questionnaire in November 2022, and seven females and 15 males (100 % of the class) filled out the questionnaire in November 2023. In total, 59 students (20 females and 39 males) filled out the questionnaire, which yielded a response rate of 93.6%. The qualitative part of the study (interviews) included seven randomly selected students from the 2023 group (Table 1).

**Table 1.** Description of students participating in interviews (Master PE, third year)

Fictive name	Gender	Age
Ronny	Male	22
Celine	Female	23
Jessica	Female	24
Michael	Male	23
Monica	Female	22
Benny	Male	23
John	Male	24

#### Study Design

A mixed-methods design was used, in which questionnaire data were examined to determine students' learning outcomes in eight different pedagogical methods, and in-depth interviews were employed to obtain more nuanced knowledge about the advantages, disadvantages, and learning related to these pedagogical methods. The quantitative data were used to identify differences between male and female students' reflections of their learning outcomes in the eight pedagogical methods. The interviews, on the other hand, investigated advantages and disadvantages within each method, with the intention to determine what factors lecturers should be especially aware of in their own teaching according to these reflections. The study uses an *explanatory sequential design* [35], that starts with the collection of quantitative data, followed by the collection and analyses of qualitative data, to explain or expand the quantitative data. Integration of the data occurs through both *building*, where the quantitative data informs the data qualitative data collection approach of the other and *merging*, where the two databases are brought together for analysis [36]. Integration of the two databases at the interpretation and reporting level occurs through narratives [36]. The research was conducted at a small university, with class sizes ranging from 20 to 30 students. The study was approved by, and conformed to, the guidelines established by the Norwegian Centre for Research Data (SIKT, ref.

code no 383620), and is in accordance with the Declaration of Helsinki.

#### Description of the Different Teaching Methods

The research was conducted related to a course in a master's degree program in physical education (PE) (15 credits). Both authors had a pedagogical degree and a total of 52 years of teaching experience (32 years in universities). Based on this experience and education, the course was planned and executed using several different pedagogical methods that appear to enhance students' learning and engagement. These methods included:

- practical exercises led by the lecturer;
- reading to prepare for writing an academic text;
- discussions during lectures;
- lectures;
- writing an academic text;
- planning and executing exercises and lectures for peer students.

Furthermore, two additional pedagogical methods were included in the study:

- discussions outside lectures;
- reading for an exam, as these methods were considered relevant for learning.

The same lecturer provided the same educational content using the same procedure in the actual subject over three consecutive years (Table 2).

The instruction in the subject was meticulously planned, systematically organized, and executed in strict accordance with the curriculum. A description of the six methods used in the teaching of PE students follows:

1. Practical activities led by the lecturer are exercises based upon relevant theories. These types of exercises are combinations of doing practical exercises and discussions of the connection between theory and exercise.
2. Reading to write an academic text involved students searching for and selecting relevant research to plan and execute an individual training period of six weeks.
3. Discussions during lectures were facilitated by the lecturer, encouraging relevant discussions between two or three students, or by the lecturer posing pertinent questions to the students.
4. Lectures without discussions or questions indicated that only the lecturer was delivering the lecture.
5. Writing an academic text involved a task where students were required to compose an academic text that included a training plan, a description and evaluation of relevant tests, and a discussion of the outcomes of the training period.
6. Planning and execution of exercises for students are a teaching method that was organized by giving the students tasks to plan lessons for others based on the theoretical themes taught in the lectures. The students usually work in groups (4-6 students).

**Table 2.** Description of the use of six teaching methods in the course (the numbers correspond to the six presented methods above)

Week/subject	Monday	Tuesday	Wednesday	Thursday
34/endurance training	Method 4	Method 1	Method 1	Method 2
35/strength training	Method 3 and 6	Method 6	Method 6	Method 2
40/speed and plyometric training	Method 3	Method 1	Method 6	Method 2
42/training of technical skills	Method 4	Method 6	Method 1	Method 3
45/training of tactical skills	Method 3	Method 6	Method 6	Method 5
46/training planning	Method 4	Method 6	Method 5	Method 5
50/exam	Home exam for 3 days			

### Procedures

Quantitative data on students' reflections regarding the learning outcomes of eight different methods were collected at three different times (2021, 2022, and 2023) after they completed a course in the fifth semester of their master's program in PE. The purpose of the questionnaire was to gather insights into students' experiences with their learning outcomes from the eight pedagogical approaches used in the course, which were:

1. Practical exercises led by the lecturer.
2. Reading to prepare for writing an academic text.
3. Discussions during lectures.
4. Discussions outside of lectures.
5. Writing an academic text.
6. Reading for an exam.
7. Planning and executing exercises for peer students.
8. Lectures.

The questionnaire was designed with a Likert-type scale between one and six, where six was the highest score. Likert scales are commonly used in questionnaire studies. A study showed that data quality, internal consistency, and discriminative validity suggest that Likert scales can be used in research [37]. According to each of the eight pedagogical methods the students answered the question: "What are your reflections according to your learning outcome in [...the actual method]?"

1. I achieve no learning outcomes from this method.
2. I achieve little learning outcomes from this method.
3. I achieve some learning outcomes from this method.
4. I achieve good learning outcomes from this method.
5. I achieve very good learning outcomes from this method.
6. I achieve excellent learning outcomes from this method.

We will argue that the questions related to each pedagogical method have a high face validity (that it is obvious what it is, i.e. reading for an exam). The survey was carried out in the same classroom

at the same time of year (November) at all three times (2021, 2002, and 2023), and the questionnaire was administered in paper format. A researcher was present during the data collection and was available to assist with any questions or difficulties that the students may have had filling out the questionnaire; however, no student had any such questions or difficulties.

The interviews of the seven randomly selected students took place in December 2023. The main purpose of the questions was to gain insight into the students' reflections on their experiences with the eight different pedagogical methods used during the course, as well as their perceptions of the advantages and disadvantages of these learning outcomes. The open-ended questions included:

- *Can you explain an episode in your own schooling where you felt you learned a lot?*
- *Can you describe the way you learned and why you remember this episode well?*
- *Can you describe how you feel you learn during practical activities?*
- *Can you describe how you feel you learn in lectures?*

At the end of the interview guide, two additional questions were included regarding the quantitative findings:

- *The findings showed that the students identified lectures as the method that created the least learning. Were you surprised by this result, and what are your reflections about it?*
- *The findings showed that the students identified practical activities as the method that created the most learning. Were you surprised by this result, and what are your reflections about it?*

In addition, one question was added to the questionnaire that did not directly concern teaching but rather dealt with academic discussions with fellow students or others. The intention was to determine whether this was regarded as an area that could provide positive learning effects for the students.

To assess the quality of the questions in the interview guide, a pilot interview was conducted with a randomly selected student in the same study as the participants in the present study. The pilot

interview showed that the interview guide led to many reflections from the students regarding their learning according to the eight different teaching methods and was not changed. During a 2-week period in December 2023, seven students were interviewed. A voice recorder was used during the interviews. All interviews were conducted at one of the researcher's offices, and the interviews lasted between 45 and 60 min.

#### *Statistical Analysis*

The students' responses to the questionnaires were analyzed in SPSS. The Kolmogorov-Smirnov test showed that all the eight dependent variables (the pedagogical methods) did not have a non-normal distribution of the variables ( $p < 0.001$  in all). Moreover, since the scale used to measure the dependent variables did not meet the assumptions of parametric tests, O'Donoghue [38] point to the importance of using Mann-Whitney U-tests nonparametric tests to test for differences between two independent groups as gender.

#### *Qualitative Analyses*

The interview data were transcribed and entered in the qualitative analysis program NVivo 12 Plus. The analyses were based on the students' answers related to their reflections according to the use of the eight different pedagogical methods, in which students' perceptions of experiences were taken as subjectively true [39]. The data are based on subjective constructions that students verbalized when processing their own interpretations and reflections on what has occurred in PE at school. The interviews were transcribed verbatim and coded so that the participants were anonymized and given pseudonyms. The analyses were based on transcribed answers focusing on meanings, as described by [40]. Opinions and statements were assessed for themes, and then condensed, coded, and categorized in units of analysis [41]. In this process, the participants' statements related to each of the eight pedagogical strategies were assigned to codes that were classified into categories [42]. The data were sorted based on these categories to elucidate patterns, similarities, relationships, and/or differences between the statements. These analyses creating codes were conducted separately by both authors. The analysis and interpretation followed hermeneutical principles, in that the interpretation process led to an increasingly deeper understanding of the statements, in parts and in aggregate, in the interviews [43]. After both authors independently performed these analyses, the codes were discussed by the authors, and the final codes were created into main findings, as shown in Table 3. The discussions revealed that both authors had created the same codes, only using different words to explain the findings, which increases the reliability of the findings.

## Results

Table 4 presents the descriptive quantitative data of the students experienced learning in different teaching methods, also according to gender. When comparing male and female students' reflections of learning related to different pedagogical methods, the results in table 4 show that males and females, in general, experienced approximately the same learning outcome in most of the eight different pedagogical methods. The statistical analyses also found no significant differences between males and females in terms of each of the eight pedagogical methods ( $p > 0.05$ ).

The descriptive data concerning what percentage of the students reported no/some learning, good learning, or very good/excellent learning in eight different pedagogical methods are presented in Figure 1.

Figure 1 shows that, in general, most students reported good or very good/excellent learning outcomes in seven of the eight different pedagogical methods. However, in terms of lectures, 39% of the students reported no or some learning, while 33.9% of the students reported no or some learning in terms of reading for an exam. On the other hand, practical exercises, writing an academic text, and discussions during lectures exhibited the lowest number of no or some learning (1.7%, 10.2%, and 15.3%, respectively).

The analyses of the interview data will be presented next according to students' in-depth reflections of learning, and the findings will be discussed in terms of the advantages and disadvantages of teachers' use of the eight different pedagogical methods that were examined.

#### Lectures

The analyses of the interview data of the students' reflections revealed that lectures possess the potential to constitute an effective teaching method. John described his experiences of lectures as follows: *"I think it's fine. It's not fantastic. It's not bad. Based on the assumptions, I think it is most motivating to have lectures if it is something completely new."* This was followed up by Ronny, who stated: *"When the lecturer has good knowledge, it could give me new perspectives and good learning on the subject."* However, according to the students' reflections, efficacy related to learning and reflections concerning lectures depended greatly on the lecturer. The students not only highlighted the importance of the lecturer's knowledge-level in the actual subject but emphasized the lecturer's ability to provide an interesting lecture, as well.

However, the students also identified certain disadvantages of lectures, as highlighted by Celine:

*If the lecturer has made a PowerPoint presentation and talks about and reads what is written on it for 45 minutes, we easily "fall out". Furthermore, if the*

**Table 3.** Categories identified in the qualitative analyses related to advantages and disadvantages of different pedagogical methods.

Pedagogical approach	Advantages	Disadvantages
Practical activities led by the lecturer.	Motivating to be physically active. Relates to future work. Theories should be tested/highlighted.	It must be related to theories. It must be time to discuss theories.
Reading to be able to write an academic text.	Learn a lot. You choose what is important. Go deeply into things.	Much to read. Sometimes it is difficult to understand. Challenging at the start.
Discussions during lectures.	Skills exchange. Easier to understand. Challenge your own assumptions. Provides reflections.	Depends on the teacher's/student's motivation. Others must contribute to the discussions. Discussions can be derailed on other aspects.
Discussions outside of lectures.	Important for more learning. Others may understand more. More viewpoints. Confirm own thoughts.	Others must contribute to the discussions.
Writing an academic text.	More deep learning. Choose something you have an interest in. Provides reflections. Easier to see connections.	You are on your own. No discussion. It must plan the work. Difficult to find sources.
Reading for an exam.	May give learning. Connect theory and practice. Can and should be combined with other methods.	May start reading too late. You do not remember all you read. Sometimes it is difficult to see connections.
Planning and execution of exercises for students.	Get different viewpoints. Repetition of theories. Relates to future employment as a teacher. Group work could be educational.	It takes a lot of time. Social loafing during group work.
Lectures	It depends deeply on the lecturer. Must involve students in discussions. Get good references and relevant theory.	It depends deeply on the lecturer. It is often long-winded and boring.

*subject presented is perceived as having little relevance to a future teaching job, it is easy to lose concentration.*

Other students described some lectures as challenging due to a high academic level. They feel that the lecturer does not take their recent knowledge into account, and the lectures are experienced as too academically difficult. Jessica explained: *“If it is teaching about a theory that you have no prior knowledge of, it is difficult, I think.”* The students also described the importance of their understanding of the connection between theories presented in lectures and the relevance for their teacher

education. Michael explained his experiences of education mainly as lectures: *“If there are too many theoretical lessons, and when you’re finished with one topic, a new topic starts, this results in our easily forgetting all that we have heard.”*

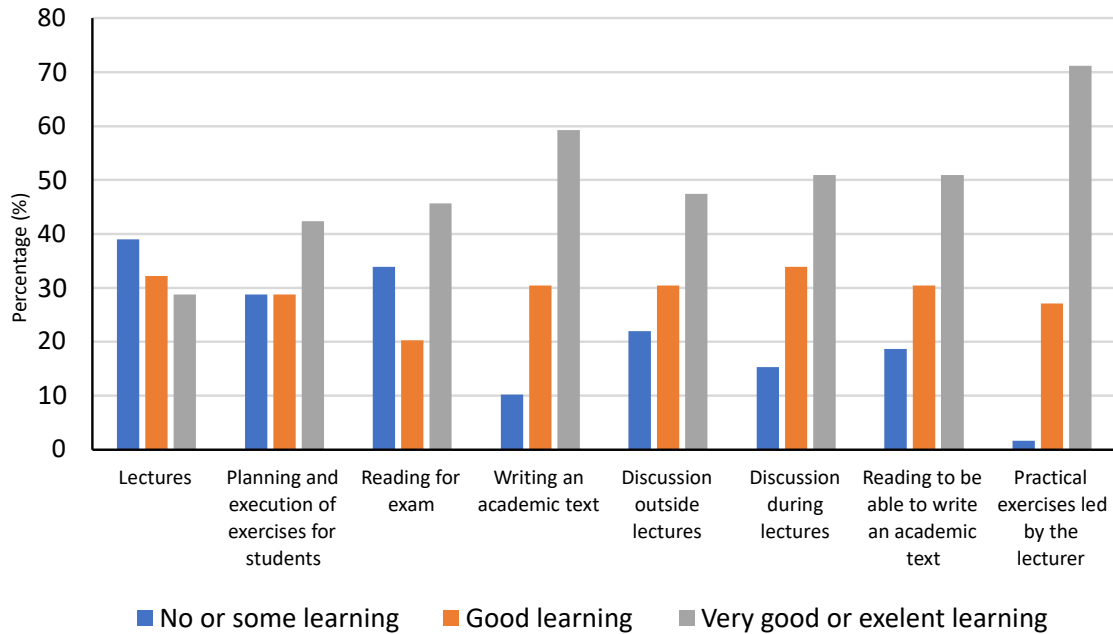
#### Discussions during Lectures

The students identified several advantages of discussions during lectures, including both discussions with the lecturer and discussions with other students during class. Monica stated: *“As soon as there is a lecture where we discuss and maybe work in groups and things like that, I learn a lot more than*

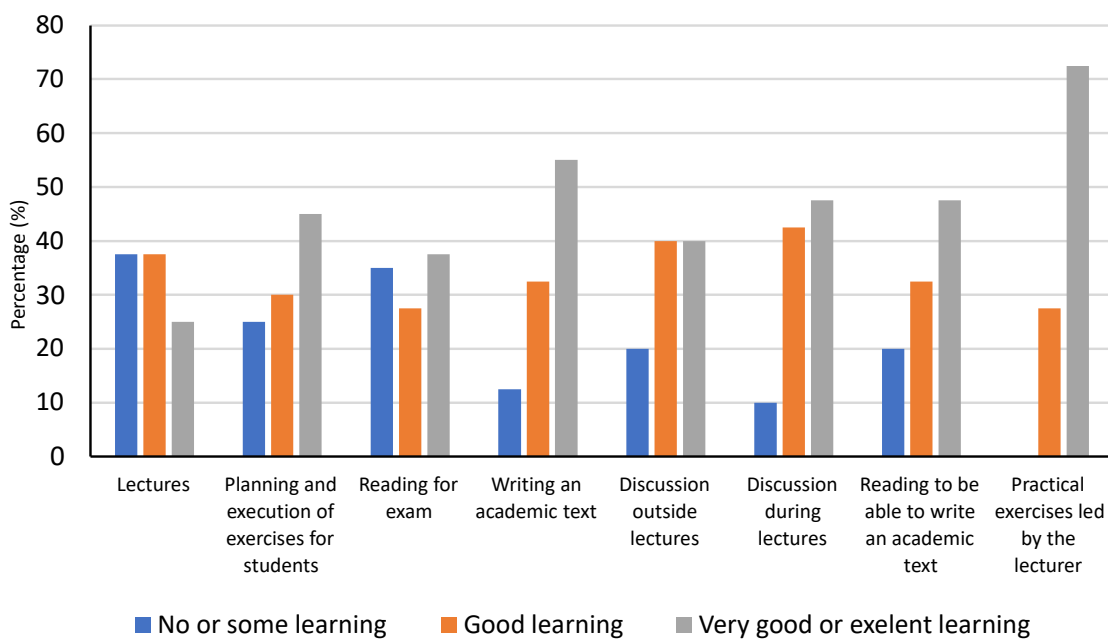
**Table 4.** Descriptive data of male and females experienced learning in different teaching methods

Variables	Male	Female	Z-Value	p-Value
Lectures	3.9 ± 1.0	3.9 ± 1.1	-0.110	0.913
Practical activities led by the lecturer	5.0 ± 0.8	4.9 ± 0.9	-0.207	0.836
Discussions during lectures	4.5 ± 0.9	4.5 ± 1.2	-0.332	0.740
Discussions outside of lectures	4.3 ± 1.0)	4.6 ± 1.3	-1.084	0.278
Planning and execution of exercises for students	4.2 ± 1.0	4.1 ± 1.1	-0.593	0.553
Writing an academic text	4.6 ± 0.9	4.8 ± 0.8	-0.765	0.444
Reading to be able to write an academic text	4.3 ± 1.2	4.3 ± 1.2	-0.273	0.785
Reading for an exam	4.1 ± 1.1	4.5 ± 1.5	-1.477	0.140

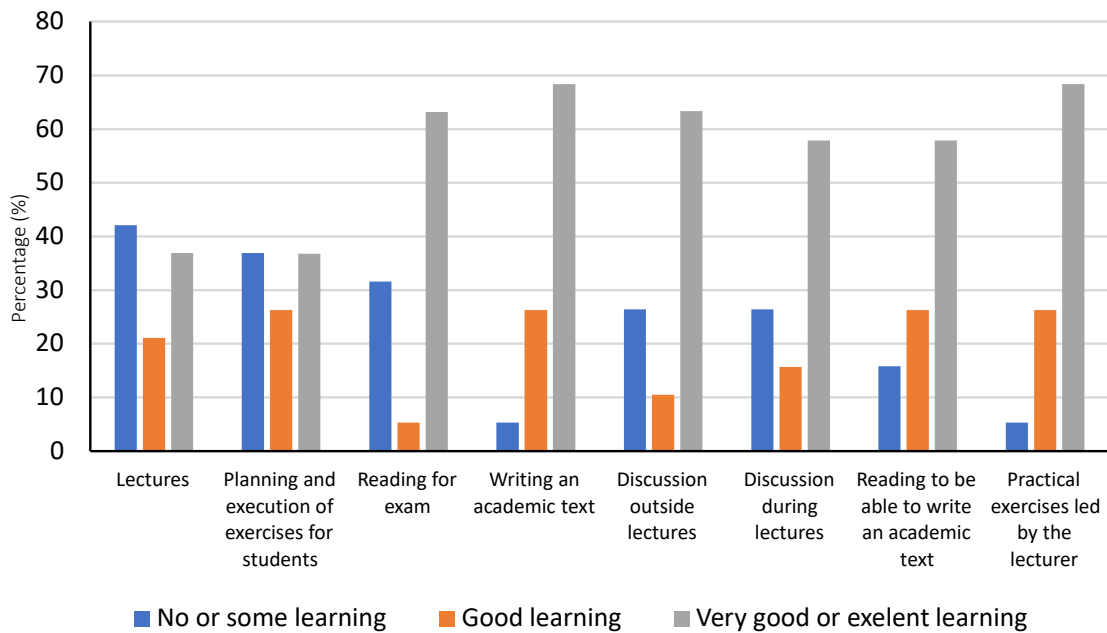
Values are expressed as means ± standard deviations.



**Figure 1.** All students self-reported learning outcomes according to eight different pedagogical methods (%).



**Figure 2.** Male students self-reported learning outcomes according to eight different pedagogical methods (%).



**Figure 3.** Female students self-reported learning outcomes according to eight different pedagogical methods (%).

*just sitting and listening.*” The analyses indicated that the students appreciate these discussions because they can constitute an exchange of experiences and knowledge between the students and between the students and the lecturer. They feel that the lecturer facilitates better reflections when the students are involved during the lectures. Ronny explained this:

*When the lecturer asks questions and involves the students in discussions, I feel that we understand the connection between theory and practice better. There are often people in the classroom who are saying interesting things that I have not thought about, and then I think “That was an interesting comment or question.” When you participate in a discussion about professional issues, I think the learning is better than that obtained just by attending the lecture.*

Although the students mainly evaluated discussions during the lectures as being positive, they also reported certain disadvantages with this approach. Firstly, the efficacy of this approach was stated as being dependent on the motivation of both the lecturer and the students and, without involvement, the method will fail. Secondly, the students reported some other challenges with the discussions, e.g., if the lecturer does not lead the discussion in a pertinent and productive direction, the discussion can become diverted towards other aspects.

#### Practical Activities led by the Lecturer

The students highlighted several advantages with practical activities led by the lecturer. Practical activities were identified as being well adopted by the student group, as they were more interesting, and the movement was enjoyed more than sitting in

lectures. Michael described this: *“I think that, for us, it is easier to learn when we are active, compared to sitting reading by ourselves, especially if you have dyslexia or have difficulty concentrating.”* Furthermore, the students emphasized how practical activities facilitated interaction between the lecturer and the students, and this method provides the students with an understanding of how theoretical aspects can be beneficially utilized in real-life situations. Benny explained:

*The advantage of having practical experiences after the lectures is that the theories that have been reviewed in lectures are put into a context. It becomes easier to remember, perhaps not the concepts, but the main elements. For me, personally, it is much easier to remember when I have done something practical, when I have experience with what we talked about in the lecture.*

Furthermore, in the students’ opinion, the practical activities do not produce any learning outcomes unless they understand the connection between the theoretical aspects and the activity. Michael described what the lecturers should do to enhance learning in practical activities:

*The lecturers should plan enough time after the practical session to talk about it and relate it to the theory. Sometimes, we just have a session, and then we forget the theory. The lecturer should set aside maybe a quarter of a session to talk about what we have done, to focus on the connection between the lecture and the practical activity.*

#### Discussions outside of Lectures

All the students reported that they have discussed relevant professional issues with others

outside of the school, such as with parents, peer students, siblings, boy/girlfriends, and former teachers. The students described these discussions as important, and as an activity through which they frequently obtained other points of view and were able to consider and adopt new perspectives. Jessica described her strategy:

*A classmate and I usually work together on schoolwork. When we struggle with something, we tend to argue back and forth to get the other person to understand. When we realize it, it's a bit funny. If one person understands it, she can explain it to the other, and then she will also understand it. We think it works, because then we get it from a different angle.*

Regarding discussions outside lectures, Benny stated:

*Both my parents are teachers, and they are very physically active. It is interesting to come home and discuss professional issues with them, because you have a different perspective on things than Mum and Dad.*

Although students reported a few disadvantages of discussions outside of lectures, it was asserted that, to provide learning potential, the other person had to contribute to the discussion with pertinent knowledge.

#### Planning and Executing Exercises for Students

The students' responses about planning and executing exercises were positive. Several important advantages were identified in terms of relevance for future employment as a teacher. This method also revealed a repetition of theories, and the students expressed different viewpoints. Celine explained this: *The advantage is that we get to go through the same theory many times, and we get to see how other students choose to present what we have talked about, and you get to see different points of view on it.*

Other students highlighted its motivational aspect. They asserted that since they were PE students, practical lessons were always interesting and motivating for them. Ronny pointed to the relevance of planning and executing exercises for students during education related to future employment as teachers:

*That's exactly how it will be when we get to work, too, in that you have an idea that something should function and you try it out, and when the lesson is finished you know what worked well or not.*

The students also stressed that for this approach to produce good learning, the connection to theory was crucial. Furthermore, discussions and feedback from the lecturers after the lessons were mentioned as decisive for enhancing learning outcomes.

According to the students' reflections, there were also some disadvantages of this method. The main problem with this approach was, according to the students, the organization of collaborative work in groups. The students described group work as a potentially efficient method, but their experience

with this approach was not only positive. John estimated that in half of the groups in which he had taken part, the groups functioned badly, and it yielded a poor learning output. Celine elaborated:

*"The efficacy really depends on who you're in the group with. If your peer students are equally interested or more interested than you, the outcome will be good."*

The students' organization of collaborative work is also viewed as problematic by Michael:

*"The tasks are often organized as one person takes a piece of the task and then another takes another piece. Then, you will be very good at your part, but the rest of the task will be a bit unclear from your side."*

The students also expressed that the methods of planning and executing exercises for students were experienced as positive, but the lecturer should pay attention to the length of the lessons. If the lessons were too long, it could lead to physical fatigue and decreased motivation within the group.

#### Writing an Academic Text

The students' reflections about working with and writing an academic text indicated several positive outcomes. Michael explained:

*"I think there are many advantages to this task, everything from searching for articles to being critical of them. I have learned many things within the chosen sport, and for my part about plyometric training. I have learned a lot through reading about the subject and implemented this knowledge myself."*

Jessica stated that for her, who is a soccer player, choosing a training intervention in soccer gave her high motivation:

*"When I can train something relevant to soccer, then it is something I want to improve. Also, it was appropriate to train at this time of the season, and it allowed me to do it properly, even though I didn't make any progress on the tests."*

The comments from others point especially to the importance of the 12-week deadline for finishing the task, in that it facilitated deep learning. Ronny described his work process:

*"This task made you do research yourself, read articles. And then, it is very nice to have the discussion part at the end, where you get to reflect on how the entire training intervention has been and discuss the results. It was a very nice task, I think."*

The students reported a few disadvantages of writing an academic text. Anne, however, identified one negative aspect:

*"If I were to point out a small disadvantage of this task, it could be that you sit alone a lot and work. You don't get any discussions."*

#### Reading to be able to write an Academic Text

The students reported some challenges in searching for relevant articles for their academic text in the beginning, but this improved quickly. Celine described this:

*"Yes, the task [to write an academic text] has given me challenges, but it hasn't been so difficult*

that I will never be able to do it. It has made me think, 'Where I must sit down and find relevant articles and read them?' At the beginning, I thought it was difficult because research my God, but now, research yes!" [enthusiastic].

Others emphasized how a large degree of autonomy in the task, in which they could choose a sport and exercise related to their interests, affected their effort. Indeed, this enhanced their motivation to read articles, and it provided them with new information about issues on which they were working. Anne appreciated this method for reading, and stated:

*"An advantage is that you can choose what to read. You don't need to read everything, I'll pick out the most important, and then you decide yourself what is most important in the article."*

John followed up on this:

*"Searching for articles and reading them online has been educational. You get a better understanding about how others have thought when they have done research."*

The students also identified some disadvantages of this type of task. For example, it was stated that the amount of research available is enormous, and it was challenging to find what they were searching for. Furthermore, the use of academic language, technical terms, and different statistical analyses in the articles could be problematic for the students.

#### Reading for an Exam

The PE students reported different experiences related to the learning outcomes of reading for an exam, and the efficacy of it. John explained:

*"In the short term, I will be able to reproduce what I have read in the exam. In the long term, it really depends on how I have read. If I read the book from cover to cover in a subject where we must reproduce, I remember little afterwards. If there are subjects that can be discussed, I learn more from it and remember more afterwards."*

Jessica expressed that, for her, the curriculum could sometimes be academically difficult:

*"Reading, myself, can also be difficult because you don't understand the basics. Then, it can be difficult to build on."*

In addition, Benny explained how the context between the curriculum and a future job as a teacher should be obvious to improve his reading effort:

*"When I read something because I will use it, it is fine. But I can quickly get tired of reading without having used it before or will use it."*

Some of the students also reported dyslexic challenges, indicating that their reading speed was low, and they experienced that using different methods for preparing for the exam was better for them than just reading. Jessica explained this:

*"When I read and take notes, I can go back. This way, I understand a little more. I also make cards, which are used for repetition, so that I can explain to*

*myself again and again. I think this works well, and I use slightly different methods."*

Some of the students also identified reading as a method they did not appreciate, as Anne stated:

*"I think it gets a bit boring when I sit down to read certain things, subjects that don't catch my interest. Then, it feels like my concentration lasts for five minutes."*

## **Discussion**

The main findings of this study overall were that most of the PE students experienced good learning outcomes according to the eight pedagogical methods, and no significant gender differences were found. According to previous literature that identified gender differences in preferred learning style in universities [32] and other research pointing to gender differences in student motivation [33] and orientation [34], this finding is somehow surprising.

The analyses of the in-depth interviews supported the quantitative findings and pointed to both advantages and disadvantages of all the eight teaching methods. This finding is in accordance with Biesta [1], who described education as a highly challenging activity, because the students are different in terms of prior knowledge, motivation and effort, and there are no decisive pedagogical approaches which always comprise optimal assumptions for learning. The findings highlight that efficient teaching is related to what and how the lecturer plans and executes his or her teaching in relation to the student group, and that the best learning does not always take place in the classroom but could also occur outside of it [3].

The findings in Figure 2 show that all male students reported good, very good, or excellent learning outcomes from practical exercises led by the lecturer, while the females reported lower learning outcomes; however, no significant differences were observed. The students also appreciated the combination of lectures and practical exercises, which improved their learning of theoretical aspects. In fact, this use of different methods to facilitate deep learning is highlighted as vital for good teaching in another research [3]. The students reported a few disadvantages with this approach, if the lessons did not become too long and resulted in physical fatigue and decreased motivation.

As a part of the task of writing an academic text, the students searched for and read scientific articles. Since this task was largely autonomic, in which the students could choose both sport and exercise type, they reported high motivation and effort in the task. This finding is in accordance with self-determination theory (SDT), which holds that if students experience support of autonomy, enjoyment and academic effort increase [2, 30, 31]. This finding is also consistent with Ribeiro-Silva et

al. [11], who argues that higher education should use active learning methods to a substantially great extent to develop this multi-competence within students.

In the students' opinion, the learning outcomes of the lectures depended on the lecturer. Specifically, it was stated that when the lecturer had good knowledge, new perspectives and good learning were achieved. This finding is in line with Opdal [12], who described lectures as a relevant arena for cognitive activation of students. However, the students in our study experienced some of the lectures as being at an academic level that was too high, which led to low learning outcomes because they did not fully understand the content. This finding highlights the importance of well-paced teaching to reach all the students [3]. The students also reported that the organization of the lecturer affected their leaning and motivation and emphasized the importance of interactions between them and the lecturers, using questions and discussions. The importance of increased student involvement has also been reported in other investigations [7, 8, 9].

During the interviews, all the students stated that discussions and breaks during lectures constituted distinct advantages for their concentration and learning. These findings are in accordance with other literature that focuses on lectures as a teaching approach in higher education [10, 11]. The students in our study expressed that they wanted to be involved and activated, which would increase their learning outcomes. According to the PE students' reflections, the main disadvantage with lectures occurs if the lecturers fail to capture the attention of the students [43] and present an uninteresting lecture. This finding is also reported in other studies, and because many students feel bored at universities, a change in teaching has frequently been proposed [18, 19].

All the students stated that they discussed professional issues outside of lectures and emphasized numerous advantages with this approach. For instance, it could result in more learning, especially if the discussions were with people who possessed good knowledge of the subject. Students could also obtain better insight into other viewpoints and assess their own reflections. The mentioned disadvantage of this method was cases in which the person with whom they engaged in the discussion did not contribute relevant knowledge to the discussion. Based on the students' reflections, the lectures should encourage students to discuss professional issues with others outside of the lectures.

The students reported different experiences with the efficacy of reading for an exam. Some of the students also described reading for an exam as a challenge due to a diagnosis of dyslexia and a low level of concentration, especially in a subject that

they experience as somewhat irrelevant to their future employment as a teacher. These findings highlight the importance of using several methods and advising the students to use different methods in preparation for the exam.

The pedagogical approach of planning and execution of exercises for students was described as educational and relevant by the PE students during the interviews. According to the students, the primary advantage of this method was that the theory was tested in real life, and it was easier to understand the theoretical issues when they had experienced this. These findings are in accordance with Burdon and Munro [26], who reported students' appreciation of performing simulation tasks, because it improved their understanding of the theory. Relevance for their future job as a teacher was also highlighted as an advantage of the method. Other research identifies this approach of teaching as relevant for the development of professional knowledge, in which the students obtain experience making decisions, and then become cognizant of the consequences of these decisions [25]. However, the students pointed to one main disadvantage with this approach, which was the challenge of collaborative work, when the task was organized as group work. Even though all the students were positive about group work, they often experienced that some of their peer students took too little responsibility in preparation for the lessons. This finding is aligned with the theory of social loafing [44], as well as extant literature related to group work in universities, in which several aspects were identified as leading to low efficacy [22, 23, 24].

#### *Strength and Limitations of the Study*

The use of a mixed-methods design, including questionnaire data and in-depth interviews is a considerable strength of the study. The quantitative data also include data from students from the same course, but three different years – a strategy that decreases the possibilities for bias. However, there are some limitations. This study does not examine students' actual learning outcomes, but their self-assessed learning [45], and their reflections may not be in accordance with their actual learning outcomes [46]. Learning outcomes should ideally be measured using validated instruments such as knowledge-specific tests, accompanied by a pre and post testing procedure to ascertain the effectiveness of different pedagogical methods. In addition, the findings related to PE students' reflections of the advantages and disadvantages of the teaching methods were analyzed according to seven students' reflections, and thus cannot be generalized. Most of the participants, however, seemed to confirm the same main findings, which strengthens the credibility and reliability of the study.

## Conclusions

An overall main finding of this study was that most of the PE students experienced good learning outcomes from all the eight pedagogical methods, and no significant gender differences were observed in any of the eight pedagogical methods. According to the analyses of the in-depth interviews, the students identified both advantages and disadvantages with all the methods. This indicates that lecturers should employ a range of methods and be cognizant of their specific disadvantages and find ways to limit them. The quantitative data also showed that lectures and reading for an exam were the methods in which the PE students experienced the lowest learning outcomes; whereas practical activities led by the lecturer and writing an academic text produced the highest learning outcomes. The analyses revealed that student-active methods (as practical exercises and writing an academic text) were assessed as appropriate by the students, as they provided a connection between theory and practice, were regarded as relevant for their employment

as a teacher and gave them high motivation. The students stated that lectures have the potential to be educational if the students are involved and the lecturer provides an interesting lecture. The findings of this study demonstrate that it is crucial for lecturers in higher education to attempt to implement different teaching methods and assess the students' reflections about them. Indeed, we conclude this is a reasonable approach to enhance students' involvement and engagement to achieve better teaching in universities. Further research should focus on actual learning outcomes produced by different teaching methods, in which the aim is to obtain deeper insight into how different pedagogical methods affect actual learning outcomes, and not only students' reflections about such outcomes. This could be accomplished with an experimental design that uses an intervention group and a control group.

## Fundings

This research received no external fundings, there are no disclosures related to this article.

## References

1. Biesta GJJ. *Beautiful Risk of Education*. London: United Kingdom: Taylor & Francis Group; 2013.
2. Gutiérrez M, Tomás JM. The role of perceived autonomy support in predicting university students' academic success mediated by academic self-efficacy and school engagement. *Educational Psychology*, 2019;39(6): 729–748. <https://doi.org/10.1080/01443410.2019.1566519>
3. Biggs J, Tang C. *Teaching for Quality Learning at University*. Maidenhead: United Kingdom: McGraw-Hill Education; 2011.
4. Bremner N. From learner-centred to learning-centred: Becoming a 'hybrid' practitioner. *International Journal of Educational Research*, 2019;97: 53–64. <https://doi.org/10.1016/j.ijer.2019.06.012>
5. Børte K, Nesje K, Lillejord S. Barriers to student active learning in higher education. *Teaching in Higher Education*, 2023;28(3): 597–615. <https://doi.org/10.1080/13562517.2020.1839746>
6. Sørensen A, Ligestad P, Mikalsen HK. Student Teacher Experiences of Learning and Pedagogical Involvement Using a Student-Centered Learning Approach. *Education Sciences*, 2023;13(9): 965. <https://doi.org/10.3390/educsci13090965>
7. Goodman BE, Barker MK, Cooke JE. Best practices in active and student-centered learning in physiology classes. *Advances in Physiology Education*, 2018;42(3): 417–423. <https://doi.org/10.1152/advan.00064.2018>
8. Lea SJ, Stephenson D, Troy J. Higher Education Students' Attitudes to Student-centred Learning: Beyond 'educational bulimia'? *Studies in Higher Education*, 2003;28(3): 321–334. <https://doi.org/10.1080/03075070309293>
9. Theobald EJ, Hill MJ, Tran E, Agrawal S, Arroyo EN, Behling S, et al. Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, 2020;117(12): 6476–6483. <https://doi.org/10.1073/pnas.1916903117>
10. Morosan C, Dawson M, Whalen EA. Using Active Learning Activities to Increase Student Outcomes in an Information Technology Course. *Journal of Hospitality & Tourism Education*, 2017;29(4): 147–157. <https://doi.org/10.1080/10963758.2017.1382369>
11. Ribeiro-Silva E, Amorim C, Aparicio-Herguedas JL, Batista P. Trends of Active Learning in Higher Education and Students' Well-Being: A Literature Review. *Frontiers in Psychology*, 2022;13: 844236. <https://doi.org/10.3389/fpsyg.2022.844236>
12. Opdal PA. To Do or To Listen? Student Active Learning vs. the Lecture. *Studies in Philosophy and Education*, 2022;41(1): 71–89. <https://doi.org/10.1007/s11217-021-09796-3>
13. Willemsen A, N. Gosen M, Van Braak M, Koole T, De Glopper K. Teachers' open invitations in whole-class discussions. *Linguistics and Education*, 2018;45: 40–49. <https://doi.org/10.1016/j.linged.2018.03.001>
14. Al-Modhefer AK, Roe S. Nursing students' attitudes to biomedical science lectures. *Nursing Standard*, 2009;24(14): 42–48. <https://doi.org/10.7748/ns.24.14.42.s47>
15. French S, Kennedy G. Reassessing the value of university lectures. *Teaching in Higher Education*, 2017;22(6): 639–654. <https://doi.org/10.1080/13562517.2016.1273213>
16. Miller CJ, McNear J, Metz MJ. A comparison of traditional and engaging lecture methods in a large, professional-level course. *Advances in Physiology*

- Education*, 2013;37(4): 347–355. <https://doi.org/10.1152/advan.00050.2013>
17. Paulus M, Kunkel J, Schmidt SCE, Bachert P, Wäsche H, Neumann R, et al. Standing Breaks in Lectures Improve University Students' Self-Perceived Physical, Mental, and Cognitive Condition. *International Journal of Environmental Research and Public Health*, 2021;18(8): 4204. <https://doi.org/10.3390/ijerph18084204>
  18. Mann S, Robinson A. Boredom in the lecture theatre: An investigation into the contributors, moderators and outcomes of boredom amongst university students. *British Educational Research Journal*, 2009;35(2): 243–258. <https://doi.org/10.1080/01411920802042911>
  19. Sharp JG, Sharp JC, Young E. Academic boredom, engagement and the achievement of undergraduate students at university: a review and synthesis of relevant literature. *Research Papers in Education*, 2020;35(2): 144–184. <https://doi.org/10.1080/02671522.2018.1536891>
  20. Johnson DW, Johnson RT. An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, 2009;38(5): 365–379. <https://doi.org/10.3102/0013189X09339057>
  21. Wilson KJ, Brickman P, Brame CJ. Group Work. *CBE—Life Sciences Education*, 2018;17(1): fe1. <https://doi.org/10.1187/cbe.17-12-0258>
  22. Burdett J. (editor). *Making Groups Work*. University Students' Perceptions; 2003.
  23. Knight JK, Wood WB. Teaching More by Lecturing Less. *Cell Biology Education*, 2005;4(4): 298–310. <https://doi.org/10.1187/05-06-0082>
  24. Eddy SL, Brownell SE, Thummaphan P, Lan MC, Wenderoth MP. Caution, Student Experience May Vary: Social Identities Impact a Student's Experience in Peer Discussions. Schinske J (ed.) *CBE—Life Sciences Education*, 2015;14(4): ar45. <https://doi.org/10.1187/cbe.15-05-0108>
  25. Farashahi M, Tajeddin M. Effectiveness of teaching methods in business education: A comparison study on the learning outcomes of lectures, case studies and simulations. *The International Journal of Management Education*, 2018;16(1): 131–142. <https://doi.org/10.1016/j.ijme.2018.01.003>
  26. Burdon WM, Munro K. Simulation – is it all worth it? The impact of simulation from the perspective of accounting students. *The International Journal of Management Education*, 2017;15(3): 429–448. <https://doi.org/10.1016/j.ijme.2017.07.001>
  27. Pape-Lindstrom P, Eddy S, Freeman S. Reading Quizzes Improve Exam Scores for Community College Students. Schinske, J (ed.) *CBE—Life Sciences Education*, 2018;17(2): ar21. <https://doi.org/10.1187/cbe.17-08-0160>
  28. Gurung R. How Do Students Really Study (and Does It Matter)? *Teaching of Psychology*, 2002;2(50):149–155.
  29. Gagné M, Gagné M. Self-Determination Theory in the Work Domain. In: Gagné M (ed.) *The Oxford Handbook of Work Engagement, Motivation, and Self-Determination Theory*, Oxford University Press; 2014. <https://doi.org/10.1093/oxfordhob/9780199794911.013.026>
  30. Reeve J, Jang H. What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology*, 2006;98(1): 209–218. <https://doi.org/10.1037/0022-0663.98.1.209>
  31. Ryan RM, Deci EL, [eds.]. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Press; 2017. <https://doi.org/10.1521/978.14625/28806> [Accessed 26th October 2024].
  32. Wehrwein EA, Lujan HL, DiCarlo SE. Gender differences in learning style preferences among undergraduate physiology students. *Advances in Physiology Education*, 2007;31(2): 153–157. <https://doi.org/10.1152/advan.00060.2006>
  33. Niemi H, Nevgi A, Virtanen P. Towards self-regulation in web-based learning. *Journal of Educational Media*, 2003;28(1): 49–71. <https://doi.org/10.1080/1358165032000156437>
  34. Kulturel-Konak S, D'Allegro ML, Dickinson S. Review Of Gender Differences In Learning Styles: Suggestions For STEM Education. *Contemporary Issues in Education Research (CIER)*, 2011;4(3): 9–18. <https://doi.org/10.19030/cier.v4i3.4116>
  35. Creswell JW, Clark VLP. *Designing and conducting mixed methods research*. Sage publications; 2017.
  36. Fetters MD, Curry LA, Creswell JW. Achieving Integration in Mixed Methods Designs—Principles and Practices. *Health Services Research*, 2013;48(6pt2): 2134–2156. <https://doi.org/10.1111/1475-6773.12117>
  37. Østerås N, Gulbrandsen P, Garratt A, Benth J, Dahl FA, Natvig B, et al. A randomised comparison of a four- and a five-point scale version of the Norwegian Function Assessment Scale. *Health and Quality of Life Outcomes*, 2008;6(1): 14. <https://doi.org/10.1186/1477-7525-6-14>
  38. O'Donoghue P. *Statistics for Sport and Exercise Studies. An Introduction*. London: Routledge; 2012.
  39. Armour K. *Research Methods in Physical Education and Youth Sport..* 1st ed. Routledge; 2012. <https://doi.org/10.4324/9780203807170>
  40. Johannessen A, Tufte PA, Christoffersen L. *Introduksjon til samfunns-vitenskapelig metode* [Introduction to social scientific method]. Oslo, Norway: Abstract publisher A/S; 2016. (In Norwegian).
  41. Brinkmann S, Kvale S. *Interviews: Learning the Craft of Qualitative Research Interviewing*. Los Angeles: USA, LA; 2009.
  42. Hastie P, Hay P, Armour K, Macdonald D. *Research methods in physical education and youth sport*. Routledge: Oxon; 2012.
  43. Kvale S. The Qualitative Research Interview. *Journal of Phenomenological Psychology*, 1983;14(1–2): 171–196. <https://doi.org/10.1163/156916283X00090>
  44. Ying X, Li H, Jiang S, Peng F, Lin Z. Group Laziness: The Effect of Social Loafing on Group Performance. *Social Behavior and Personality: an*

- international journal*, 2014;42(3): 465–471. <https://doi.org/10.2224/sbp.2014.42.3.465>
45. Sitzmann T, Ely K, Brown KG, Bauer KN. Self-Assessment of Knowledge: A Cognitive Learning or Affective Measure? *Academy of Management Learning & Education*, 2010;9(2): 169–191. <https://doi.org/10.5465/amle.9.2.zqr169>
46. Deslauriers L, McCarty LS, Miller K, Callaghan K, Kestin G. Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceedings of the National Academy of Sciences*, 2019;116(39): 19251–19257. <https://doi.org/10.1073/pnas.1821936116>
- 

#### Information about the authors:

**Arne Sørensen**; (Corresponding Author); associate professor; <https://orcid.org/0009-0007-7955-0636>; Arne.sorensen@nord.no; Faculty for Teacher Education and Arts, Nord University; Bodø, Norway.

**Pål Lagestad**; professor; <https://orcid.org/0000-0003-4608-8039>; Pal.a.lagestad@nord.no; Faculty for Teacher Education and Arts, Nord University; Bodø, Norway.

---

Cite this article as:

Sørensen A, Lagestad P. Student teachers' reflections of advantages, disadvantages, and learning related to lecturers' different pedagogical methods. *Physical Education of Students*, 2024;28(6):313–326. <https://doi.org/10.15561/20755279.2024.0601>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 03.10.2024

Accepted: 06.11.2024; Published: 30.12.2024

# Exercise addiction in individuals who exercise regularly

Bekir Furkan Tüzer<sup>ABCDE</sup>, Havva Demirel<sup>ABCDE</sup>

Selcuk University Faculty of Sports Science, Turkey

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Addiction has significant effects on individuals who exercise regularly, influenced by factors such as age and gender. This study aimed to measure the exercise addiction levels among university students who regularly engage in fitness activities.

**Material and Methods** The Exercise Addiction Scale was used to determine the participants' levels of exercise addiction. This scale was administered to 198 voluntary participants (students), including 101 women and 97 men. A demographic information form was used to collect data regarding participants' gender, age, years of training, and levels of national athleticism. To compare differences between two independent groups, independent t-tests and One-Way ANOVA multiple comparison tests were applied to identify differences between variables.

**Results** Results revealed significant differences in the tolerance development and passion subscales based on gender, with results favoring women. No statistically significant difference was found in the subdimension of excessive focus and mood changes based on years of athletic experience. In contrast, individuals with 1-3 years of experience had significantly higher scores in the postponement of individual-social needs compared to those with 4-6 years of experience. In the subdimension of tolerance development and passion, individuals with 1-3 years of experience scored significantly higher than those with 4-6 years and those with 11 or more years of experience. However, no significant differences in exercise addiction scores were observed based on age or national athlete status.

**Conclusions** Results suggest that the risk of exercise addiction may be mitigated by fostering a balanced approach to sports participation. Emphasizing both health and social engagement, rather than solely performance, may help individuals maintain a healthier relationship with exercise.

**Keywords:** addiction, exercise addiction, sports, gender differences, tolerance development

## Introduction

Exercise, widely promoted as beneficial for health, can, however, lead to negative consequences when it becomes excessive and compulsive. This emerging problem, known as exercise addiction, has become a subject of increasing concern in recent years. The stress and fatigue of working life have led people to seek activities that allow them to relax physically, mentally, and spiritually [1]. Undoubtedly, one of the most important of these activities is exercise, which is considered a subclass of physical activity. Moreover, exercise positively affects mood by promoting the production of endorphins, helping people feel happier [2]. Additionally, it supports physiological development by regulating oxygen capacity, metabolism, strength, endurance, and body fat percentage [3, 4, 5].

Exercise is defined as a set of movements based on the planned and voluntary repetition of activities aimed at promoting healthy living and supporting physical, social, and emotional development [2, 6, 7, 8]. Katra [9] stated in his study that excessive exercise may have negative effects on individuals' mental and

physical functions. A review of the literature reveals studies that support this hypothesis. Some studies [10, 11, 12, 13] indicate that exercise addiction can lead to a decrease in time spent with family and social circles, as well as a reduction in participation in various activities. Additionally, symptoms of exercise addiction may include constant feelings of inadequacy, the perception that exercise is insufficient, and psychological pressure to achieve desired performance levels [14].

Exercise addiction can be defined as a condition in which the level of exercise becomes uncontrollable, resulting in increased duration, frequency, and intensity. This leads to weakened relationships with the individual's social environment, insufficient time allocation, inability to participate in social activities due to exercise intensity, and a reorganization of life around exercise activities [15]. Exercise addiction was first noted by Baekeland [16] in studies examining the effects of exercise deprivation on sleep patterns. The concept was later popularized by Glasser [17] and further explored by Sachs and Pargman [18, 19], who introduced the term 'running addiction' [20].

Veale [21] developed specific criteria for diagnosing exercise addiction, based on the substance dependence criteria in the DSM-IV.

According to these criteria, the presence of at least three of the specified indicators within a 12-month period may lead to significant disturbances and issues in individuals. Exercise addiction may develop depending on factors such as tolerance, withdrawal effects upon cessation, intention effects, loss of control, time commitment, reduction in other activities, and persistence despite negative consequences [22]. Demir et al. [22] identify key signs of exercise addiction, including the need to increase intensity (tolerance), experiencing anxiety or fatigue when exercise is reduced (withdrawal), exercising more than intended, and losing control over exercise habits. Other indicators are prioritizing exercise over other activities and continuing to exercise despite negative consequences. In another study, Demir et al. [23] noted that factors like duration, intensity, desire, and fatigue can directly impact exercise addiction levels. Consequently, symptoms may include an inability to stop, feeling a need for more exercise, extending workout time, and prioritizing exercise over social activities.

For this reason, attitudes toward exercise are especially important for individuals who engage in sports, as exercise has significant physical, mental, emotional, and social effects. However, exercising excessively and uncontrollably may lead to negative outcomes, countering its potential benefits. Therefore, the aim of this research is to examine the levels of exercise addiction in individuals who regularly exercise at fitness centers.

## Materials and Methods

### *Participants*

The population of this study consists of individuals who regularly exercise in Konya (Turkey). The sample group includes 101 women and 97 men, totalling 198 students, selected from this population through convenience sampling and who volunteered to participate in the research. Convenience sampling is considered 'the most straightforward way to obtain data quickly and cheaply' [24].

Participation in the study was voluntary, and informed consent was obtained from all participants. Participant confidentiality was ensured, with all responses anonymized. The study adhered to international ethical standards, including the principles of the Declaration of Helsinki. This research received approval from the Ethics Committee of the Selçuk University Faculty of Sports Sciences (Ethics Committee Report No. 141, dated 26.12.2023).

### *Study Design*

This study employed a comparative method from quantitative research techniques and utilized the 'Exercise Addiction Scale.' A demographic information form was also used to gather data on participants' gender, age, years of training, and national athlete status.

### *Exercise Addiction Scale (EAS)*

The EAS consists of three factors: 'Excessive Focus and Mood Changes' (items 1-7), 'Postponement of Individual-Social Needs and Conflict' (items 8-13), and 'Tolerance Development and Passion' (items 14-17). The scale uses a 5-point Likert format, with scores categorized as follows: 1-17 (normal), 18-34 (low risk), 35-51 (risk), 52-69 (dependent), and 70-85 (high-level dependent).

### *Statistical Analysis*

Statistical analysis of the data was conducted using the Statistical Package for Social Sciences (SPSS) Version 22.0 software. Since the skewness and kurtosis values for the normality test fell within the  $\pm 2$  range, parametric tests were applied [25]. A significance level of  $p < 0.05$  was set. Independent t-tests were used to compare differences between two independent groups, while One-Way ANOVA tests were applied for comparisons involving more than two independent groups.

Table 1 presents the comparison of participants' exercise addiction levels by gender. No statistically significant differences were observed in the subdimensions of excessive focus and mood changes or in the postponement of individual-social needs. However, a significant difference was found in the subdimension of tolerance development and passion. Female participants showed notably higher levels in this area.

Table 2 presents the comparison of participants' exercise addiction levels based on age. According to the data, no statistically significant differences were found in the subdimensions of excessive focus and mood changes, postponement of individual-social needs, or tolerance development and passion.

Analysis of the data regarding participants' years of athletic experience (see Table 3) showed no statistically significant difference in the subdimension of excessive focus and mood changes. In the subdimension of postponement of individual-social needs, individuals with 1-3 years of athletic experience had significantly higher average scores compared to those with 4-6 years of experience. Additionally, individuals with 7-10 years of experience showed significantly higher scores than those with 4-6 years. In the subdimension of tolerance development and passion, individuals with 1-3 years of experience scored significantly higher than those with 4-6 years and those with 11 or more years of experience.

According to Table 4, which presents the comparison results related to participants' national athleticism status, no statistically significant differences were found. This applied to the subdimensions of excessive focus and mood changes, postponement of individual-social needs, and tolerance development and passion.

Table 5 shows the results of the correlation

**Table 1.** Comparison Results of Data by Gender Factor

Addiction Subdimensions	Gender	N	x	Sd	t	p
Excessive Focus and Mood Changes	Female	101	28.48	3.39	1.17	0.24
	Male	97	27.92	3.32		
Postponement of Individual-Social Needs	Female	101	16.93	5.83	1.60	0.11
	Male	97	15.65	5.43		
Tolerance Development and Passion	Female	101	14.81	2.36	2.68	.008*
	Male	97	13.94	2.22		

Note. \* -  $p < 0.05$

**Table 2.** Comparison Results of Data by Age Factor

Addiction Subdimensions	Age	N	x	Sd	F	p
Excessive Focus and Mood Changes	18-19	26	28.08	3.35	0.39	0.76
	20-21	73	28.53	2.07		
	22-23	88	27.97	4.17		
	24-25	11	28.18	3.22		
Postponement of Individual-Social Needs	18-19	26	18.12	6.12	2.01	0.11
	20-21	73	15.23	5.17		
	22-23	88	16.74	5.87		
	24-25	11	15.64	5.14		
Tolerance Development and Passion	18-19	26	14.69	2.26	2.35	0.07
	20-21	73	14.38	1.96		
	22-23	88	14.51	2.60		
	24-25	11	12.64	1.96		

**Table 3.** Comparison Results of Data by Years of Athletic Experience Factor

Addiction Subdimensions	Athletic Experience (years)	N	x	Sd	F	p	Tukey
Excessive Focus and Mood Changes	1-3 <sup>a</sup>	51	27.75	3.38	2.16	0.09	
	4-6 <sup>b</sup>	100	28.73	2.65			
	7-10 <sup>c</sup>	37	27.86	3.99			
	11 and above <sup>d</sup>	10	26.50	5.84			
Postponement of Individual-Social Needs	1-3 <sup>a</sup>	51	17.59	6.09	4.32	.006*	a>b b<c
	4-6 <sup>b</sup>	100	14.95	5.57			
	7-10 <sup>c</sup>	37	18.16	5.07			
	11 and above <sup>d</sup>	10	16.40	2.67			
Tolerance Development and Passion	1-3 <sup>a</sup>	51	15.18	2.65	4.71	.003*	a>b a>d
	4-6 <sup>b</sup>	100	14.16	1.79			
	7-10 <sup>c</sup>	37	14.41	2.64			
	11 and above <sup>d</sup>	10	12.50	2.92			

Note. \* -  $p < 0.05$ ; a,b,c,d - groups classified by years of athletic experience

**Table 4.** Comparison Results of Data by National Athleticism Factor

Addiction Subdimensions	Nationality	N	x	Sd	t	p
Excessive Focus and Mood Changes	Yes	20	27.05	4.61	-1.21	0.24
	No	178	28.33	3.18		
Postponement of Individual-Social Needs	Yes	20	16.25	5.71	-0.04	0.97
	No	178	16.31	5.67		
Tolerance Development and Passion	Yes	20	14.20	2.71	-0.37	0.71
	No	178	14.40	2.29		

**Table 5.** Exercise Addiction Correlation Analysis

Addiction Subdimensions		Excessive Focus and Mood Changes	Postponement of Individual-Social Needs	Tolerance Development and Passion
Excessive Focus and Mood Changes	r	1	.185*	.316*
	p		.016	.000
Postponement of Individual-Social Needs	r	.185*	1	.509*
	p	.016		.000
Tolerance Development and Passion	r	.316*	.509*	1
	p	.000	.000	

\*. Correlation is significant at the 0.05 level.

analysis for the exercise addiction scale. The analysis reveals a low-level positive relationship between the subdimension of excessive focus and mood changes and the subdimensions of postponement of individual-social needs and tolerance development and passion. Additionally, a moderate positive correlation was found between postponement of individual-social needs and tolerance development and passion.

### Discussion

This study aims to compare the levels of exercise addiction among students engaging in regular exercise. The results indicate no statistically significant differences in exercise addiction levels based on participants' age or national athlete status. However, gender differences were observed, with female participants showing higher levels in the tolerance development and passion subdimension. Additionally, individuals with 1-3 years of athletic experience scored higher in certain subdimensions, such as postponement of individual-social needs and tolerance development, compared to those with more extended experience. A low to moderate positive correlation was also found between the subdimensions, suggesting that various aspects of exercise addiction are interrelated.

The initial findings of the study examined exercise addiction levels in relation to gender. The analysis revealed a significant difference in the subdimensions of tolerance development and passion, with female participants scoring higher. In contrast, Üstün and Öz [26] found significant differences favoring male participants in exercise addiction, specifically in the dimensions of continuity, tolerance, reduction of other activities, and time.

Çingöz and Mavibaş [1] found a significant difference in exercise addiction levels between male and female participants, with higher levels observed in women. In a study examining exercise addiction among future coaches, Arslanoğlu et al. [5] found a difference in the postponement of individual-social needs and conflict subdimension, favoring men. Similarly, Demir and Türkeli [23] found significant differences favoring male participants

in the postponement of individual-social needs and in the development of tolerance and passion subdimensions.

In a study examining exercise addiction levels among marathon runners, men were found to have higher levels of exercise addiction than women [27]. Lichtenstein and Jensen [28] also identified a significant gender difference in groups with and without exercise addiction. Conversely, Rudolph [29] found that female participants had higher exercise addiction levels than male participants. Similarly, a study examining individuals studying physical education and sports determined that female participants exhibited more intense exercise addiction [30].

Çakır [31], in a study on the exercise addiction levels of university students, found that men had higher levels of addiction in the subdimension of postponement of individual-social needs. Another study on exercise addiction revealed that males differed statistically significantly from females across various addiction dimensions [32]. Additionally, a study examining the relationship between basic psychological needs and exercise addiction found that male participants experienced higher levels of exercise addiction [33].

Güneş [34] examined the relationship between exercise addiction and quality of life, finding that men had higher levels of exercise addiction. In a study on exercise addiction levels among individuals with physical disabilities, a significant difference favoring men was observed based on gender [35]. Conversely, Yılmaz [36] found that women had higher levels of exercise addiction than men. Similarly, Kaşka [37] found that exercise addiction scores were higher in men than in women.

According to the results, the decrease in the effects felt by female participants during exercise, along with their desire to increase intensity through more training, may contribute to a higher level of addiction compared to male participants. Women's tendency to dedicate more time to exercise and their impatience may also explain the higher prevalence of exercise addiction. In Birgönül's study [38], however, no significant gender difference was found in exercise addiction levels. Similarly, Başaran

et al. [39] did not identify any significant gender differences in exercise addiction levels among fitness center members.

Sadıq [40] found no significant difference in exercise addiction levels between male and female participants in his study. Similarly, Uzun [41], who examined exercise addiction levels in individuals undergoing sports training, found no significant gender difference. In a study on the relationship between eating behavior disorders and exercise addiction, no significant difference was observed between genders [42]. Lichtenstein et al. [43] also investigated exercise addiction levels in elite athletes and did not detect a statistically significant gender difference.

Age is a significant distinguishing factor among athletes, particularly in individual sports. It also plays a crucial role in team sports, allowing athletes to perform at their highest professional levels. The lack of significant age differences in our participant group does not imply that age has little impact on athletic performance. Instead, the close age range within the research group may explain the absence of significant differences in the analysis results. Additionally, similar levels of exercise addiction among athletes of comparable ages may clarify these findings. Çingöz and Mavibaş [1] obtained similar results, finding no significant differences in exercise addiction levels among participants.

Üstün and Öz [26] found no significant age-related differences in exercise addiction levels among participants in their study. Similarly, Yılmaz [36], who examined exercise addiction levels among sports sciences faculty students, also found no significant difference based on age. Sadıq [40] investigated exercise addiction levels in kickboxing, taekwondo, and muay thai athletes. His analysis revealed no significant differences according to the age factor.

In addition, several studies in the literature support our findings. Sucular [42] found no significant age-related difference in exercise addiction levels in his study. Lichtenstein et al. [43] also reported no difference in exercise addiction levels among elite athletes based on age. Similarly, Rock et al. [44] revealed no age-based changes in exercise addiction levels among students with eating disorders. İlbak [45] likewise found that exercise addiction levels in individuals engaged in sports did not vary with age.

According to our findings, beginners, being at the start of their sports journey, showed higher levels of exercise addiction compared to individuals with 4-6 years of experience. This may be due to their intense focus on exercise, often at the expense of basic needs like nutrition and social activities, as they strive to make progress in sports. This dedication may lead them to tolerate feelings of inadequacy by exercising more.

Additionally, individuals with 7-10 years of

experience exhibited higher levels of exercise addiction than those with 4-6 years. A period of 7-10 years is often ideal for athletes aiming to compete professionally or to attain a specific role within their sport. For elite competitors, prioritizing exercise over diet and social life, as well as increasing exercise when they feel their current performance is insufficient, may explain the significant differences compared to those with 4-6 years of experience.

In their study, Kayhan et al. [14] found significant age-based differences in exercise addiction levels, specifically in the dimensions of tolerance, continuity, and overall scores. Similarly, Güler [33] noted that individuals in the 20-24 age group showed significant differences compared to older age groups. However, there are also studies that do not align with our findings.

Lichtenstein and Jensen [28] found significant age-related differences in participants' exercise addiction levels. Similarly, Güneş [34] found a low-level positive correlation between age and exercise addiction. Kaşka [37] also identified significant age-based differences in exercise addiction levels. Specifically, scores in the tolerance subdimension were significantly higher for participants aged 21-23 and 24-26 compared to those aged 30 and over.

In the study examining the mental endurance and exercise addiction levels of the participants, a significant difference was found in the control subdimension. It was observed that the mean scores of individuals in the 22-25 age group were significantly higher than those in the 18-21 age group [46].

In a study examining exercise addiction levels in elite cyclists, significant differences were found. Individuals aged 23-26 years and individuals aged 27 years and older showed statistical differences in the sub-dimensions and total score of the exercise addiction scale compared to individuals aged 19-22 years [47].

Our research sample consists of individuals who regularly engage in exercise, making their duration of athletic involvement potentially influential on their levels of exercise addiction. According to our analysis, individuals who have exercised for 1-3 years exhibit higher levels of exercise addiction in the dimension of individual social needs being postponed compared to those who have exercised for 4-6 years. Additionally, those who have exercised for 7-10 years show significantly higher levels of exercise addiction compared to individuals exercising for 4-6 years. It was also found that in terms of tolerance development and passion, individuals who have exercised for 1-3 years differ significantly from those who have exercised for 4-6 years and for 11 years or more.

Sucular [42] reported findings similar to ours, identifying significant differences in average scores among individuals exercising for 0-2 years compared to those exercising for 2-4 and 4-6 years.

Furthermore, it was found that individuals exercising for 2-4 years had significantly lower average scores than those exercising for 4-6 years. Kalkavan et al. [48] also identified significant differences in exercise addiction levels based on years of athletic experience, concluding that individuals with fewer years of experience have significantly higher levels of exercise addiction compared to those with more experience. Similarly, İlbak and Altun [45] found parallels with our findings, although they noted that individuals with lower years of experience also exhibited lower levels of exercise addiction. Kaşka [37] demonstrated that individuals with more years of experience have significantly higher levels of exercise addiction compared to those with less experience.

Arslanoğlu et al. [5] examined the exercise addiction levels of coaches and found that coaches with 1-2 years of licensed athletic experience exhibited lower levels of exercise addiction than those with 3-5 years of experience.

Çingöz and Mavibaş [1] stated that the exercise addiction levels of those who worked less than 1 year were lower. However, it was revealed that the mean values of individuals who exercised for 5 years or more differed significantly.

Güler [33] concluded in his study that individuals who exercised between 5-8 years had a higher level of exercise addiction.

Significant differences were found in the exercise addiction scores of elite cyclists regarding their years of sportsmanship. Accordingly, the exercise dependence levels of individuals who have been practicing sports for 1-3 years were found to be considerably lower than other age groups [47].

Orhan et al [49] found that the mean scores of addicted individuals differed statistically significantly compared to symptomatic and asymptomatic individuals.

In his study, Yılmaz [36] concluded that there was no significant difference in exercise addiction levels based on years of athletic experience. As participants' years of athletic involvement increase, their levels of professionalism in their respective sports also tend to rise. Notably, some participants

compete at the national athlete level. Our research findings included an analysis of exercise addiction levels based on national athlete status, which revealed no significant differences. Similarly, Aksoy [50] found no significant differences in exercise addiction levels based on national athlete status. Additionally, Levit et al. [51] reported no significant differences in exercise addiction levels between professional and amateur athletes. However, a study examining exercise addiction levels in professional and amateur football players found significant differences, with amateur athletes exhibiting higher levels of exercise addiction compared to their professional counterparts [52].

According to Table 5, positive relationships were found between the sub-dimensions of exercise addiction. It can be said that an increase in any of the sub-dimensions of exercise addiction will mean an increase in all other sub-dimensions. On the contrary, it is predicted that a decrease in the sub-dimensions may lead to a decrease in the other scores of the individual.

## Conclusions

In conclusion, exercise addiction can be experienced early in athletes' careers and during professional years. At the beginning of their athletic journey, individuals may view exercise as a mandatory obligation, potentially leading to higher addiction levels. Over time, as professional athletes strive for self-improvement both mentally and physically, they may approach exercise not as an addiction, but as a means to achieve personal development and peak performance.

Furthermore, athletes are often willing to sacrifice basic and social needs in pursuit of success. If individuals view exercise not as a requirement but as preparation to perform at their best during competitions, it can transform from an addiction into a pathway toward personal achievement. Therefore, the primary challenge athletes face is to see exercise not as an obligation but as a stepping stone for growth. Each mental and physical step taken will bring them closer to success.

## References

1. Çingöz YE, Mavibaş M. Investigation of exercise addiction levels among university students. *The Online Journal of Recreation and Sports (TOJRAS)*. 2022; 11(2):19-28.
2. Demirel HG, Cicioğlu Hİ. Üst Düzey Sporcuların Egzersiz Bağımlılık Düzeylerinin İncelenmesi [Examination of exercise addiction levels in elite athletes]. *Gaziantep Üniversitesi Spor Bilimleri Dergisi*, 2020;5(3): 242–254. (In Turkish). <https://doi.org/10.31680/gaunjss.737158>
3. Landolfi E. Exercise Addiction. *Sports Medicine*, 2013;43(2): 111–119. <https://doi.org/10.1007/s40279-012-0013-x>
4. Batu B, Aydın AD. Investigation of exercise addiction levels in elite swimmers. *Gaziantep University Journal of Sports Sciences*. 2020; 5(4):399-412.
5. Arslanoğlu C, Acar K, Mor A, Arslanoğlu E. Geleceğin antrenörlerinde egzersiz bağımlılığı [Exercise addiction in future coaches]. *Ankara Üniversitesi Beden Eğitimi ve Spor Yüksekokulu SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi*, 2021; 137–146. (In Turkish). <https://doi.org/10.33689/spormetre.758693>
6. Wilmore JH, Costill DL, Gleim GW. Physiology of Sport and Exercise: *Medicine & Science in Sports & Exercise*, 1995;27(5): 792. <https://doi.org/10.1249/00005768-199505000-00024>
7. Haskell WL, Kiernan M. Methodologic issues in measuring physical activity and physical fitness when evaluating the role of dietary supplements for physically active people. *The American Journal of Clinical Nutrition*, 2000;72(2): 541S-550S. <https://doi.org/10.1093/ajcn/72.2.541S>
8. Özer K. *Physical fitness* (4th ed.). Ankara: Nobel; 2013.
9. Katra H. Egzersiz Yapan Bireylerde Egzersiz Bağımlılığı ve Benlik Saygısı [Exercise addiction and self-esteem in individuals who exercise]. *Bağımlılık Dergisi*, 2021;22(4): 370–378. (In Turkish). <https://doi.org/10.51982/bagimli.897106>
10. Yates A. *Compulsive exercise and the eating disorders: Toward an integrated theory of activity*. Psychology Press; 1991
11. Griffiths M. Internet Addiction - Time to be Taken Seriously? *Addiction Research*, 2000;8(5): 413–418. <https://doi.org/10.3109/16066350009005587>
12. Szabo A. *Physical activity as a source of psychological dysfunction*. In: *Physical Activity and Psychological Well-Being*. 2000. P.130-153.
13. Berczik K, Szabó A, Griffiths MD, Kurimay T, Kun B, Urbán R, et al. Exercise Addiction: Symptoms, Diagnosis, Epidemiology, and Etiology. *Substance Use & Misuse*, 2012;47(4): 403–417. <https://doi.org/10.3109/10826084.2011.639120>
14. Kayhan RF, Kalkavan A, Terzi E. Fitness Salonlarında Spor Yapan Bireylerin Egzersiz Bağımlılığı Düzeyleri ve İlişkili Değişkenler [Evaluation of exercise addiction levels and related variables among individuals exercising in fitness centers]. *Bağımlılık Dergisi*, 2021;22(3): 248–256. (In Turkish). <https://doi.org/10.51982/bagimli.893414>
15. Adams J, Kirkby RJ. Excessive Exercise as an Addiction: A Review. *Addiction Research & Theory*, 2002;10(5): 415–437. <https://doi.org/10.1080/1606635021000032366>
16. Baekeland F. Exercise Deprivation: Sleep and Psychological Reactions. *Archives of General Psychiatry*, 1970;22(4): 365. <https://doi.org/10.1001/archpsyc.1970.01740280077014>
17. Glasser W. *Positive Addiction*. Harper & Row; 1976.
18. Sachs M, Pargman D. Running addiction. In: Sachs ML, Buffone GW, editors. *Running as therapy: An integrated approach*. Lincoln, NE: University of Nebraska Press; 1984. P. 231-252.
19. Sachs M, Pargman D. Running addiction: A depth interview examination. *Journal of Sport Behavior*. 1979; 2:143-155.
20. Griffiths M. Exercise Addiction: A Case Study. *Addiction Research*, 1997;5(2): 161–168. <https://doi.org/10.3109/16066359709005257>
21. Veale D. Does primary exercise dependence really exist? In: *Exercise Addiction: Motivation for Participation in Sport and Exercise*. Leicester: British Psychological Society; 1995; P. 1-5.
22. Demir GT, Hazar Z, Cicioğlu Hİ. Egzersiz Bağımlılığı Ölçeği (EBÖ): Geçerlik ve Güvenirlik Çalışması [Exercise Addiction Scale (EAS): A study of validity and reliability]. *Kastamonu Eğitim Dergisi*, 2018;26(3): 865–874. (In Turkish). <https://doi.org/10.24106/kefdergi.413383>
23. Demir GT, Türkeli A. Spor Bilimleri Fakültesi Öğrencilerinin Egzersiz Bağımlılığı ve Zihinsel Dayanıklılık Düzeylerinin İncelenmesi [Investigation of exercise addiction and mental resilience levels among sports sciences faculty students]. *Spor Bilimleri Araştırmaları Dergisi*, 2019;4(1): 10–24. (In Turkish). <https://doi.org/10.25307/jssr.505941>
24. Karagöz Y. *SPSS and AMOS: Applied Qualitative-Quantitative-Mixed Scientific Research Methods and Publication Ethics*. Ankara: Nobel Academic Publishing; 2017.
25. George D, Mallery M. *SPSS for Windows Step by Step: A Simple Guide and Reference*, 17.0 Update (10th ed.). Boston: Pearson; 2010.
26. Üstün F, Öz EB. Investigation of exercise addiction levels among university students participating in recreational activities at fitness centers. *National Kinesiology Journal*. 2022; 3(1):10-19. <https://doi.org/10.5281/zenodo.6771040>
27. Pierce EF, Rohaly KA, Fritchley B. Sex Differences on Exercise Dependence for Men and Women in a Marathon Road Race. *Perceptual and Motor Skills*, 1997;84(3): 991–994. <https://doi.org/10.2466/pms.1997.84.3.991>
28. Lichtenstein MB, Jensen TT. Exercise addiction in CrossFit: Prevalence and psychometric properties of the Exercise Addiction Inventory. *Addictive Behaviors Reports*, 2016;3: 33–37. <https://doi.org/10.1016/j.abrep.2016.02.002>
29. Rudolph S. The connection between exercise addiction and orthorexia nervosa in German fitness sports. *Eating and Weight Disorders - Studies on*

- Anorexia, Bulimia and Obesity*, 2018;23(5): 581–586. <https://doi.org/10.1007/s40519-017-0437-2>
30. Gun A, Agirbas O. The Relationship between Exercise Addiction, Physical Activity Level and Body Mass Index of the Students Who are Studying at Physical Education and Sports College. *Asian Journal of Education and Training*, 2018;5(1): 50–55. <https://doi.org/10.20448/journal.522.2019.51.50.55>
  31. Çakir E. The Examination of Exercise Addiction Levels of University Students Studying in Health Field. *Journal of Education and Training Studies*, 2019;7(3): 177. <https://doi.org/10.11114/jets.v7i3.4096>
  32. Bahçivan O. *The relationship between exercise addiction, life satisfaction, and mental resilience levels of individuals exercising in fitness centers*. [Master's thesis], Sakarya University of Applied Sciences, Graduate School of Health Sciences, Sakarya; 2020.
  33. Güler F. *Investigation of the relationship between basic psychological needs and exercise addiction: The example of adults working with personal trainers*. [Master's thesis], Istanbul Gelisim University, Graduate School of Health Sciences, Department of Coaching Education, Istanbul; 2020.
  34. Güneş O. *Determining the relationship between exercise addiction and quality of life in individuals who exercise regularly*. [Master's thesis], Sakarya University of Applied Sciences, Department of Recreation, Sakarya; 2020.
  35. Top E, Türkmen Y. Factors affecting social integration and exercise addiction of athletes with physical disabilities. *Journal of Physical Education & Sports Science*. 2021; 15(3).
  36. Yılmaz ÖE. *Examination of exercise addiction and behavioral regulation levels in physical education and sports sciences undergraduate students*. [Master's thesis], Istanbul Gelisim University, Graduate School of Health Sciences, Department of Coaching Education, Istanbul; 2021.
  37. Kaşka F. *Basic psychological needs and exercise addiction in individuals doing fitness exercises*. [Master's thesis], Aydın Adnan Menderes University, Institute of Health Sciences, Department of Physical Education and Sports, Aydın; 2022.
  38. Birgönül Y. *The relationship between exercise addiction and peace in tennis*. [Master's thesis], Balıkesir University, Institute of Health Sciences, Department of Physical Education and Sports, Balıkesir; 2019.
  39. Başaran Z, Doğanay M, Çolak S, Erdal R. Examination of the exercise addiction, happiness, and life satisfaction of fitness center members based on personal characteristics. In: *Proceedings of the International Congress on Sports and Wellness for Everyone*; 2019. P. 476–484.
  40. Sadıq BJ. *Investigation of exercise dependence of athletes' kickboxing, taekwondo and muay thai*. [Master's thesis], Fırat University, Institute of Health Sciences, Department of Physical Education and Sports, Elazığ; 2018.
  41. Uzun U. *Investigation of exercise addiction in higher education students in sports sciences*. [Master's thesis], Trakya University, Institute of Social Sciences, Department of Recreation Management, Edirne; 2019.
  42. Sucular E. *The impact of eating behavior disorders on exercise addiction in individuals who exercise*. [Master's thesis], Aydın Adnan Menderes University, Institute of Health Sciences, Department of Physical Education and Sports Education, Aydın; 2020.
  43. Lichtenstein MB, Melin AK, Szabo A, Holm L. The Prevalence of Exercise Addiction Symptoms in a Sample of National Level Elite Athletes. *Frontiers in Sports and Active Living*, 2021;3: 635418. <https://doi.org/10.3389/fspor.2021.635418>
  44. Rocks T, Pelly F, Slater G, Martin LA. Prevalence of Exercise Addiction Symptomology and Disordered Eating in Australian Students Studying Nutrition and Dietetics. *Journal of the Academy of Nutrition and Dietetics*, 2017;117(10): 1628–1636. <https://doi.org/10.1016/j.jand.2017.04.001>
  45. İlbak İ, Altun M. Examination of exercise addiction levels in non-sedentary individuals. *Çanakkale Onsekiz Mart University Journal of Sports Sciences*. 2020; 3(1):11-19.
  46. Güzel MC. *Investigation of exercise addiction and mental resilience levels among sports sciences faculty students (The example of Balıkesir)*. [Master's thesis], Balıkesir University, Institute of Health Sciences, Department of Physical Education and Sports, Balıkesir; 2021.
  47. Koçyigit B, Pepe O, İçen İŞ. Examination of exercise addiction levels in elite cyclists. *Düzce University Journal of Sports Sciences*. 2022; 2(2):119-127.
  48. Kalkavan A, Terzi E, Kayhan RF. Investigation of exercise addiction levels in athletes working in Turkish Olympic preparation centers. *Sport Education Journal*. 2021; 5(2):25-35.
  49. Orhan S, Yücel AS, Gür E, Karadağ M. Investigation of exercise addiction in sports centers. *Electronic Turkish Studies*. 2019; 14(2).
  50. Aksoy ÖF. *Investigation of the relationship between exercise addiction and substance addiction awareness in weightlifting and boxing athletes*. [Master's thesis], Bayburt University, Graduate School of Health Sciences, Department of Physical Education and Sports, Bayburt; 2021.
  51. Levit M, Weinstein A, Weinstein Y, Tzur-Bitan D, Weinstein A. A study on the relationship between exercise addiction, abnormal eating attitudes, anxiety and depression among athletes in Israel. *Journal of Behavioral Addictions*, 2018;7(3): 800–805. <https://doi.org/10.1556/2006.7.2018.83>
  52. Kavuran K, Mutlu Bozkurt T, Dursun M. Addiction to Exercise of Professional and Amateur Football Players Comparison of Levels. *Journal of Current Researches on Social Sciences*, 2020;10 (4): 809-820. <https://doi.org/10.26579/jocress.408>

---

### Information about the authors:

**Bekir Furkan Tüzer;** (Corresponding Author); <https://orcid.org/0000-0002-1665-7205>; [bekir.tuzer@selcuk.edu.tr](mailto:bekir.tuzer@selcuk.edu.tr); Faculty of Sports Science, Selcuk University; Konya, Turkey.

**Havva Demirel;** <https://orcid.org/0000-0003-2805-4281>; [havvademirel@selcuk.edu.tr](mailto:havvademirel@selcuk.edu.tr); Faculty of Sports Science, Selcuk University; Konya, Turkey.

---

Cite this article as:

Tüzer BF, Demirel H. Exercise addiction in individuals who exercise regularly. *Physical Education of Students*, 2024;28(6):327–335.

<https://doi.org/10.15561/20755279.2024.0602>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 01.10.2024

Accepted: 19.11.2024; Published: 30.12.2024

# Active discussion vice versa passive observation: a comparative study on developing sport-related moral competencies in amateur and professional sport students

Małgorzata Bronikowska<sup>1ABCDE</sup>, Krzysztof Pezdek<sup>2BD</sup>, Sara Wawrzyniak<sup>2BCD</sup>, Marlena Łopatka<sup>3BD</sup>, Michał Bronikowski<sup>3ABCD</sup>

<sup>1</sup> Department of Recreation, Poznan University of Physical Education, Poland

<sup>2</sup> Department of Physical Education and Sport, Wrocław University of Health and Sport Sciences, Wrocław, Poland

<sup>3</sup> Department of Physical Activity Didactics, Poznan University of Physical Education, Poland

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Moral education of youth is one of the key components in shaping values across various contexts. Among the many approaches to such education, a special role is assigned to sports and physical activity and their influence on personality development. The potential of sports to foster moral education underscores the need for effective approaches to teaching moral values through sport. The aim of the study is to compare the effectiveness of active discussion and passive observation approaches in developing moral competencies among amateur and professional sports students.

**Material and Methods** The study included 259 first-year sports students. Among them, 131 were professional athletes. In the pre-test phase, all participants completed Lind's Moral Judgment Test and the Moral Judgment Test in Physical Education. After a seven-week intervention, participants completed only the Moral Judgment Test in Physical Education as a post-test. The intervention involved three groups. Groups E1 and E2 viewed films that portrayed contrasting behaviors in sports. Group E3 participated in discussions based on the Konstanz Method of Dilemma-Discussion.

**Results** Significant differences ( $p = .01$ ) in sport-related moral competence were observed in the post-test. Group E3, which participated in moral dilemma discussions, achieved the highest scores in sport-related moral competence. Among amateur athletes, the intervention significantly improved sport-related moral competencies from pre- to post-test.

**Conclusions** The results show that engaging in discussions about moral dilemmas can shape young athletes' perceptions and judgments. Viewing positive portrayals of sporting behavior in films also influences their understanding of moral issues in real-life sports situations.

**Keywords:** discussion, video-based moral judgement learning, sport, amateurs, professionals

## Introduction

Moral education in sports is vital for shaping ethical values and enhancing decision-making skills in students and athletes. Despite the recognized potential of sports to promote moral development, the lack of clear consensus on the most effective approaches may hinder progress in this field. This highlights the need for a deeper analysis of moral education strategies that effectively support the holistic development of young people's moral competencies.

In this context, Szyszko-Bohusz [1] emphasizes that the global civilizational transformations of the modern world reveal signs of a socio-moral crisis. This crisis is reflected in the erosion of universal moral values, such as altruism, adherence to truth, and the transcendence of individual egoism. Similarly,

research findings suggest that sport, at various levels of involvement, is becoming increasingly intense, commercialized, and professionalized [2]. These trends often lead to conflicts between values and functionality, as well as between fairness and merit.

Premises about negative trends in the development of contemporary culture highlight the need for greater attention to moral education. Bronikowska et al. [3] emphasize that educating morally conscious youth is the most critical condition for the socially and morally healthy functioning of modern societies. Despite the previously mentioned tendencies, sport, when viewed in the context of justice, remains inherently connected to morality. As such, it can serve as a valuable tool for education and moral development [4]. Research shows that practicing sports can have both positive and negative impacts on moral competences, depending on the factors examined [3, 5, 6].

Engagement in sport has the potential to

enhance moral reasoning skills, encourage prosocial behavior, and improve sportsmanship among participants [7, 8]. Additionally, it serves as a platform for learning cooperation with teammates. Negotiating and resolving moral dilemmas can help athletes develop self-control, demonstrate courage, and cultivate virtues such as teamwork, fairness, and a strong work ethic [9, 10, 11]. However, when neglected or misused, sports can lead to significant moral harm. For instance, recent studies [12] indicate that perfectionism and burnout in sports often result in lower levels of moral engagement and increased antisocial behaviors among athletes.

The hidden potential of moral education in sports raises an important question about the most effective methods for teaching morality through sport. Moral competences, including moral reasoning and acting in accordance with universal values [3], are developed through a complex process. This process involves exposure to moral tasks that, when designed effectively, can foster an individual's moral development.

Garrigan et al. [13] define moral development as the process of maturing in making moral decisions. This process is influenced by moral reasoning, which is stored in memory as moral patterns shaped by moral rules, knowledge, and understanding. Gibbs [14] expands on this idea, emphasizing that both affective components, such as empathy, and cognitive components, such as reasoning, are equally important for moral action. The role of moral schemas stored in memory, along with the affective validation of discussions about dilemmas that involve choosing between actions tied to different moral values, is central to moral education. Current research shows that discussing moral dilemmas can be an effective method for fostering moral development [15, 16, 17, 18, 19], particularly in peer interactions [18]. However, it remains unclear whether this method will be equally effective in a sports context.

Discussing moral dilemmas in sports plays a significant role in moral education [9]. These discussions allow young people to reflect on real-life situations where athletes face decisions about their integrity. Examples include deciding whether to report a foul, follow the rules of fairness, or cheat to win [19, 20, 21]. Analyzing these relatable scenarios helps young people understand the moral consequences of their actions, both in sports and in everyday life. Additionally, such discussions contribute to the development of values associated with sports. Sport is universally recognized as a promoter of values such as justice, responsibility, tolerance, solidarity, and perseverance in achieving goals. These values are essential not only for an athlete's personal growth but also for fostering social relationships [22, 23]. Furthermore, they have lasting relevance and utility beyond the realm of

sports, enriching life outside athletic contexts.

Another important educational aspect of discussing moral dilemmas is emphasizing the role of empathy and considering the perspectives of others. In sports, athletes frequently collaborate with various individuals. This includes teammates, coaching staff, and officials. Such collaboration requires a multidimensional understanding and the ability to take others' perspectives into account. This skill is especially crucial for building healthy relationships within a team.

Sports provide numerous examples of moral actions that can be analyzed through various moral theories. To help young minds connect theory with practice and understand its impact on an athlete's daily life, specially designed educational tasks should be incorporated into the training process. Discussing moral dilemmas in sports encourages young people to reflect on their own behaviors and their consequences. As a result, it is hoped that their actions will become more conscious and responsible. Additionally, the impact of such discussions on the development of decision-making skills in young people should not be underestimated. These discussions teach them how to analyze and evaluate specific situations. They also help young people learn to act in accordance with socially acceptable moral values [18, 24, 25].

When examining modern education and the rise of new teaching technologies, it is essential to consider video as a tool for conveying information visually. Video appears to be an effective educational tool [27, 28], particularly due to its cognitive potential and its ability to evoke emotions. Previous research shows that video can support the moral learning process as early as childhood [29]. It may also help teach moral principles to older students [30].

These findings, along with the demonstrated high effectiveness of dilemma discussions, indicate the need to compare two different intervention methods. The first method involves active participation in discussions, while the second relies on watching video materials without discussion, using a self-reflection approach.

This approach allows for the assumption that the group discussion method on moral dilemmas is likely to contribute to the development of moral competencies among university students. A similar effect is anticipated from film materials featuring positive content, such as sportsmanship and adherence to fair play rules. In contrast, films depicting negative content, such as unsportsmanlike behavior or violations of fair play principles, are less likely to produce the same results. Additionally, it is hypothesized that students engaged in amateur sports will exhibit a higher level of moral competencies compared to their peers involved in professional sports. The aim of the study is to

compare the effectiveness of active discussion and passive observation approaches in developing moral competencies among amateur and professional sports students.

## Material and Methods

### *Participants*

The study included 259 participants (35% female), recruited from first-year students of Sport major faculties at Poznan University of Physical Education and Wroclaw University of Health and Sport Sciences during the 2023/2024 academic year. Of these, 128 students identified as amateur athletes, with an average of  $7.9 \pm 3.42$  years of recreational training experience. The remaining 131 participants identified as professional athletes, reporting an average of  $10.0 \pm 3.01$  years of professional training experience. The average age of the respondents was  $19.5 \pm 1.44$  years.

### *Ethics*

The experiment was carefully designed and conducted in compliance with the regulations of the Declaration of Helsinki (2013 revision). The study protocol was approved by the Bioethics Committee of the University of Medical Sciences in Poznan (decision number: 893/18).

Prior to the research, all participants were informed about the study's aim and procedures. They were assured that their participation was voluntary and that they could withdraw at any time without consequences. Written informed consent was obtained at the beginning of the study after participants were briefed about the confidentiality and anonymity of data collection and storage. They were also informed that their contributions would remain unidentifiable in any final outputs, including publications and reports.

### *Research Design*

The study employed a diagnostic survey method using a quasi-experimental design with pre- and post-testing across four groups: three experimental groups (EG1-EG3) and one control group (CG). During the pre-test phase, all participants first completed Lind's Moral Judgment Test (MJT) [31, 32], followed by the Moral Judgment Test in Physical Education (MJT-PE) [33]. The tests were administered in accordance with standard instructions, without providing additional information or further explanations. Each testing session lasted 45 minutes.

After a seven-week intervention period, the post-test was administered among university students. At this stage, participants in all groups completed only the Moral Judgment Test in Physical Education (MJT-PE). Groups E1 and E2 watched films depicting contrasting behaviors in sports prior to taking the post-test. Meanwhile, Group E3 participated in

discussions conducted according to the full protocol of the Konstanz Method of Dilemma-Discussion (KMDD) [34, 35].

In Group E1 (N=75), the session began with the academic teacher presenting a short film [36] via a classroom projector. The film, lasting approximately six minutes, depicted various examples of unethical behavior and unfair play across different sports disciplines. Immediately after watching the video, participants completed the MJT-PE test without engaging in any discussion or sharing views with other participants. The film was sourced from a publicly available streaming platform (YouTube) on the Internet.

In Group E2 (N=64), the academic teacher presented a six-minute film showcasing examples of fair play behavior across various sports [37]. Immediately afterward, participants were instructed to complete the MJT-PE test without engaging in any discussion or exchange of opinions. The film was sourced from a publicly available streaming platform.

In the third group, E3 (N=72), a moral dilemma discussion was conducted before participants completed the MJT-PE post-test. The discussion followed the principles of the Konstanz Method of Dilemma-Discussion (KMDD) [35]. This method focuses on exploring moral dilemmas within a framework of democratic principles. Its primary goal is to encourage the exchange of well-reasoned arguments and diverse perspectives in a structured, intellectually, and emotionally engaging environment. The session involved a dynamic interplay of cognitive and emotional engagement, incorporating phases of varying intensity and activity levels [35].

The group discussion was facilitated by a well-trained academic instructor who was proficient in the KMDD method. Participants spent 45 minutes discussing each item of the MJT-PE test as a group. The topics included themes such as obeying the coach or referee's decisions, winning at all costs, fouling versus fair play, respect for opponents and their well-being, aggressive behaviors in sports, sporting and unsporting behaviors, rule violations, and the judgment of winners. Each of the 12 items in the MJT-PE test was discussed for approximately three minutes.

The discussion was designed to present various perspectives on these topics without offering final conclusions or evaluating the moral or ethical aspects. The primary objective was to encourage participants to form their own opinions. The academic instructor moderated the discussion, ensuring that it remained structured and that participants adhered to the rules. Only one person was allowed to speak at a time, and no judgments about right or wrong were made by the instructor.

In contrast, participants in the control group (CG,

N=48) completed the MJT-PE post-test immediately after the seven-week period. No supplementary activities, such as media usage or group discussions, were conducted prior to the test.

The level of general-life moral competence was measured using a validated Polish version [38] of Lind's Moral Competence Test (MCT) [31, 32] to determine the respondents' moral competence level (C-index). University students were presented with two dilemmas based on real-life scenarios. The first scenario involved a healthcare setting, where a patient experiencing severe pain and facing a progressive condition seeks her clinician's assistance in considering euthanasia. The second scenario depicted unethical behavior in a factory, where employees, suspecting management of misusing confidential information against them, decide to break into the administrative office.

After carefully reading the scenarios, students were asked to evaluate their thoughts using 12 statements for each moral problem (6 in favor and 6 against the described behavior). Responses were recorded on a 9-point Likert scale, ranging from -4 (totally disagree) to +4 (totally agree), following the established protocol [32]. This tool aligns with Kohlberg's six-stage moral development framework [39]. After all, MCT surveys were collected, the C-index score was calculated using Lind's algorithm [31].

Upon completing the survey, respondents receive a score ranging from 1 to 100 points, depending on their answers. A lower C-index score indicates a lower level of moral competence. The final score reflects an individual's ability to evaluate a dispute based on their own moral principles.

In broader terms, the C-index measures the extent to which a person's judgments are influenced by external moral concerns or intermediating factors, rather than their personal moral constructions and opinions. Scores below 19 are classified as low, scores between 19 and 29 as moderate, and scores above 29 as high levels of moral competence.

#### *Moral Competence in Physical Education and Sport*

The level of sport-related moral competence was measured using the Moral Judgment Test in Physical Education (MJT-PE), developed by Mouratidou et al. [33], to evaluate university students' moral competence in a specific sports context. This tool is an extension of Lind's MCT [31, 32], grounded in Kohlberg's moral development theory [39] and the dual-feature theory of moral behavior. Unlike the MCT, the MJT-PE involves only a single dilemma. This dilemma is based on a real-life scenario that depicts an inconsistent situation during a sports competition. The moral problem concerns young athletes participating in a school basketball championship. In the final moments of the decisive game, they employ dishonest strategies to secure victory at any cost. As with Lind's MCT, respondents

are expected to evaluate their agreement or disagreement with 12 statements (6 in favor and 6 against the behavior described in the scenario). They are asked to base their responses on their prior experiences and knowledge of sports. Participants record their answers on a 9-point Likert scale, ranging from -4 (totally disagree) to +4 (totally agree), while assessing the entire situation.

From a moral perspective, this tool was intended to capture the understanding of ethical dilemmas reflected in the behaviors of players depicted in the sports context. The moral competence in sports index (C-PE index) is calculated in the same way as the moral competence index in Lind's tool (C-index). The primary difference is the changed context of the dilemma, as well as the fact that the MJT-PE contains only one moral dilemma.

Participants were asked to honestly define their level of involvement in sports, specifying whether it was amateur (participating in sports activities as a hobby, for pleasure [40]) or professional (participating in a regular system of sports competitions organized by official federations [41]). The survey also included questions about the number of years of involvement in sports and the specific sport they practiced.

The study was conducted in a lecture hall and lasted no longer than 45 minutes. To facilitate efficient and convenient data collection, respondents completed the survey using an online Google Forms link. Technical support from the researcher was available to participants if needed.

#### *Statistical Analysis*

The data analysis was conducted using tests appropriate for normally distributed data (Shapiro-Wilk test). An ANOVA test was applied to examine interaction and main effects. Student's t-test was used to assess the significance of differences in mean values between pre-test and post-test results within each group for sport-related competence level C-index scores. Additionally, the Kruskal-Wallis ANOVA was employed to test for potential differences in C-index scores between all groups. This was done separately for the General-life level of moral competencies and the Sport-related competencies level in term I (pre-test) and term II (post-test). The significance level was set at  $p < .05$ . All analyses were performed using the STATISTICA 13.1 software package (StatSoftPolska sp. z o.o., 2021).

## **Results**

The repeated measures ANOVA revealed a main effect of the experimental (intervention) factor on the level of sport-related competencies across the examined groups between terms I and II [ $F(1, 254) = 4.4223, p = 0.036$ ]. The interaction effect (time  $\times$  group) was approaching statistical significance [ $F(3, 254) = 2.5594, p = 0.055$ ].

A more detailed comparison of C-index scores is presented in Table 1. No significant differences were found between the groups in General-life moral competencies. Similarly, no significant differences were observed in sport-related competence levels between the groups during the first term of examination (pre-test). However, a significant difference ( $p = 0.01$ ) was detected during the second term (post-test). Post-hoc testing revealed that these differences were due to variations between the following groups: Experimental Group 1 vs. Experimental Group 3 and Control Group vs. Experimental Group 3. All differences were significant ( $p \leq 0.05$ ) and favored Experimental Group 3. Furthermore, a significant positive improvement in sport-related competence scores was observed between terms I and II for Experimental Group 3 ( $p = 0.01$ ). No such changes were noted in the other groups. The mean C-score for sport-related competence achieved by Experimental Group 3 in the second term (post-intervention) was the highest among all groups.

In the second step, a repeated measures ANOVA was conducted separately for subgroups (amateurs and professionals). For the amateur subgroup, the analysis revealed a main effect of the experimental (intervention) factor on the level of sport-related competencies between terms I and II [ $F(1, 124) = 6.5423, p = 0.017$ ]. The interaction effect (time  $\times$

group) approached statistical significance [ $F(3, 124) = 2.5020, p = 0.062$ ]. In contrast, for the professional subgroup, no significant main effects or interaction effects were observed.

Further, an in-depth comparison of mean C-index scores between groups and examination terms for amateurs (Table 2) revealed significant differences between the groups during the second term of examination ( $p = 0.01$ ). Amateurs in Experimental Group 3 scored significantly higher than their peers in Experimental Group 1 and the Control Group ( $p < 0.05$ ). Additionally, the most significant increase in sport-related competencies ( $p = 0.01$ ) between terms I and II was observed in Experimental Group 3. This score was also the highest among all groups and terms. No significant differences were found between the subgroups of amateurs in the levels of General-life competencies.

For the professional subgroup (Table 3), the only observed difference between the groups was in the levels of sport-related competencies during the second term of examination ( $p = 0.03$ ). However, post-hoc analysis revealed no statistically significant differences. It is noteworthy that the mean score of professional athletes in Experimental Group 3 was the highest among all groups. This score showed a slight upward trend in the second term of examination, although it did not reach the level of statistical significance.

**Table 1.** General-life index and sport-related C-index scores for total groups of athletes.

Group Code	N	General-Life Competence C-Index	Sport-Competence C-Index I Term	Sport-Competence C-Index II Term	I - II Terms Students' T-Test
		M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	p value
EG 1	75	15.5 $\pm$ 0.82	30.3 $\pm$ 0.38	33.4 $\pm$ 0.40	0.27
EG 2	64	12.8 $\pm$ 8.68	32.2 $\pm$ 18.43	35.7 $\pm$ 20.21	0.24
EG 3	72	14.3 $\pm$ 9.80	33.7 $\pm$ 18.85	43.2 $\pm$ 21.29 <sup>a, b</sup>	<b>0.01</b>
CG	48	14.4 $\pm$ 9.19	36.9 $\pm$ 20.98	33.9 $\pm$ 22.62	0.39
Kruskal-Wallis (ANOVA) p value		0.43	0.35	0.01	

Post-hoc test: \*  $p < 0.05$ ; a - E1<E3\*, b - Control<E3\*

**Table 2.** General-life index and sport-related C-index scores for group of amateur athletes.

Group Code	N	General-Life Competence C-Index	Sport-Competence C-Index I Term	Sport-Competence C-Index II Term	I - II Terms Students' T-Test
		M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	p value
EG 1	75	16.3 $\pm$ 11.00	31.5 $\pm$ 19.00	33.4 $\pm$ 21.8	0.10
EG 2	64	11.8 $\pm$ 8.08	33.2 $\pm$ 20.12	35.8 $\pm$ 21.4	0.44
EG 3	72	13.5 $\pm$ 9.50	32.3 $\pm$ 18.43	47.9 $\pm$ 22.01 <sup>a, b</sup>	<b>0.01</b>
CG	48	14.3 $\pm$ 9.62	39.9 $\pm$ 20.4	38.5 $\pm$ 24.85	0.25
Kruskal-Wallis (ANOVA) p value		0.28	0.53	0.01	

Post-hoc test: \*  $p < 0.05$ ; a - E1<E3\*, b - Control<E3\*

**Table 3.** General-life index and sport-related C-index scores for professional athletes.

Group Code	N	General-Life Competence C-Index	Sport-Competence C-Index I Term	Sport-Competence C-Index II Term	I - II Terms Students' T-Test
		M±SD	M±SD	M±SD	p value
EG 1	75	14.4±8.68	28.7±20.16	28.1±17.7	0.87
EG 2	64	13.9±9.33	31.6±16.51	35.4±19.28	0.38
EG 3	72	14.9±10.10	34.8±19.32	39.7±20.28	0.20
CG	48	14.6±9.04	34.7±21.45	30.7±20.76	0.36
Kruskal-Wallis (ANOVA) p value		0.93	0.95	0.03	

Post-hoc test: non-significant

**Table 4.** General-life competence C-index and sport-related competence C-index between the groups of amateurs and professional athletes.

Group	N	General-life competence C-index	Sport-related competence C-index I term	Sport-related competence C-index II term
		M ± SD	M ± SD	M ± SD
Amateurs	N=128	14.1±9.76	33.5±19.38	39.7±23.18
Professionals	N=123	14.5±9.27	32.5±19.85	34.0±19.85
p value		0.76	0.67	0.03

The final step involved comparing the mean values of General-life competencies between the groups of amateurs and professional athletes. No statistically significant differences were found (Table 4). A similar outcome was observed in the pre-test (Term I) comparison of sport-related competence scores between amateurs and professionals. However, a statistically significant difference ( $p = 0.03$ ) was identified in the post-test (Term II) analysis of these scores. Amateurs demonstrated significantly higher levels of moral competence in the sport-related context compared to professionals.

## Discussion

The objective of this research was to examine the potential impact of different interventions on the moral competences of Sport and PE major students. These interventions included moral dilemma discussions and exposure to sports-related video films showcasing both sportsmanlike and unsportsmanlike behaviors. Additionally, the study aimed to explore the relationship between moral competence and the level of competition among athletes.

In this study, we hypothesized that the moral dilemma discussion method would have the most significant impact on participants' moral competence among the methods used. This hypothesis was based on previous research conducted with students in the United States and Britain [42]. The findings suggest that, despite being digital natives, Generation Z members prefer face-to-face communication over

text or email. Studies indicate that young people value emotional connections and the human aspect of interactions. This preference may be a response to the challenges of living in a globalized and often remote world. Respondents highlighted the importance of direct contact, expressing a desire for closeness and authenticity in their interpersonal relationships [42]. Our hypothesis was positively validated. The levels of competence among students in the moral dilemma discussion group were notably higher than those in the other groups. Furthermore, these differences were statistically significant when compared to both the control group (which had no intervention) and the group exposed to negative behaviors in sports via video films.

Research suggests [43] that exposure to negative or violent media, including movies, can significantly influence the moral judgment and behavior of young people. Studies indicate that violent media can lead to increased aggressive thoughts, emotions, and behaviors. This underscores that the moral implications presented in stories can shape how young individuals perceive right and wrong.

It was also hypothesized that the moral dilemma discussion group and the group exposed to positive sporting behaviors through video films would demonstrate higher levels of proficiency. Research highlights that media emphasizing specific moral intuitions can directly influence how young viewers perceive and evaluate right and wrong in real-life situations. By presenting clear narratives of justice, kindness, and perseverance, positive films can

promote more ethical behavior among the youth [44]. In educational contexts, movies can also foster critical thinking and reflection. They help students process complex social issues and moral scenarios, which further influence their personal development and moral outlook [45]. Our hypothesis was partially validated. While the level of moral competence was higher in these groups, the differences were not statistically significant, except in the case of the moral dilemma discussion group.

Introducing moral dilemma discussions is firmly grounded in multiple scientific disciplines. Their efficacy has been extensively studied across various age groups [46, 47, 48]. However, this approach has not been widely applied in the context of sports, nor among athletes and sports professionals. This gap inspired the current research, which focuses on sport-related issues and their impact on students engaged in any form of sport. These findings are consistent with prior research by Bronikowska et al. [3], which highlighted the positive effect of dilemma discussions on athletes' moral competence within the domain of physical education and sports.

On the other hand, Nicholas et al. [30] suggest that educators can use videos to teach moral principles, supported by evidence of student achievement and increased interest in learning. In this study, film materials were used to present positive (one experimental group) and negative (another experimental group) sporting behaviors tailored to specific groups. The results showed that both experimental groups (E1 and E2) demonstrated higher levels of moral competence in physical education and sports (PE&S) during the post-test compared to the control group. However, their scores were lower than those of the discussion group. These findings highlight the potential value of video-based interventions and point to directions for further research. Particularly, they suggest exploring the integration of the moral dilemma discussion approach with technological tools such as films or virtual reality [49].

The study aimed to explore differences in the level of moral competence between amateur and professional athletes. Among both groups, amateur athletes demonstrated higher levels of moral competence compared to their professional counterparts. Notably, within the amateur subgroup, the participants engaged in moral dilemma discussions showed the most significant improvement in moral competencies. Their results were also notably higher than those of both the control group and the group exposed to films depicting negative, unsportsmanlike behaviors.

The findings of this study align with previous research, which has demonstrated a negative correlation between athletes' proficiency in sports and their ethical and moral conduct [49, 50, 51]. These studies suggest that professional athletes often

exhibit lower levels of moral aptitude compared to amateurs if not properly educated in this area. Additionally, the results support the conclusions of Bronikowska et al. [3], who established that incorporating structured dilemma discussions can significantly benefit amateur athletes. This highlights the critical importance of integrating ethical deliberations into athletic training programs. Such initiatives are especially vital for Physical Education and Sports educators and should ideally begin early in the training process, before young athletes transition into professional sports.

According to Cumming et al. [48], ethical decision-making skills in undergraduate elementary and secondary education students can be enhanced through targeted educational interventions that include discussions of moral dilemmas. Therefore, implementing an intervention program for younger age groups, including both active and non-active participants in sports, was considered valuable.

Within the scope of our research, a single-session intervention was implemented across all three experimental groups, each employing a different approach. The findings indicated that the discussion method was the most effective. For future investigations, it would be prudent to explore the potential efficacy of extending this intervention model across multiple sessions or increasing its duration. Such an approach could provide valuable insights into the sustained impact and long-term effectiveness of the intervention. Additionally, it may prove beneficial in educational systems across different cultures and age groups.

Although the study highlighted important aspects, such as the effectiveness of a positive approach, particularly the discussion method, it also had some limitations. The research sample was relatively small and restricted to students majoring in Sport and Physical Education. This can be seen as both a limitation and a strength. On one hand, these students are expected to have a heightened awareness of the dilemmas presented and be better prepared for their future roles as coaches or teachers. On the other hand, their responses showed notable inconsistencies, which warrant further exploration. Another limitation was the use of only a single-session intervention. It is possible that a more sustained and frequent application of the intervention could lead to more significant changes. However, this aspect remains an area for future in-depth research designs.

## Conclusions

Based on the discussion above, several conclusions can be drawn. The research confirms that moral dilemma discussions, compared to other forms of influence, significantly enhance moral competence in a sport-related context. This finding supports the initial hypothesis that discussions

would have the greatest impact. Although exposure to positive sports behaviors through video films also improved moral competence, the improvements were not statistically significant when compared to the discussion group. This indicates that while videos can be beneficial, they may not be as effective as active discussions in fostering moral development.

The study revealed that non-professional athletes exhibited higher moral competencies than professional athletes, particularly those who participated in moral dilemma discussions. This finding underscores the need for ethical education, especially for professional athletes, who may lack competency in this area, as reflected in their lower scores. The results highlight the importance of incorporating structured moral discussion sessions into athletic training programs. Amateur athletes appeared to be the most responsive group, suggesting the necessity of fostering ethical decision-making from an early stage of involvement in sports practice. Given the potential of moral discussions to enhance ethical decision-making skills, it is recommended

to implement similar interventions for younger age groups. These interventions should include both active and non-active sports participants to maximize their impact.

The study recommends exploring the long-term effects of moral dilemma discussions through multi-session interventions. Such an approach could offer valuable insights into the sustained impact of ethical training on moral competence over time.

However, the research acknowledges certain limitations. These include a relatively small sample size restricted to Sport and PE students and the use of a single-session intervention. These factors may limit the generalizability and robustness of the findings, emphasizing the need for further studies to validate the results.

In conclusion, this study provides strong evidence supporting the effectiveness of moral dilemma discussions in enhancing moral competence among athletes. At the same time, it highlights areas for further exploration and underscores the importance of integrating ethical training into sports education programs.

## References

1. Szyszko-Bohusz A. Kultura fizyczna w społeczeństwie nowoczesnym w świetle pedagogiki holistycznej i teorii nieśmiertelności genetycznej [Physical culture in modern society in the light of holistic pedagogy and the theory of genetic immortality]. In: Dziubiński Z, Jankowski KW, editors. *Kultura fizyczna w społeczeństwie nowoczesnym* [Physical culture in modern society]. Warszawa: SOSRP; 2009. P. 365–371. (In Polish).
2. Yaffe Y, Levental O, Arey DL, Lev A. Morality and Values in Sports Among Young Athletes: The Role of Sport Type and Parenting Styles - A Pilot Study. *Frontiers in Psychology*, 2021; 12:618507. <https://doi.org/10.3389/fpsyg.2021.618507>
3. Bronikowska M, Mouratidou K, Khorkova M, Bronikowski M. Moral competence, dilemma discussion, and sports: unraveling the significance of framework, competitive level, and sporting experience. *Physical Education of Students*, 2023; 27(6): 303–312. <https://doi.org/10.15561/20755279.2023.0601>
4. Arnold PJ. Sport and Moral Education. *Journal of Moral Education*, 1994; 23(1): 75–89. <https://doi.org/10.1080/0305724940230106>
5. Mouratidou K. Determinants of athletes' moral competence: the role of demographic characteristics and sport-related perceptions. *Sport in Society*, 2017; 20(7): 802–815. <https://doi.org/10.1080/17430437.2016.1221926>
6. Bredemeier BJ. Children's moral reasoning and their assertive, aggressive and submissive tendencies in sport and daily life. *Journal of Sport and Exercise Psychology*, 1994; 16(1): 1–14. <https://doi.org/10.1123/jsep.16.1.1>
7. Naylor AH, Yeager JM. A 21st-century framework for character formation in sports. *Peabody Journal of Education*, 2013; 88(2): 212–224. <https://doi.org/10.1080/0161956X.2013.775878>
8. Gasic-Paviscic S, Janjetovic D. Connection between participation in sport and pro-social orientation and aggression of adolescents: Differences according to gender. *Zbornik Instituta za pedagogsku istrazivanja*, 2007; 39(2): 329–346. <https://doi.org/10.2298/ZIPI0702329G>
9. Ludwiczak M, Parry J, Bronikowska M. Improving moral competence in adolescents through non-linear pedagogy in the context of physical education and sport. *The Journal of Sports Medicine and Physical Fitness*, 2024; 64(6): 599–608. <https://doi.org/10.23736/s0022-4707.23.15695-7>
10. Shields DLL, Bredemeier BJL. *Character development and physical activity*. Champaign, IL: Human Kinetics; 1995.
11. Weiss MR, Bredemeier BJ. Moral development in sport. *Exercise and Sport Sciences Reviews*, 1990; 18: 331–378. <https://doi.org/10.1249/00003677-199001000-00015>
12. Stanger N, Jowett GE, Kaiseler M, Williams TL. Linking perfectionism with moral behaviors in sport: The mediating role of burnout and moral disengagement. *Research Quarterly for Exercise and Sport*, 2024; 95(3): 646–655. <https://doi.org/10.1080/02701367.2023.2294096>
13. Garrigan B, Adlam ALR, Langdon PE. Moral decision-making and moral development: Toward an integrative framework. *Development Review*, 2018; 49: 80–100. <https://doi.org/10.1016/j.dr.2018.06.001>
14. Gibbs JC. *Moral development and reality: Beyond*

- the theories of Kohlberg, Hoffman, and Haidt. Oxford: Oxford University Press; 2013. <https://doi.org/10.1093/acprof:osobl/9780199976171.001.0001>
15. Lind G. *How to Teach Moral Competence*. Berlin: Logos Verlag; 2019. <https://doi.org/10.4324/9780429321597-10>
  16. Lind G. *Ist Moral lehrbar? Ergebnisse der modernen Moral psychologischen Forschung* [Can morality be teachable? Results of modern moral psychology research]. Berlin: Logos Verlag; 2002. (in German).
  17. Salvador RO. Re-examining the 'Discussion' in the Moral Dilemma Discussion. *Journal of Business Ethics*, 2019; 156(1): 241–256. <https://doi.org/10.1007/s10551-017-3626-z>
  18. Kruger AC. The Effect of Peer and Adult-Child Transactive Discussion on Moral Reasoning. *Merill-Palmer Quarterly*, 1992; 38(2): 191–211.
  19. Simon RL. *Fair Play: The Ethics of Sport*. Routledge; 2018. <https://doi.org/10.4324/9780429492570>
  20. Arnold PJ. *Sport, Ethics and Education*. Herndon, VA: Cassell; 1997.
  21. Shields DL, Bredemeier BL, editors. *True competition: A guide to pursuing excellence in sport and society*. Champaign: Human Kinetics; 2009. <https://doi.org/10.5040/9781492596011>
  22. Carr D. Moral values and the development of character: education and sports. *Journal of the Philosophy of Education*, 2003; 37(4): 605–625.
  23. Kretchmar RS. *Practical philosophy of sport and physical activity*. Champaign, IL: Human Kinetics; 2005.
  24. McNamee MJ, Parry SJ. (Eds.) *Ethics and Sport*. Abingdon: Routledge; 2013.
  25. Haan N. Moral development and sportsmanship in physical education and sport. *Quest*, 1983; 35(2): 135–144.
  26. Rackaway C. Video killed the textbook star? Use of multimedia supplements to enhance student learning. *Journal of Political Science Education*, 2012; 8(2): 189–200. <https://doi.org/10.1080/15512169.2012.667684>
  27. Hsin WJ, Cigas J. Short videos improve student learning in online education. *Journal of Computing Sciences in Colleges*, 2013; 28(5): 253–259.
  28. Brame CJ. Effective educational videos: principles and guidelines for maximizing student learning from video content. *CBE - Life Sciences Education*, 2016; 15(4): es6. <https://doi.org/10.1187/cbe.16-03-0125>
  29. Jennah R, Mazrur M, Rahmaniati R. Video-Based Moral Learning: An Internalization of Values in Early Childhood. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 2023; 7(3): 2733–2741. <https://doi.org/10.31004/obsesi.v7i3.4247>
  30. Nicholas T, James G, Robert K. Moral Aqidah Learning Using Video-Based Technology. *Scientechno: Journal of Science and Technology*, 2023; 2(1): 1–16. <https://doi.org/10.55849/scientechno.v2i1.65>
  31. Lind G. *An introduction to the moral judgment test (MJT)*. Unpublished manuscript. Konstanz: University of Konstanz, 1998.
  32. Lind G. *How to teach morality. Promoting deliberation and discussion. Reducing violence and deceit*. Berlin: Logos-Publisher; 2016.
  33. Mouratidou K, Chatzopoulos D, Karamavrou, S. Validity study of the Moral Judgment Test in Physical Education : Development and preliminary validation. *Perceptual and Motor Skills*, 2008; 106: 51–62. <https://doi.org/10.2466/PMS.106.1.51-62>
  34. Hemmerling K, Scharlipp M, Lind G. Dyskusja konstancka jako metoda edukacyjna w grupach wysokiego ryzyka [Constanța discussion as an educational method in high-risk groups]. In: Cern KC, Juchacz PW, Nowak E, editors. *Edukacja demokratyczna* [Democratic education]. Poznań: UAM Publishing House; 2009. P. 153–165. (In Polish).
  35. Lind G. Die Förderung moralisch-demokratischer Kompetenzen mit der Konstanzer Methode der Dilemma-Diskussion (KMDD) [Promoting moral-democratic competencies with the Konstanz Method of Dilemma Discussion (KMDD)]. In: Latzko B, Malti T, editors. *Moralentwicklung und –erziehung in Kindheit und Adoleszenz* [Moral development and education in childhood and adolescence]. München: Juventa-Verlag; 2010. P. 285–302. (in German).
  36. *Twenty-five most unsportsmanlike & disrespectful moments in sports*. [video file]. [cited 2024 Jan 25]. Available from: <https://www.youtube.com/watch?v=8H5OkjcCqPw>
  37. *Legendary Respect and Fair Play Moments in Sports*. [video file]. [cited 2024 Jan 26]. Available from: [https://www.youtube.com/watch?v=helXtzTVGiQ&ab\\_channel=SporDelisiHD](https://www.youtube.com/watch?v=helXtzTVGiQ&ab_channel=SporDelisiHD)
  38. Nowak E. Demokracja zaczyna się w umyśle. Rozwijając osobowość demokratyczną [Democracy begins in the mind. Developing a democratic personality]. *Principia*, 2013; 57-58: 23–40. (In Polish).
  39. Kohlberg L. *Stages of moral development as a basis for moral education*. Cambridge: Center for Moral Education, Harvard University; 1971. <https://doi.org/10.3138/9781442656758-004>
  40. Collins English Dictionary. Definition of "Amateurism." [Internet]. 2022 [cited 2022 Jan 12]; [about 1 screen]. Available from: <https://www.collinsdictionary.com/dictionary/english/amateurism>
  41. Bronikowska M, Korcz A, Bronikowski M. The role of sports practice in young adolescent development of moral competence. *International Journal of Environmental Research and Public Health*, 2020; 17(15): 5324. <https://doi.org/10.3390/ijerph17155324>
  42. Katz R, Ogilvie S, Shaw J, Woodhead L, editors. *Gen Z explained: The art of living in a digital age*. Chicago: University of Chicago Press; 2022. <https://doi.org/10.7208/chicago/9780226814988.001.0001>
  43. Anderson CA, Bushman BJ, Bartholow BD, Cantor J, Christakis D, Coyne SM, et al. Screen violence and youth behavior. *Pediatrics*, 2017; 140(Supplement\_2):142–147. <https://doi.org/10.1542/peds.2016-1758T>
  44. Silva Santos IL, Pimentel CE. Superhero films'

- impacts on prosocial behavior: the mediating role of state-empathy and violence justification. *The Journal of Psychology*, 2024; 1–15. <https://doi.org/10.1080/00223980.2024.2387039>
45. Hareket E, Kartal A. Are children and youth “right” in animated movies? A systematic analysis. *The International Journal of Children’s Rights*, 2024; 32(2): 288–326. <https://doi.org/10.1163/15718182-32020001>
46. Cloninger PA, Seivarajan TT. Can ethics education improve ethical judgment? An empirical study. *SAM Advanced Management Journal*, 2010; 75(4): 411.
47. Christensen JF, Gomila A. Moral dilemmas in cognitive neuroscience of moral decision-making: A principled review. *Neuroscience & Biobehavioral Reviews*, 2012; 36(4): 12491264. <https://doi.org/10.1016/j.neubiorev.2012.02.008>
48. Cummings R, Maddux R, Richmond A, Cladianos A. Moral reasoning of education students: the effects of direct instruction in moral development theory and participation in moral dilemma discussion. *Teachers College Record*, 2010; 112(3): 621644. <https://doi.org/10.1177/016146811011200305>
49. García-Moriyón F, González-Lamas J, Botella J, González Vela J, Miranda-Alonso T, Palacios A, et al. Research in moral education: the contribution of P4C to the moral growth of students. *Educ Sci*, 2020;10(4): 119. <https://doi.org/10.3390/educsci10040119>
50. Hewko SJ, Cooper SL, Cummings GG. Strengthening moral reasoning through dedicated ethics training in dietetic preparatory programs. *Journal of Nutrition Education and Behavior*, 2015; 47(2):156–161. <https://doi.org/10.1016/j.jneb.2014.10.001>
51. Stephens DE. Predictors of aggressive tendencies in girls’ basketball: An examination of beginning and advanced participants in a summer skills camp. *Research Quarterly for Exercise and Sport*, 2001; 72: 257–266. <https://doi.org/10.1080/02701367.2001.10608958>

---

#### Information about the authors:

**Małgorzata Bronikowska**; (Corresponding Author); <https://orcid.org/0000-0002-0584-0725>; [bronikowska@awf.poznan.pl](mailto:bronikowska@awf.poznan.pl); Department of Recreation, Poznan University of Physical Education; Poznan, Poland.

**Krzysztof Pezdek**; <https://orcid.org/0000-0003-1750-5999>; [krzysztof.pezdek@awf.wroc.pl](mailto:krzysztof.pezdek@awf.wroc.pl); Department of Physical Education and Sport, Wrocław University of Health and Sport Sciences; Wrocław, Poland.

**Sara Wawrzyniak**; <https://orcid.org/0000-0003-3040-6637>; [sara.wawrzyniak@awf.wroc.pl](mailto:sara.wawrzyniak@awf.wroc.pl); Department of Physical Education and Sport, Wrocław University of Health and Sport Sciences; Wrocław, Poland.

**Marlena Łopatka**; <https://orcid.org/0000-0002-2664-1864>; [lopotka@awf.poznan.pl](mailto:lopotka@awf.poznan.pl); Department of Physical Activity Didactics, Poznan University of Physical Education; Poznan, Poland.

**Michał Bronikowski**; <https://orcid.org/0000-0002-4534-7345>; [bronikowski@awf.poznan.pl](mailto:bronikowski@awf.poznan.pl); Department of Physical Activity Didactics, Poznan University of Physical Education; Poznan, Poland.

---

Cite this article as:

Bronikowska M, Pezdek K, Wawrzyniak S, Łopatka M, Bronikowski M. Active discussion vice versa passive observation: a comparative study on developing sport-related moral competencies in amateur and professional sport students. *Physical Education of Students*, 2024;28(6):336–345. <https://doi.org/10.15561/20755279.2024.0603>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 20.10.2024

Accepted: 21.11.2024; Published: 30.12.2024

# Universal test of possibility of action based on motor potential (UTPA-MP) – health and survival applications

Artur Kalina<sup>1ABCDE</sup>, Roman Maciej Kalina<sup>2ABCDE</sup>, Artur Kruszewski<sup>3ABCDE</sup>, Michał Kruszewski<sup>3ABCDE</sup>

<sup>1</sup> Plus-Rehabilitation Services Ltd., Crystal Lake, United States

<sup>2</sup> EKO-AGRO-FITNESS Prof. Roman M. Kalina, Piwniczna-Zdrój, Poland

<sup>3</sup> Jozef Pilsudski University of Physical Education in Warsaw, Poland

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** The cognitive aim of the paper is the methodological argumentation, showing the UTPA-MP as a basic tool for providing evidence that the physical education paradigm is in many ways counterproductive in the sense of the social responsibility of science to permanently strengthen all dimensions of personal health and safety. Application objective – a perspective on the application of UTPA-MP from the micro-scale to the global dimension of public.

**Material and Methods** UTPA-MP, as a compilation of empirically verified non- and quasi-experimental tests in numerous experimental applications, provides knowledge about human motor potential according to uniform evaluation criteria, irrespective of gender. The age limits are conventional – the boundaries of the continuum are only indicatively linked to the start of primary school.

**Results** The results of the UTPA-MP provide knowledge of deep sensibility, flexibility, ability to tolerate imbalances, muscle strength of the upper and lower limbs and abdominal muscles, as well as the body's physical capacity (anaerobic and aerobic). Since it lasts about 15-20 minutes it is a sufficient stimulus preparing the body for the continuation of physical effort. The test is a system of specific training sessions and has references to the strengthening of health and survival skills.

**Conclusions** Since in the praxeological sense 'dispositional feasibility' – is the strength, intellectual or manipulative ability and knowledge (skill) and willingness sufficient to perform a given action, the interpretation of the results of measuring motor (energy) potential based on UTPA-MP indices goes beyond the paradigm narrowed to the field of physical education and sport.

**Keywords:** pain, physical education, physical fitness paradigm, preventive medicine

## Introduction

The 'physical fitness' paradigm is most strongly associated with physical education [1], sport and recreation [2, 3], but also with military training and security services [4], health related fitness [5, 6], personal training, physiotherapy. Somewhere further down the line are utilitarian motoricity (of everyday activity), industrial motoricity (relating to different jobs), acting motoricity, musical instrumentalists' motoricity [7, 8] etc. The variety of goals and needs pursued in these and many other areas of human activity is only one reason for the multiplicity of synonyms for the phenomenon 'physical fitness'. Even though the common perception of the phenomenon of 'physical fitness' is linked, only partly rightly, to the biological layer of the human personality, this consistency is not apparent either on a semantic or evaluative level (there are few synonyms for the word, so the chance to avoid misunderstandings).

A synthetic exemplification of the meaning of the last sentence is the paradox that 'strength', as

a basic component of 'physical fitness', is measured in metres and centimetres, in the number of repetitions of a diagnostic exercise, in the indicators used in physics, etc. Meanwhile, the term 'strength', in some natural languages combined with various adjectives, effectively clarifies the terminology of even distant scientific disciplines and organises colloquial communication (moral strength, strength of character, strength of personality, strength of influence, strength of argument, etc.). It matters little that 'strength' is replaced by numerous synonyms.

Since the vast majority of human activity involves physical engagement, but not necessarily every time using all somatic (upper and lower limbs, etc.) and energetic resources to the point of subjective exhaustion, and since all activity is impossible outside of time, it is these general premises that are the primary impetus to, first and foremost, challenge the 'physical fitness' paradigm as we know it.

The second group of rationales relates to responsibility for one's own health, the health of those with whom the individual has a legal caring relationship, for survival, and for the quality of the environment (not only the environmental aspect, but also the impact on social health).

This simplified line of reasoning is, in our opinion, sufficient to formulate the elementary assumption that, in place of the 'physical fitness' paradigm, we are proposing an evidence-based model (as a basic tool of preventive medicine) [9, 10, 11] that can be implemented in any activity that can be quantified and modified for desired purposes. This evidence, on the one hand, is synthesised scientific knowledge. On the other, our own innovations, repeatedly verified in many of the areas of practice we highlighted in the first paragraph.

## Material and Methods

### *Methodological background*

Praxeology – a forgotten science – is recognized as a methodology proper by the prominent leaders and continuators of The Lwów–Warsaw School (an interdisciplinary school mainly philosophy, logic and psychology) [12]. Praxeology is the science of the effective attainment of the goals of all physical and mental work, and therefore provides concepts at the highest possible level of generality [13, 14]. Thus, a concept with a higher level of generality than 'physical fitness' and its synonym is 'possibility of action' in the sense just understood in praxeology. 'Possibility of action' is still understood in the logical and evaluative sense (refer to the encyclopaedia of praxeology) [14].

Physical fitness is a concept that falls into two praxeological categories that complement the meaning of the term 'possibility of action': a) dispositional feasibility – the strength, intellectual or manipulative prowess, knowledge (skill) and willingness sufficient to perform a given action; b) situational actionability means that the performance of a given action under certain circumstances is not thwarted by those very circumstances [13, 14].

The term 'strength' here is neither synonymous with physical fitness nor identical with the basic component of this phenomenon 'muscle power' (at the same time, this is an example of the use of the synonym 'strength').

Terminological differences (although often the same phenomenon) arise within the practices and sciences exploring selected human activities. The specific disciplines of sport science provide knowledge of 'general physical fitness' and 'special physical fitness' (abstracting from the more in-depth classifications) [15]. These two manifestations of physical fitness remain in relations of identification with 'dispositional feasibility' and 'situational actionability', from the preparation stage (exercises, training) and sports combat to macro-level competition (Olympic Game and world game). It is sport, with its strengths in motor diversity and attractiveness, as well as the possibility of repeatedly verifying the relationship of congruence between 'dispositional feasibility' and 'situational

actionability', that is the area most rich in possible evidence-based analyses and syntheses.

A certain analogy applies to the field of instrumental music. However, it is not only the frequency, especially of piano and violin competitions of global prestige, that gives way to the activity associated with sport, descending all the way to the micro level. There is disproportionately less scientific knowledge concerning the motoricity of musicians [7, 8]. The perception of this knowledge by motor learning and performance experts is hindered by the language of methodological publications [16, 17, 18, 19].

Transferring the argument to the field of professional activity, in which motor potential is a leading factor or equivalent to intellectual commitment, epidemiological indicators can – paradoxically – be considered the simplest performance criterion. The lower the scale of failures with fatal and health consequences, the higher the quality of selection for the profession and preparation methods (influencing 'dispositional feasibility' and 'situational actionability'). Regardless of the scale of successes and failures, the barriers to communication between professionals (both educators and researchers) of these more or less distant areas of activity are the different languages with which they describe the motor sphere. However, it is not only language that is a significant factor in many absurdities.

*The logical contradiction of the recommended physical fitness test with the practice of motor responses in a certain class of everyday circumstances*

Every known test is preceded by a warm up [20, 21, 22, 23]. This is precisely one of the most controversial adaptive effects of transferring to physical education and recreational activities the patterns that work in sport. There, extreme training effort and competition effort take place. Meanwhile, there are three extreme circumstances, pervading daily human activity *en block*, that require an immediate motor response. To survive, minimise, or avoid injury, there is no time to warm up. These include: an unintentional fall [24, 25]; physical aggression directed at the individual [26, 27, 28]. In such circumstances, however, the individual does not have full (complete) 'dispositional feasibility' and 'situational actionability'. Admittedly, although the individual can professionally cushion a fall, is familiar with techniques for avoiding collision with an object in motion and has many years of hand-to-hand-combat practice, he or she may for some reason consciously fail to make an adequate motor response – the example of a determined suicide who lacks the courage for this ultimate act is imposed. In any other internal circumstances (state of the psyche), a person threatened by the aforementioned events cannot postpone the motor response if he wants to avoid the aforementioned consequences as well [29].

However, in order to base warm up on safe fall exercises (techniques), avoiding collision and hand-to-hand combat (self-defence) it is necessary to bring about such motor competences (motor skills) as early as possible in ontogeny. Preferably before the child starts school [10, 30, 31]. Schools do not teach this, because – sarcastically – physical education is generally a giant sports club that injects students with a more or less diverse range of sports techniques [9, 11].

The obvious rationale that in a certain class of circumstances, when an individual's vertical posture is stable, an intentional controlled fall can prevent a collision with an object in motion – if only with the limb of an aggressor who prefers to strike. So there is no need to repeat warm up patterns from sport, some of which favour vertical stability, others enhance activity in a safe horizontal stance.

Since almost every child by the time he or she reaches the age of three is able to collide safely with the ground due to a loss of balance – starting with the first attempts to adopt a vertical stance – this ability must be wisely maintained for the rest of his or her life. This is facilitated by fun forms fall and fun forms of combat [32], the effectiveness of which has been repeatedly verified by the experts of the 'Polish School of Safe Falling' [33]. It is also a way of stimulating the child's cognitive sphere early and attractively.

A pictorial exemplification of the veracity of these assumptions is a sequence attributed to one of the leaders of medieval ju-jitsu, the Nagasaki physician Shirobei Akiyama Yoshitoki: 'the storm breaks the oaks, but the reeds only sway'; to him the first ju-jitsu principle 'give way to win'.

So far, neither the collapse, which is an empirical obviousness available to everyone, nor the medieval discoveries of the Nagasaki doctor, nor praxeology (a methodology appropriate for the efficient achievement of cognitive goals and meaningful implementations of knowledge of value in numerous areas of practice) have disturbed the paradigms of physical fitness and physical education.

*UTPA-MP structure, general justifications, evaluation, preliminary interpretations*

#### *Intimate sphere*

If more than one person is being investigated, the measurement of motivation and perceived pain, but also the determination of the causes of the pulse rate, should be done in a way that ensures that the principles of the GDPR are respected.

The test is preceded by a determination of the motivation for effort (willingness sufficient to perform a given action). The easiest way to do this is to have the test subject point with a gesture to a number between 1 and 10, which should be written down in arbitrary places on a piece of paper beforehand (changing the spacing of the numbers in

successive tests counteracts routine). Any change in motivation before any of the trials is signalled by raising the fingers (fingertip) in a number appropriate to the subjective feeling – up (increased motivation) or down (vice versa); zero indicates a refusal of effort. The person must be informed of these possibilities before starting the exercise and also that motivation can be asked by the researcher at any time. The results should be recorded on the UTPA-MP card in the 'motivation' section, in the box confirming the moment of measurement (e.g. trial 3, i.e. before performing the 'Rotational Test – RT').

It is best to measure of the heart rate (HR) using easily accessible technological offers or by palpation. If by palpation, measure HR before exercise for one minute. During exercise, we recommend a six-second measurement [34] immediately after performing the diagnostic exercise. Enter the result multiplied by 10 in the HR section in the cart 'EVALUATION OF THE POSSIBILITY OF ACTION – based on motor potential'.

The HR measurements taken are sufficient to make the interpretations recommended by physiology, medicine and ergonomics [35, 36, 37]. In this simple indicator of the 'HR of work' – during UTPA-MP (HR difference = test HR – HR before test).

We recommend monitoring pain using the Visual Analogue Scale (VAS) from 0 to 10: 0 means no pain; mild pain is rated with points 1, 2, 3; moderate pain with points 4, 5, 6, 7; severe pain 8, 9, 10 (10 - the strongest the person can imagine). Especially when testing children, you can use the VAS in the drawing version [38].

*Measuring components of motor potential (MP) with use non-apparatus and quasi-apparatus tests*

#### *Deep sensibility*

The result is a conjunction of four specific 'diagnostic exercises' (Trials 1, 4, 5, 11).

Trials 1 and 11 – 'lying forward on the ball' (rehabilitation ball up to 80 cm in diameter, darkened goggles, stopwatch; the person tries to lie forward on the ball for as long as possible without contact with the ground by any limb; The longest time from three repetitions of the exercise with open eyes (tOE; Photo 1 and identically with covered eyes (tCE; Photo 2) is taken into account; the result is calculated from the formula (tOE + tCE) : 2 : 15 × 100.

Trial 3 – 'feeling of the dominant hand' (this is one possible version of measuring the phenomenon of the ability to optimally use muscle strength – AUOMS.

Trial 3 – 'feeling of the dominant hand' (this is one possible version of measuring the phenomenon of the ability to optimally use muscle strength – AUOMS.

'Diagnostic Exercise Arrangement': '2 × 160 UMS' (UMS – used muscle force). Assumption of this model

is to use 160% of muscle force twice each: three times with OE, three times CE (6 exercises in total) in an order known only to the examiner, alternating OE, CE. We recommend the order of throws from UMS: 50%; **25%**; 75%; **50%**; 35%; **85%**; three times 100% (**bold CE**). Estimation of maximum force is based on performing the last three throws with OE with a sense of the greatest energy exposure, with the longest is the 100% criterion.

Motor criteria: baseball throws from a relatively isolated standing posture (heels, buttocks and back pressed against the wall), the V finger of the hand that holds the ball must adhere to the chin, and the forearm parallel to the ground). The quality of isolated posture is controlled in such a way that the tested person must to press 4 sheets of paper against the wall with the muscles of the back and buttocks (Photo 3). The attempt is considered valid if the card or cards did not fall during the throw of the baseball. The throw distance is determined using a measuring tape with an accuracy of 1 cm (measuring from the wall to the central point of contact between the baseball and the ground).

The consequence of missing even one piece of paper three times conventionally means a throw with a 15% error (six times such a result means a 90% errors). The inability to also maximally expose the UMS in an error-free manner means a score of

99. If this is the only time, the longest score of the six preceding test throws is considered 100%. The results of the throws are documented on the card 'The ability to optimally use the muscle strength AOUMS'. In case of a deficiency in the strength used, insert the mathematical symbol 'minus' (without space) after the number indicating this result. Document each instance of a piece(s) of paper falling short three times with the symbol ∓. Final calculations are made without these symbols and '+' and/or '-'. The index is calculated from the formula  $100 - (OE + CE)$ .

Trial 5 – 'feeling of the legs'.

Procedures and model analogous to Trial 4, and the results of the jumps are documented at the bottom of the card 'The ability to optimally use the muscle strength AOUMS'. A method of the long jump from standing position'.

After making a jump in front of a fixed line, the test subject turns on the heel of the foot closer to the starting line (Photo 4ab), and the measure of distance is the number of feet (Photo 4c). If the last foot either crosses the starting line or does not make contact with it (Photo 4d), the distance should be subjectively estimated to the nearest 0.1 of the length of that foot (Photo 4e); the raw result should be recorded, e.g. 6.4.

*Flexibility*



Photo 1. Lying forward on the ball OE.



Photo 2. Lying forward on the ball CE



Photo 3. Posture standing before baseball throws (without and with goggles) and version sitting on a chair (next to the kilogram weight, used in both forms can replace the baseball).

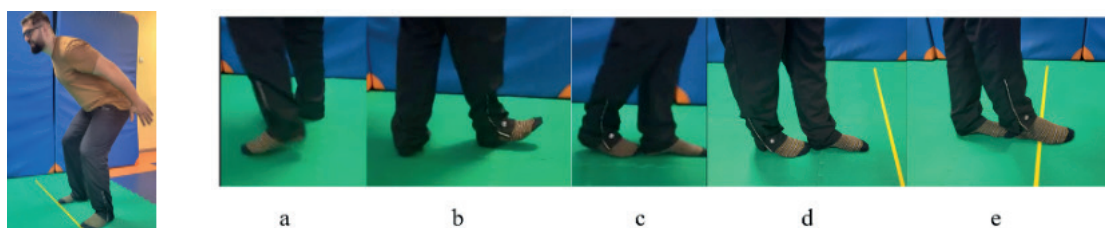


Photo 4. Starting posture during trial 'long jump from standing position' and stages of measuring stroke length

Trial 2 – bend (measurement of the flexibility of lower spinal region and hamstrings: *non-apparatus flexibility test*) [39].

Motor criteria: sit in a straddle position (with legs apart for a foot length) so that the heels are adjacent to the previously determined line i.e. linking tuber calcanei of both feet. Put one hand in the middle of the knees with fingers directed towards the feet and the second one place from the top. Hands joined in his way press lightly down to the ground. Straighten the legs in knee joints and slowly do a forward bend moving the hand on the ground to the area in which you will be able to hold them for 2 seconds tolerating negative feelings generated by the extension of the body (Photo 5a). Without changing the position of the hand bend your knees, sit back and estimate the result.

Assessment method: if the end of distal phalanx of the middle finger (dactylion III) coincides with the determined line, then so-called raw result equals '0' (60 evaluation points – see Table 1). The width of one finger represents 2 evaluation points. Example Photo 5b and 5c means raw score '5-', and decomposition into 50 evaluation points ('sufficient level' of this component of motor potential – it is identified with somatic health and the chance of survival). A decomposition of raw scores into diagnostic points is provided in Table 1.

Trial 3 – 'body balance disturbance tolerance skills (BBDTS)' – measured with a 'Rotational Test' ('RT') in non-apparatus and quasi-apparatus version.

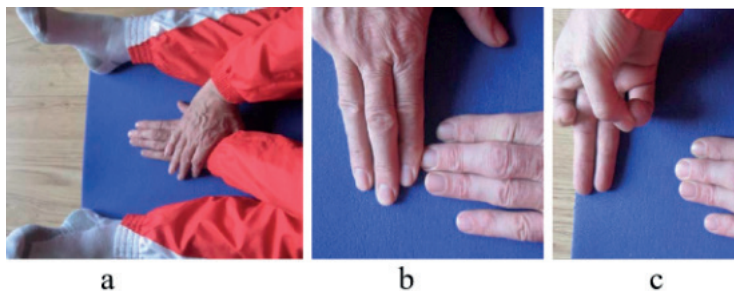
Motor and evaluation criteria (Photo 6): in evaluation criterion is the result in points indicating the number of errors made. 'RT' consists of six tasks (consecutive jumps with body rotation of 360°

alternately to the right and to the left). The overall result (motoric aspect) is the sum of the six tasks and includes 0 to 18 stipulated points. Criteria of an individual level of BBDTS are as follows: very high (0-1), high (2-3), average (4-9), low (10-12), very low (13-15), insufficient (16-18). The 'quasi-apparatus' version takes into account execution time 'RT' (this is an additional qualitative criterion).

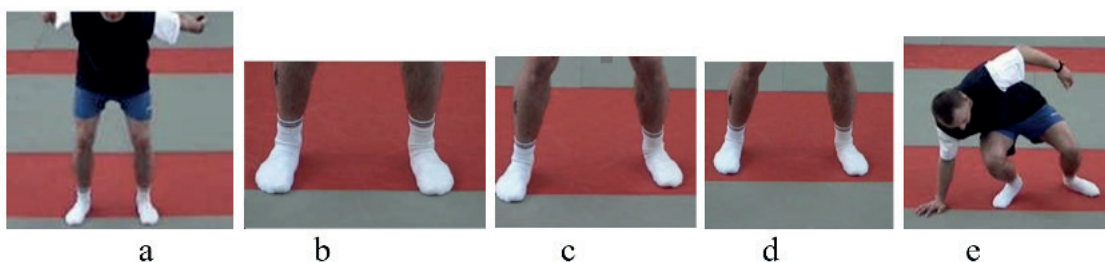
Trial 6 – 'leg strength' (the longest jump during Trial 5).

Trial 7 – 'arm strength' (the measurement is a compilation of overhangs and pull-ups within 100 seconds).

The stopwatch is activated when the person performs an overhang on the bar (Photo 7a). If they are unable to pull-up, the measure of the arm strength is the overhang time, however, only a time of 100 seconds indicates a score of 49. The equivalent of any overhang up to 48 seconds is equivalent points (1 second = 1 point). If, at any point during the overhang, one pulls up just once so that the chin reaches the height of the bar (Photo 7b), but without assisting the movement with balancing the legs and/or torso, this means a score of 50 points (regardless of how long the overhang lasted). Continuing the overhang for up to 70 seconds increases the score to 59 points. With two pull-ups, regardless of the duration of the overhang, the score means 60 points. Similarly, continuing the overhang to 60 seconds increases the score to 69 points. The required maximum number of pull-ups is 5 and means a score of 90 points. Continuing the overhang up to 30 seconds means a score of 100 points. Table 1 details the decomposition of the observations into points.



**Photo 5.** Example of measured flexibility: a) results below the determined line – first stage; b) initiation of detailed measurement – from dactylion III to determined line; c) continuation of the detailed measurement – in this example the raw score fingers '5-'.



**Photo 6.** 'RT' starting position (a) and evaluation criteria: b) no error 0 points; c) 1 penalty point; d) 2 -points; e) 3 -points.

**Table 1.** The ability to optimally use the muscle strength AOUMS

Model of 3 diagnostic throws (sum of 160% UMS) alternately open (OE) and covered eyes (CE)										Only 50%	
Results	OE	CE	OE	CE	OE	CE	open eyes			OE & CE	
	50	25	75	50	35	85	100	100	100	are mandatory and	
raw results (cm) and verified against the model (%)										and	
Cm										only 100% OE	
%										sum of throws results ▶	
Profile deep sensibility dominant hand [accuracy in %] Index DS hand(d)											
Criteria for three ranges of use of muscle strength (UMS)	open eyes (OE)					covered eyes (CE)					Mathematical calculations
	the range of UMS [%]					the range of UMS [%]					differences % 'model ↔ execution' in the score lines 0.00 to <5 are insignificant
	comparison					Comparison					
	model	execution	+	-	0 or **	model	execution	+	-	0 or **	OE
5 to 45%	35					25					
50%	50					50					
55 to 95%	75					85					
Sum	160					160					
Mathematical calculation	difference*		∑ % without symbols			difference*		∑ % without symbols			Index DS hand(d)
											100 - (OE + CE)
*put '+' or '-' after the result; ** equivalent 15 points (the symbol means that the sheets of paper fell three times)											
Trial 5 - 'feeling of the legs' (long jump from standing position)											
Model of 3 diagnostic jumps (sum of 160% UMS) alternately open (OE) and covered eyes (CE)										Only 50%	
Results	OE	CE	OE	CE	OE	CE	open eyes			OE & CE	
	50	25	75	50	35	85	100	100	100	are mandatory and	
raw results (number of foots) and verified against the model (%)										and	
number of foots										only 100% OE	
%										sum of throws results ▶	
Profile deep sensibility legs [accuracy in %] - Index DS legs											
Criteria for three ranges of use of muscle strength (UMS)	open eyes (OE)					covered eyes (CE)					Mathematical calculations
	the range of UMS [%]					the range of UMS [%]					differences % 'model ↔ execution' in the score lines 0.00 to <5 are insignificant
	comparison					Comparison					
	model	execution	+	-	0	model	execution	+	-	0	OE
5 to 45%	35					25					

**Table 1.** (Continued)

50%	50		50		
55 to 95%	75		85		
Sum	<b>160</b>		<b>160</b>		
Mathematical calculation	difference*	$\Sigma$ % without symbols	difference*	$\Sigma$ % without symbols	<b>Index DS legs</b> 100 – (OE + CE)

\*put „+” or „-” after the result;



**Photo 7.** Overhang on the bar: a) it is necessary to bend the legs at the knees to avoid contact of the feet with the ground; b) pull-up counted when the chin reaches the height of the bar.



**Photo 8.** How to perform trial 8.



**Photo 9.** How to perform trial 9.

Trial 8 – ‘the abdominal muscle strength’ (the measure is the time to continue transverse flutter kicks: 1 second = 1 point).

Lying on the back, arms crossed on the chest, legs with minimal bending at the knees raised to 20 cm above the ground. In this position, continue to alternate crossing the legs after opening them as wide as possible (Photo 8).

Trial 9 – ‘anaerobic capacity’ (Burpee Test 100 seconds version).

Within 100 seconds, repeat the exercise ‘from standing to lying forward, rise and clap’ (Photo 9).

The decomposition of the number of exercises is based on a calculation of 1 cycle in 3 seconds.

Trial 10 – ‘aerobic capacity’ (measure of aerobic capacity is the ‘collective test’ score calculated from the formula:  $(D_2 + D_3 + E) : 3$ . Where:  $D_2$  arm strength;  $D_3$  abdominal muscle strength; E anaerobic capacity. Details in the cart ‘EVALUATION OF THE POSIBILLITY OF ACTION – based on motor potential’.

This card also documents the observational data for calculating the motor potential (MP). Index MP =  $(A + B + C + D + E + F) : 6$ . Where: A *deep sensibility*;

B flexibility; C body balance disturbance tolerance skills; D muscle strength; E anaerobic capacity. F aerobic capacity. Details in the cart 'EVALUATION OF THE POSSIBILITY OF ACTION – based on motor potential'.

*The ability to optimally use the muscle strength AOUMS*

Trial 4 – 'feeling of the dominant hand' (baseball throws).

## Results

*Possibilities and limits of interpretation of evaluation*

The measurements made in the course of the UTPA-MP provide knowledge of those dispositional feasibility (DF) definition variables associated with the symbolic term 'strength' and willingness sufficient to perform a given action (Index M).

General knowledge of the variable 'strength', although narrowed down to an individual's motor potential (MP), is only partly provided by Index MP. This knowledge is supplemented by Index P (subjective sense of pain), but only after simple mathematical transformations, as Index CS (chance to survival). Index P = 0, when transformed, is the inverse of Index CS and is '1' (equivalent 100 points/percent). Thus, when P = 0.3, CS = 0.7, while the two indices are equal only at a value of 0.5. The task is not feasible if Index CS = 0.

Thus, 'strength' narrowed down to circumstances when the action requires primarily physical effort is a conjunction of indicators of motor potential and chance to survival ( $MP \wedge CS$ ). If a person has to do simple garden work or clean a large flat, it is obvious that all motor potential is involved, with selective exposure of muscular strength, flexibility, ability to tolerate body imbalances etc. during specific tasks. Both jobs are efforts of extended duration (exceeding at least one hour). The factors that can change significantly during these efforts are, on the one hand, mental (concerning willingness sufficient to perform a given action – its continuation), and, on the other hand – health-related. The health factor has a stronger relationship with either the biological layer of the system, or the mental (psychological) layer, or with both in a relatively balanced way. Since the above-mentioned activities do not require specialised knowledge and skills. The DF index should be calculated from the formula:

$$\text{Index DF} = [((MP+CS) \times M)]^{-1/2}$$

After substituting the values of the indicators monitored in the 'EVALUATION ...' cart (and converting P to CS)

$$\text{Index DF} = [((70+70) \times 50)]^{-1/2} = 83.67$$

That is, the probability of the effect of an individual's effort would have to be estimated at around 84%, with 70% confidence that health and life are not at risk.

If motivation is increased by 10% during exercise, then, with an unchanged sense of pain, the Index DF will increase to 91.65. An approximate 8% increase in exercise efficiency can be expected. If further monitoring of effort by this method shows that motivation is maintained at 60%, but subjective sense of pain has increased by a factor of two, then when these values are substituted (after P-transformation) into the formula the result will not only indicate a reduction in predicted performance to 74.16%. It would be unacceptable from the perspective of respecting ethical criteria to continue the effort with only 40% certainty that no negative health effects would occur.

In other circumstances, preferably when Index CS = 100 and is based on even more demanding criteria for estimating health status and exercise-related risk, repeating the UTPA-MP would be advisable. This is not only for cognitive purposes for the sake of expanding scientific knowledge. Tracking the indicators necessary to determine the dispositional feasibility of a specific individual is important in a preventive and therapeutic sense. Moreover, it is an important element for predicting training effects in the emergency services, the military, the police, etc., but also for selecting suitable individuals for task forces of ad hoc rescue or other interventions.

## Discussion

The mathematical simulations that conclude the 'results' section highlight the cognitive and application advantages of using UTPA-MP. The most similarities of measuring motor potential either within the possibility of action model or the physical fitness paradigm relate to diagnostic exercises. We emphasise their similarity, as none are used identically to the recommended *physical fitness tests*. Even more so, the evaluative criteria for observational results are different.

The main difference is that the UTPA-MP combines indicators of motor potential with indicators of the mental sphere (motivation) as well as health status – simple indicators of HR and subjective sense of pain and location are of great preventive value. The method of monitoring HR and pain before and during test exercise meets the criteria for early warning of possible injury.

The universal praxeological definition of the phenomenon of possibility of action takes into account an elementary component, without which any conscious act would be impossible – motivation (called by Kotarbiński in ornate Polish: willingness sufficient to perform a given action). Thus, an elementary question arises as to whether

the rates of diagnosed motor potential at possibly distant motivations (e.g. range  $\geq 50\%$ ) will also vary significantly. There is no certainty that a multiplication of motivation (assuming that the declaration is consistent with the internal state of the examined person) will mean an enlargement of the Index MP or even one component. It may even be the other way around – a reduction in the Index MP, and there may be many reasons for this (e.g. chronic overtraining, illness, injury concealed from the researcher).

The implications related to this question are important not only for intellectual appeal. If motivation does indeed significantly influence the disclosure of motor potential, another question remains unanswered: what level of motivation corresponds to the *physical fitness* results published to date, especially the cross-sectional ones.

This is not to depreciate the cognitive value of such knowledge. Since cross-sectional studies, repeated in cycles of many years, use an identical *physical fitness test*, but do not include a procedure for estimating motivation, this factor must have similarly influenced the average result of repeated studies. Therefore, the cognitive value of studies of positive health of Polish children and youth within the last 2 decades of the 20<sup>th</sup> century, documented results of International Physical Fitness Test and Cooper Test [40].

Knowledge of the relationship of revealed motor potential to motivation and vice versa (after all, the inability to perform one diagnostic exercise may even result in a refusal to continue) is useful during the aforementioned procedure of selecting individuals for intervention groups and other special tasks.

We recommend one of the most valuable empirical systems for studying this phenomenon. Testing fights in a vertical posture' (TFVP) based on a safe form of sumo, where the winner is the one who first pushes a competitor outside the circle four times or makes them touch the ground within the circle with a body part other than their feet [41, 42]. The four-person group of people combats (GPC) ensures that it is impossible for all participants to tie, in the sense that everyone fights three TFVPs each, so only one can win all and one can lose all [27]. The dynamic rotation of fighting pairs and experiencing after each TFVP the feeling of either 'being a winner' or 'being defeated' – alternating or monotonous – are factors with as yet unknown effects on motivation for the next TFVP. Preceding the TFVP cycle with the use of UTPA-MP and repeating it afterwards will complete the knowledge of the possible interpenetration of the mentioned phenomena and facilitate the discovery of possible regularities.

All diagnostic tools applied in a set sequence with continuous monitoring of HR and P (pain)

indices have the unique advantage of reducing the likelihood of injury and overload if continued exertion is stopped in time. Repeated UTPA-MP according to an established algorithm can, over time, develop into a habit of self-monitoring effort during daily physical activity. Correctly performed UTPA-MP lasts about 15-20 minutes, so it can be used even several times a day, as a kind of training session system aimed at strengthening health and survival abilities in critical circumstances. It is important that the procedure for monitoring HR and P ratios is followed, even if for some reason one of the diagnostic exercises is omitted or swapped for another.

Another advantage of half diagnostic exercises is their survival utility. The ability to 'feel the legs' and to be aware of the performance capabilities of the lower limbs in extreme circumstances of their use, precisely in a test-like manner, may prove to be the only way to leave a place of mortal danger. The need to land on a small surface makes the test situation similar during the 'Rotational Test' and highlights the diagnostic value of measuring 'RT' execution time – although this is 'only' an auxiliary evaluative indicator [43]. The extremity of such a sequence of activities, which are not just a figment of the imagination, is compounded by both time pressure and stress. Repeating the UTPA-MP multiple times is therefore a simple method of motor and mental preparation for such and similar circumstances.

The task of educators and authors of publications promoting UTPA-MP is to raise awareness that the outcome of the seemingly trivial 'bent arm hang' diagnostic exercise is of paramount importance for estimating survival competence in the sense of rescue motor skills. It is about increasing the ability to extend the time of the bent arm hang to sufficiently long to leave a threatened area using mountaineering techniques. Evaluation criteria at 49 points document a bent arm hang for 100 seconds.

The Burpee Test score, in addition to being a reliable measure of anaerobic capacity, is linked to predicting the chances of survival after a fall. A number of studies show that 40% of older people who have fallen, although uninjured, are unable to get up on their own. Waiting a long time for help while lying on the ground or floor, causes a number of complications (hypothermia, pneumonia, etc.). One of the main factors increasing mortality after a fall is remaining in a horizontal position for at least 1 hour [44]. Of these people, 1% fail to cope with such stress and die.

The above simulations and comments stimulate the imagination. The authors of the 'physiotherapist in every school' project [9] are right when they emphasise that the physical education paradigm is counter-productive when it draws on more than just the motor patterns of sport. Not only

are injuries and even death calculated into sport, which is a voluntary activity, but this culturally important area of human activity is permeated by a mentality of admiration for the winners and contempt for the losers. The declarative association of the purpose of sport with health, is a blatant denial of reality, but an important indicator from the perspective of estimating social health. Since PE is legally compulsory, so the current PE paradigm is unacceptable in any rational society. The recommended UTPA-MP is therefore first and foremost a tool for elementary health prevention focused on functional motor skills and personal safety. It thus transcends both the physical education paradigm and the physical fitness paradigm. It is a simple, safe tool. With a little imagination possible in a home environment, but optimal motivation is needed. UTPA-MP is therefore a low-cost offer to invest in people from the ground up. That is, in the one good that – as Fritjof Capra [45] noted – we have in abundance. The sample forms for conducting the AOUMS test and the conversion table for the obtained results are placed at the end of the publication (attachment 1, 2, 3).

## Conclusions

Since in the praxeological sense (i.e. methodology proper) ‘dispositional feasibility’ – is the strength, intellectual or manipulative ability and knowledge (skill) and willingness sufficient to perform a given action, the interpretation of the results of measuring motor (energy) potential based on UTPA-MP indices goes beyond the paradigm narrowed to the field of physical education and sport.

## Acknowledgements

The authors are grateful to Bartłomiej Gąsienica Walczak PhD for lending his image during the demonstration of the diagnostic exercises.

## Funding

The authors declare that a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors has not been used for this project.

## Conflicts of interest

The authors declare no conflicts of interest.

### Attachment 1 The ability to optimally use the muscle strength AOUMS

#### A) Trial 4 – ‘feeling of the dominant hand’

baseball throws from standing (*siting – option*) posture: **dominant hand** (*non dominant – option*)

Person code ..... place ..... date ..... time: from ..... to .....

Model of 3 diagnostic throws (sum of 160% UMS) alternately open (OE) and covered eyes (CE)										Only 50% OE & CE are mandatory and only 100% OE		
Results	OE	CE	OE	CE	OE	CE	open eyes					
	50	25	75	50	35	85	100	100	100			
raw results (cm) and verified against the model (%)												
cm												
%											sum of throws results	>
Profile deep sensibility dominant hand [accuracy in %] Index DS hand(d)												
Criteria for three ranges of use of muscle strength (UMS)	open eyes (OE)					covered eyes (CE)					Mathematical calculations	
	the range of UMS [%]					the range of UMS [%]					differences % ‘model - execution’ in the score lines 0.00 to <5 are insignificant	
	comparison		difference model - execution			comparison		difference model - execution			OE	CE
	model	execution	+	-	0 or ±**	model	execution	+	-	0 or ±**		
5 to 45%	35					25						
50%	50					50						
55 to 95%	75					85						
Sum	160					160						<b>Index DS hand(d)</b> 100 – (OE + CE)
Mathematical calculations	difference*		Σ % without symbols			difference*		Σ % without symbols				

\*put ‘+’ or ‘-’ after the result; \*\* equivalent 15 points (the symbol means that the sheets of paper fell three times)

**Attachment 1. (Continued)**

**B) Trial 5 – ‘feeling of the legs’**

Model of 3 diagnostic jumps (sum of 160% UMS) alternately open (OE) and covered eyes (CE)										Only 50% OE & CE are mandatory and only 100% OE		
Results	OE	CE	OE	CE	OE	CE	open eyes					
	50	25	75	50	35	85	100	100	100			
raw results (number of foets) and verified against the model (%)												
number of foets												
%							sum of throws results			>		
Profile deep sensibility legs [accuracy in %] – Index DS legs												
Criteria for three ranges of use of muscle strength (UMS)	open eyes (OE)					covered eyes (CE)					Mathematical calculations	
	the range of UMS [%]					the range of UMS [%]					differences % ‘model - execution’ in the score lines 0.00 to <5 are insignificant	
	comparison		difference model - execution			comparison		difference model - execution				
	model	execution	+	-	0	model	execution	+	-	0	OE	CE
5 to 45%	35				25							
<b>50%</b>	<b>50</b>				<b>50</b>							
55 to 95%	75				85							
Sum	<b>160</b>				<b>160</b>					<b>Index DS legs</b> 100 – (OE + CE)		
Mathematical calculations	difference*		Σ % without symbols			difference*		Σ % without symbols				
*put „+” or „-” after the result;												

**Attachment 2 EVALUATION OF THE POSSIBILITY OF ACTION – based on motor potential**

Person (code) ..... F/M (circle) height (cm)..... weight (kg) ..... BMI..... age.....

Date ..... time: start ..... end..... /safe HR/ HRmax = 208 – (0.7 × age) .....

Sequence and name of the test (diagnostic exercise)		Motor potential (MP) component	Raw score		Pts	Combined MP indicators	
			time (s)	n		A	
1	lying forward on the ball	deep sensibility before effort (tOE + tCE) : 2 : 15 × 100				< A <sub>1</sub>	deep sensibility (A <sub>1</sub> + A <sub>2</sub> +A <sub>3</sub> +A <sub>4</sub> ) : 4
2	bend	flexibility	-			< B	flexibility
3	Rotational Test	Body balance disturbance tolerance skills (BBDS)				< C	BBDS
4	AOUMS upper limbs	feeling of the dominant hand	-			< A <sub>2</sub>	component A
5	AOUMS lower limbs	feeling of the legs	-			< A <sub>3</sub>	component A
6	long jump from standing position	legs strength	-			< D <sub>1</sub>	D muscle strength (D <sub>1</sub> +D <sub>2</sub> +D <sub>3</sub> ) : 3
7	overhangs/pull-ups 100s	arm strength				< D <sub>2</sub>	
8	transverse flutter kicks 100s	abdominal muscle strength		-		< D <sub>3</sub>	
9	Burpee Test 100s	anaerobic capacity				< E	anaerobic capacity
10	‘collective test’	aerobic capacity	(D <sub>2</sub> +D <sub>3</sub> +E) : 3			< F	aerobic capacity
11	lying forward on the ball post exercise	deep sensibility after a series of physical exertions (tOE + tCE) : 2 : 15 × 100				< A <sub>4</sub>	component A

Attachment 2. (Continued)

Graphic profiles: MP ;M ; test HR ;P											Health indicators and survival capacity		
Points	Sequence of diagnostic tests and exercises										points	grade	Index MP
	1	2	3	4	5	6	7	8	9	10			
100											>96	EXCELLENT	
95											86-95	astonishing	
90											76-85	master	
85											66-75	very good	
80											56-65	good	
75											46-55	sufficient	
70											30-45	acceptable	
65											20-29	alarming	
60											10-19	high risk	
55											0-9	risk	
50											<b>general indicators</b>		
45											<b>motivation (M) for effort on a scale from 1 to 10 (in profile × 10)</b>		
40											average	<b>Index M</b> (willingness to act)	
35											tests	<b>HR difference</b> = test HR – HR before test	
30											<b>and after each HR test (in profile: % safe HR)</b>		
25											average	<b>&lt; Index P</b> (subjective sense of pain)	
20											<b>pain (P) on a scale from 1 to 10 (in profile × 10) of body parts</b>		
15											body part<	<b>Index MP</b> = $\frac{A+B+C+D+E+F}{6}$	
10													
5													
0													

**Attachment 3** Decomposition of UTPA-MP diagnostic test and exercise scores into evaluation points (trial scores 1, 4, 5, 11 are ‘deep sensibility’ A components, while time of trial 8 in seconds is the same as the scores; trial 10 is ‘collective test’: average score trial 7, 8, 9).

Points & seconds equivalent	Trial						Points & seconds equivalent	Trial					
	2	3	6	7a	7b	9		2	3	6	7	9	
	bend finger	'RT' error	long jump foot	over hangs second	pull-ups number	Burpee 100s number		bend finger	'RT' error	long jump foot	over hangs second	Burpee 100s number	
100	18	0	10	30	time limit overhangs to increase the score to 100 points	34	<b>points limit for overhangs</b>						
99			9.9	29		49			4.9	100			
98			9.8	28		33	48	6-		4.8	48	17	
97			9.7	27			47			4.7	47		
96			9.6	26			46	7-		4.6	46		
95	17		9.5	25			45			4.5	45	16	
94		1	9.4	24			32	44	8-	10	4.4	44	
93			9.3	23			43			4.3	43		
92	16		9.2	22			42	42	9-		4.2	42	14
91			9.1	21			41			4.1	41		
90	15		9	5	31	40	40	10-		4	40		

**Attachment 3. (Continued)**

89		2	8.9	40	time limit overhangs to increase the score to 89 points		39		11	3.9	39	13	
88	14		8.8	39				38	11-		3.8	38	
87			8.7	38			30	37			3.7	37	
86	13		8.6	37				36	12-		3.6	36	12
85			8.5	36				35			3.5	35	
84	12		8.4	35			29	34	13-		3.4	34	
83		3	8.3	34				33		12	3.3	33	11
82	11		8.2	33				32	14-		3.2	32	
81			8.1	32			28	31			3.1	31	
80	10		8			4		30	15-		3	30	10
79			7.9	59	time limit overhangs to increase the score to 79 points		29			2.9	29		
78	9	4	7.8	49			27	28	16-	13	2.8	28	
77			7.7	48				27			2.7	27	9
76	8		7.6	47				26	17-		2.6	26	
75			7.5	46			26	25			2.5	25	
74	7		7.4	45				24	18-		2.4	24	8
73			7.3	44				23			2.3	23	
72	6	5	7.2	43			25	22	19-	14	2.2	22	
71			7.1	42				21			2.1	21	7
70	5		7			3		20	20-		2	20	
69			6.9	60	time limit overhangs to increase the score to 69 points		24	19		1.9	19		
68	4		6.8	59				18	21-		1.8	18	6
67		6	6.7	58				17		15	1.7	17	
66	3		6.6	57			23	16	22-		1.6	16	
65			6.5	56				15			1.5	15	5
64	2		6.4	55				14	23-		1.4	14	
63			6.3	54			22	13			1.3	13	
62	1		6.2	53				12	24-		1.2	12	4
61		7	6.1	52				11		16	1.1	11	
60	0		6			2	21	10	25-		1	10	
59			5.9	70	time limit overhangs to increase the score to 59 points		9			0.9	9	3	
58	1-		5.8	69				8	26-		0.8	8	
57			5.7	68			20	7			0.7	7	
56	2-	8	5.6	67				6	27-	17	0.6	6	2
55			5.5	66				5			0.5	5	
54	3-		5.4	65			19	4	28-		0.4	4	
53			5.3	64				3			0.3	3	1
52	4-		5.2	63				2	29-		0.2	2	
51			5.1	62			18	1			0.1	1	
50	5-	9	5			1		0	0	18	0	0	0

## References

- Januszewski J, Mleczek E. Ewaluacja sprawności fizycznej krakowskich studentów: Założenia teoretyczne, implikacje praktyczne [Evaluation of physical fitness of Krakow students: Theoretical assumptions, practical implications]. *Antropomotoryka*. 2007;17(39):25–40. (In Polish).
- Clark S. Being ‘Good at Sport’: Talent, Ability and Young Women’s Sporting Participation. *Sociology*, 2012;46(6): 1178–1193. <https://doi.org/10.1177/0038038511435061>
- Bailey R, Collins D. The Standard Model of Talent Development and Its Discontents. *Kinesiology Review*, 2013;2(4): 248–259. <https://doi.org/10.1123/kj.2.4.248>
- Chodała A, Gąsienica-Walczak B. Changes in overall and special physical fitness of military cadets and physiotherapy students under the influence of various annual specialist trainings. *Arch Budo Sci Martial Art Extreme Sport*. 2021;17:167–182.
- Bouchard C, Shephard RJ. Physical activity, fitness and health: The model and key concepts. In: Bouchard C, Shephard RJ, Stephens T, editors. *Physical activity, fitness and health: International proceeding and consensus statement*. Champaign, IL: Human Kinetics; 1994. p. 77–88.
- Fletcher GF, Balady G, Blair SN, Blumenthal J, Caspersen C, Chaitman B, et al. Statement on Exercise: Benefits and Recommendations for Physical Activity Programs for All Americans: A Statement for Health Professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. *Circulation*, 1996;94(4): 857–862. <https://doi.org/10.1161/01.CIR.94.4.857>
- Waszkiewicz E. Multidimensional Educational Models Recommended by Innovative Agonology – Examples of Physical Education and Music Education. In: 2023. <https://doi.org/10.54941/ahfe1003499> [Accessed 21st November 2024].
- Waszkiewicz E, Kruszewski A. Measurement of motivation and qualitative effects of physical effort during two motor learning sessions with multifaceted variation of goals, methods, measures and tools – Example of violin playing and safe fall. In: Ahram T, Karwowski W, editors. *Human Factors in Design, Engineering, and Computing*. Proceedings of the AHFE 2024 International Conference; 2024 Jul 24–28; USA. Cham: AHFE Open Access; 2024. (AHFE Open Access, vol 159). <http://doi.org/10.54941/ahfe1005715>
- Dobosz W, Gąsienica-Walczak B, Kalina A, Kalina RM, Kruszewski M, Waszkiewicz E, Wicher P. The ‘physiotherapist in every school’ project is the first step in replacing the physical education paradigm with the subject of preventive medicine in every type of school – A perspective to improve public health and safety in a rational community. *Archives of Budo: Journal of Innovative Agonology*. 2024;20.
- Kalina RM. Methodology of complementary research as the basis for integrating science in fulfilling its social mission in the future. *Arch Budo*. 2023;19:77–82.
- Kalina R. Preventive Medicine: The most prestigious profession of the near future. In: Ahram T, Karwowski W, editors. *Human Factors in Design, Engineering, and Computing*. Proceedings of the AHFE 2024 International Conference; 2024 Jul 24–28; USA. Cham: AHFE Open Access; 2024. (AHFE Open Access, vol 159). <http://doi.org/10.54941/ahfe1005713>
- Kalina RM, Kruszewski A. INNOAGON is an acronym for ‘innovative agonology,’ but is not synonymous with ‘science of martial arts.’ *Arch Budo*. 2023;19:193–204.
- Kotarbiński T. *The Theory of Good Work*. Dordrecht: Reidel; 1972.
- Pszczołowski T. *Zasady sprawnego działania: Wstęp do prakseologii*. 6th ed. [Principles of Efficient Action: Introduction to Praxeology. 6th Edition]. Warszawa: Wiedza Powszechna; 1978. (In Polish).
- Platonow VN. *Sistema podgotovki sportsmenov w olimpijskom sporcie: Obszczaja teoria i jejo praktičeskie prilozhenija* [Sportsmen training system in Olympic sports: General theory and practical applications]. Kyiv: Olympic Literature; 2004. (In Russian).
- Haag H, Haag G, Kaulitz B. *From physical fitness to motor competence: Aims, content, methods, evaluation*. Frankfurt/M, Berlin, Berno, Bruksela, New York, Wien: Sports Sciences International; 2000.
- Thomas JR, Nelson JK, Silverman SJ. *Research methods in physical activity*. 5th ed. Windsor: Human Kinetics; 2005.
- Heyward VH. *Advanced fitness assessment and exercise prescription*. 5th ed. Champaign, IL: Human Kinetics; 2006.
- Schmidt RA, Wrisberg CA. *Motor learning and performance: A situation-based learning approach*. 4th ed. Champaign, IL: Human Kinetics; 2008.
- Council of Europe. *EUROFIT*. Strasbourg, France: Council of Europe; 1993.
- Oja P, Tuxworth B, editors. *Eurofit for adults: Assessment of health-related fitness*. Strasbourg: Council of Europe, Committee for the Development of Sport; 1995.
- Pilicz S, Przewęda R, Dobosz J, Nowacka S. *Physical fitness score tables of Polish youth: Criteria for measuring aerobic capacity by the Cooper test*. Studia i Monografie - Akademia Wychowania Fizycznego Józefa Piłsudskiego. Warszawa: Wydawnictwo Akademii Wychowania Fizycznego; 2002;86.
- Ashok C. *Test your physical fitness*. Delhi: Kalpaz Publications; 2008.
- Boguszewski D, Adamczyk JG, Kerbaum K, Antoniak B, Obszyńska-Litwiniec A, Białoszewski D. Susceptibility To Injury During Falls In Women Practising Combat Sports And Martial Arts. *Polish Journal of Sport and Tourism*, 2015;22(1): 15–19. <https://doi.org/10.1515/pjst-2015-0009>
- Kalina RM, Dłubacz N, Zachwieja J, Pilarska E, Dobosz D, Gąsienica-Walczak B, et al. Innovative

- method of diagnosing the susceptibility to body injuries during the fall of children from 2 to 6 years. *Arch Budo Sci Martial Arts Extreme Sports*. 2022;18:211–28.
26. Kruszewski M, Niedomagala W, Klimczak J, Litwiniuk A. Methodological and mental distance to the dissemination of vertical test fight between girls and boys. In: Ahram T, Karwowski W, editors. *Human Factors in Design, Engineering, and Computing*. Proceedings of the AHFE 2024 International Conference; 2024 Jul 24–28; USA. Cham: AHFE Open Access; 2024. (AHFE Open Access, vol 159). <http://doi.org/10.54941/ahfe1005714>
  27. Kruszewski A, Litwiniuk A, Waszkiewicz E. Reliability and objectivity of the new version of the ‘susceptibility test for body injuries during a fall’ (STBIDF-M) in physiotherapy students. *Physical Education of Students*, 2024;28(5): 303–312. <https://doi.org/10.15561/20755279.2024.0507>
  28. Klimczak J, Chodała A. The effectiveness of hand-to-hand combat is not determined by the need for a high level of aggressiveness. *Arch Budo*. 2023;19:205–212.
  29. Kruszewski A. Wrestling fight – Between tradition, sport and spectacle. *Arch Budo*. 2023;19:21–7.
  30. Gąsienica-Walczak B, Kruszewski A, Kruszewski M. The body balance disturbance tolerance skills during increasing physical exertion as an important criterion for assessing personal safety. *Arch Budo Sci Martial Arts Extreme Sports*. 2021;17:103–11.
  31. Gąsienica-Walczak B, Kalina A, Litwiniuk A, Baj-Korpak J. Mental barriers to reduce vulnerability to injury during a fall: an elementary issue of personal safety in a global civilization. *Health Problems of Civilization*, 2024; <https://doi.org/10.5114/hpc.2024.144111>
  32. Kalina RM, Kruszewski A, Jagiełło W, Włoch G. *Combat sports propedeutics: Basics of judo*. Warszawa: Akademia Wychowania Fizycznego; 2003.
  33. Iermakov S, Podrigalo L, Podrihalo O, Yermakova T, Jagiello W. Means and methods of physical activity in the context of prevention and treatment of Alzheimer’s disease: Analysis of Russian-language scientific resources and the perspective of implementing the unique achievements of the «Polish School of Safe Falling.» *Arch Budo*. 2022;18:121–43.
  34. Pollock ML, Gaesser GA, Butcher JD, Despr??s JP, Dishman RK, Franklin BA, et al. ACSM Position Stand: The Recommended Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory and Muscular Fitness, and Flexibility in Healthy Adults: *Medicine & Science in Sports & Exercise*, 1998;30(6): 975–991. <https://doi.org/10.1097/00005768-199806000-00032>
  35. Karvonen M, Kentala K, Mustala O. The effects of training on heart rate: A longitudinal study. *Ann Med Exp Biol Fenn*. 1957;35:307–15.
  36. Tanaka H, Monahan KD, Seals DR. Age-predicted maximal heart rate revisited. *Journal of the American College of Cardiology*, 2001;37(1): 153–156. [https://doi.org/10.1016/S0735-1097\(00\)01054-8](https://doi.org/10.1016/S0735-1097(00)01054-8)
  37. Kruszewski A, Gąsienica-Walczak B. A method of diagnosing body control errors during a simple motor activity in relation to cognitive-behavioral influence on personal safety. *Arch Budo Sci Martial Arts Extreme Sports*. 2022;18:133–45.
  38. Stieger S, Schmid I, Altenburger P, Lewetz D. The Sensor-Based Physical Analogue Scale as a Novel Approach for Assessing Frequent and Fleeting Events: Proof of Concept. *Frontiers in Psychiatry*, 2020;11: 538122. <https://doi.org/10.3389/fpsy.2020.538122>
  39. Mosler D. Usability of non-apparatus and quasi-apparatus flexibility tests based on self-perception participants in health-related judo training. *Arch Budo Sci Martial Arts Extreme Sports*. 2015;11:189–97.
  40. Przewęda R, Dobosz J. *Kondycja fizyczna polskiej młodzieży* [Physical condition of Polish youth]. Warszawa: Studia i Monografie - Akademia Wychowania Fizycznego Józefa Piłsudskiego; 2003. (In Polish).
  41. Niedomagala W. The result of «testing fights in a vertical posture» as a selection criterion for professional training of judo sport – Prognostic value TFVP. *Arch Budo Sci Martial Arts Extreme Sports*. 2016;12:181–90.
  42. Sertić H, Sterkowicz S, Vuleta D. Influence of latent motor abilities on performance in judo. *Kinesiology*. 2009;41(1):76–87.
  43. Litwiniuk A, Waldziński T, Waldzińska E, Grants J, Gąsienica-Walczak B. Profiles of the ability to optimally use the limbs’ muscle strength of combat sports athletes, racket sports athletes, and drummers as validation of the accuracy of the recommended methods of measuring this phenomenon. *Archives of Budo*. 2023;19:29–40.
  44. Reece AC, Simpson JM. Preparing Older People to Cope after a Fall. *Physiotherapy*, 1996;82(4): 227–235. [https://doi.org/10.1016/S0031-9406\(05\)66877-0](https://doi.org/10.1016/S0031-9406(05)66877-0)
  45. Capra F, March R. *The Turning Point: Science, Society and the Rising Culture*. *Physics Today*, 1982;35(11): 76–77. <https://doi.org/10.1063/1.2914857>

---

### Information about the authors:

**Artur Kalina;** <https://orcid.org/0009-0003-9312-0254>; e-mail; [a.kalina@usa.edu](mailto:a.kalina@usa.edu), Plus-Rehabilitation Services Ltd., Crystal Lake, United States.

**Maciej Kalina;** <https://orcid.org/0000-0003-2064-2724>; e-mail; [kom.kalina@op.pl](mailto:kom.kalina@op.pl), EKO-AGRO-FITNES Prof. Roman M. Kalina, Piwniczna-Zdrój, Poland.

**Artur Kruszewski;** (Corresponding Author); <https://orcid.org/0000-0002-3930-7304>; e-mail; [artur.kruszewski@awf.edu.pl](mailto:artur.kruszewski@awf.edu.pl); Jozef Pilsudski University of Physical Education in Warsaw; Warsaw, Poland.

**Michał Kruszewski;** <https://orcid.org/0009-0008-6056-754X>; e-mail; [michukru12@gmail.com](mailto:michukru12@gmail.com); Jozef Pilsudski University of Physical Education in Warsaw; Warsaw, Poland.

---

Cite this article as:

Kalina A, Kalina RM, Kruszewski A, Kruszewski M. Universal Test of Possibility of Action Based on Motor Potential (UTPA-MP) – Health and Survival Applications. *Physical Education of Students*, 2024;28(6):346–361. <https://doi.org/10.15561/20755279.2024.0604>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 20.10.2024

Accepted: 26.11.2024; Published: 30.12.2024

# Relationship between leisure-time physical activity and components of somatotype among university students

Maria Zadarko-Domaradzka<sup>1BCD</sup>, Edyta Nizioł-Babiarz<sup>2BC</sup>, Zbigniew Barabasz<sup>2AB</sup>,  
Emilian Zadarko<sup>1ABCDE</sup>

<sup>1</sup> *Institute of Physical Culture Sciences, Medical College of Rzeszow University, University of Rzeszów, Poland*

<sup>2</sup> *Department of Physical Education, Institute of Health and Economy, State Academy of Applied Sciences in Krosno, Poland*

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Physical activity (PA) has become a critical component of social, economic, and health policy worldwide. Leisure-time physical activity (LTPA) plays a particularly significant role in preventing lifestyle-related diseases. This study aimed to analyze students' LTPA and examine the relationship between LTPA levels and somatotype.

**Material and Methods** The study included 309 students, aged 20–24, from five Polish universities. Anthropometric measurements were taken, somatotypes were determined using the Heath-Carter method, and LTPA was assessed using the Minnesota Leisure-Time Physical Activity Questionnaire (MLTPAQ).

**Results** Among the students studied, 22.3% had a BMI above the normal range—31% of males and 13.6% of females. Men reported higher levels of LTPA than women and engaged in more physical activity across all intensity levels. In both male and female groups, one in four students did not reach the recommended leisure-time physical activity level of 1000 kcal/week. A statistically significant negative correlation was found between endomorphy and high-intensity LTPA in both sexes. Additionally, one in four Polish students in the study did not achieve a level of leisure-time physical activity sufficient to meet health-protective energy expenditure guidelines.

**Conclusions** These findings underscore the essential role of high-intensity exercise in achieving beneficial levels of leisure-time physical activity (LTPA). They also highlight the importance of considering individual somatotype characteristics when developing physical activity recommendations for university students. Promoting tailored, intensity-specific LTPA programs could enhance engagement and address diverse fitness needs, contributing to effective health interventions in young adult populations.

**Keywords:** MLTPAQ, body composition, exercise intensity, energy expenditure, university youth, preventive health.

## Introduction

In light of current health challenges, physical activity (PA), as recommended for health, plays a critical role as a protective factor in preventing noncommunicable diseases. It contributes to lowering the risk of cardiovascular diseases and cancer, helps maintain healthy body composition and proper functioning of the musculoskeletal system, and improves mental health [1, 2, 3]. In an era of rapid societal progress, a marked decline in daily physical activity levels can be observed. Consequently, the quantity and quality of physical activity are no longer solely individual concerns but have become significant areas of focus within social, economic, and health policy worldwide [4, 5].

Eliminating inadequate physical activity, defined as engaging in less than 150 minutes of moderate-intensity physical activity per week, can provide substantial health benefits and reduce healthcare

costs [5]. However, trends in adult physical activity levels worldwide are concerning. According to the latest data, in 2022, 31% of adults globally did not meet the WHO's recommended level of physical activity [6, 7]. This represents a five-percentage-point increase between 2010 and 2022. If this trend continues, by 2030, physical inactivity may affect 35% of adults [8]. Studies among university students across 23 countries indicate that 41.4% of students are physically inactive [9]. Additionally, a significant proportion of students show higher levels of sedentary behavior compared to the general young adult population [10].

Physical activity includes various categories, such as occupational, transport-related, and leisure-time activities [6, 11]. Leisure-time physical activity (LTPA) is thought to play a particularly important role in supporting good health [12]. Studies have shown that following LTPA guidelines is associated with a reduced risk of sleep disorders [13] and a lower risk of developing depression symptoms, regardless of sex, age, race, marital status, economic status, or

BMI [11]. LTPA can also help prevent osteoporosis [14] and improve cardiorespiratory fitness (CRF) [15]. Current research suggests that engaging in sports activities during leisure time, with an energy expenditure of over 5 kcal/min and a total weekly expenditure of 1000–1499 kcal, may represent a threshold level effective for preventing coronary heart disease and promoting overall health [16].

Leisure-time physical activity (LTPA) among university students and its associated variables is a topic of interest for many researchers [17, 18, 19, 20]. Research on students from selected countries in the Carpathian Euroregion (Poland, Slovakia, and Ukraine) reveals significant differences in LTPA levels among these countries, with students from Slovakia participating in physical activities more frequently than those from Poland or Ukraine [21]. Research by Acebes-Sánchez et al. indicates that the LTPA levels among Spanish students are generally inadequate [22]. Motevalli et al. report that the majority of Austrian university students regularly engage in physical activity during their leisure time, while approximately one in five participate in club sports activities [23]. Findings also suggest that, regardless of sex, individuals with higher levels of LTPA tend to have a stronger health locus of control, which increases with higher LTPA levels [24]. Additional studies indicate that college students who engage in some weekly physical activity have a reduced risk of experiencing hopelessness, depression, and suicidal behaviors compared to inactive students [17]. Further research shows that university students who regularly participate in physical activity during their leisure time have lower BMIs and are less likely to be overweight than those who are inactive [23, 25].

The measurement of a person's current body shape and composition is referred to as somatotyping. Each individual's somatotype represents a unique combination of body fat, musculoskeletal development, and body linearity, captured through the components of endomorphy, mesomorphy, and ectomorphy [26]. While a person's body type and constitution are largely determined by genetics, they are also shaped by external factors, such as lifestyle, nutrition, and physical activity, and naturally change with age [27, 28, 29, 30]. Fat and muscle tissues, in particular, are highly responsive to environmental influences [31]. A study of boys aged 8–15 found that average endomorphy was significantly higher among inactive boys and lower among physically active ones, both before and during puberty. Additionally, among pubescent boys, average somatotype components differed significantly depending on the hours spent walking to and from school and the time spent in sedentary activities [32].

Studies of adults aged 18–40, including both men and women, have shown that as physical fitness increases, the mesomorphy component of the somatotype also increases, while the endomorphy

and ectomorphy components tend to decrease [33]. Research examining the relationship between somatotype components and the prevalence of certain chronic diseases suggests that a somatotype dominated by mesomorphy with prominent endomorphy constitutes a risk factor, indicating a predisposition to certain conditions, such as hypertension or liver diseases, and underscores the importance of body mass control [34].

The diversity of research on somatotype reflects an ongoing exploration of correlations between its components and various factors. Nevertheless, the specific relationship between leisure-time physical activity and somatotype components among university students remains underexplored, highlighting the need for more focused investigation in this area.

The study aim is to present the level of physical activity and its intensity during leisure time among Polish students and to assess the correlation between the level and intensity of LTPA and somatotype components.

## Materials and Methods

### *Participants*

The study included 309 full-time students (154 female and 155 male) in their first-cycle (Bachelor's) studies from five Polish universities: Krosno State College, the University of Rzeszów, Maria Curie-Skłodowska University in Lublin, Cracow University of Technology, and Poznań University of Life Sciences. Participants were between the ages of 20 and 24 and represented a variety of academic profiles. All students were actively engaged in physical education classes as part of their university curriculum. All study procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki.

### *Research Design*

The study was conducted during physical education (PE) classes held in gymnasiums (sports halls). The criterion for participation was voluntary consent, while the exclusion criterion – any medical contraindications to participation in PE classes. Recruitment was carried out through randomized sampling from specific departments. In each university where authorities had granted consent for the study, a list was compiled of all student groups with mandatory PE classes. Then, using a random draw without repetitions conducted in Statistica, two student groups – one male and one female – were selected to participate.

Anthropometric measurements were taken for each participant to calculate the three components of somatotype – endomorphy, mesomorphy, and ectomorphy – using the Heath-Carter method [26]. Endomorphy indicates body fat, mesomorphy reflects muscle development, and ectomorphy refers

to body slenderness. Body height (BH) was measured with a mobile stadiometer (SECA 2012, Germany) with an accuracy of 1 mm, and body weight (BW) was recorded using Tanita TBF 300 (Japan) scales. Upper arm and calf circumferences were measured with a Gulick anthropometric measuring tape of constant tension, accurate to 1 mm. Four skinfolds (triceps, subscapular, supraspinal, and medial calf) were measured using a Harpenden skinfold caliper with an accuracy of 0.1 mm. The breadths of the humerus and femur bones were measured with a small Martin caliper, accurate to 1 mm. All measurements were conducted by a trained research team following standard anthropometric procedures. Additionally, body mass index (BMI) was calculated using the standard formula, and BMI classification was performed according to WHO norms [35].

To assess leisure-time physical activity, the Polish version of the Minnesota Leisure-Time Physical Activity Questionnaire (MLTPAQ) was used [36, 37]. This questionnaire collects data on physical activity over the course of a year, focusing specifically on activities outside of professional work. It enables the assessment of energy expenditure in kcal per week. The study analyzed students' leisure-time physical activity (outside university obligations), excluding mandatory PE classes, and covered the six months prior to the study (from October 2016 to March 2017).

Exercise intensity was categorized according to Metabolic Equivalent of Task (MET) values on a three-level scale: low intensity (L) [ $\leq 4$  MET], medium intensity (M) [4.5–5.5 MET], and high intensity (H) [ $\geq 6$  MET]. The MLTPAQ score was calculated as the sum of metabolic activity indexes for low, medium, and high intensities [36]. Data was collected using the PAPI (Paper-and-Pen Personal Interview) method, with participants completing the paper questionnaire in the presence of research team members, who provided detailed instructions and addressed any questions.

#### *Statistical Analysis*

Basic statistical measures were calculated, including the arithmetic mean ( $\bar{x}$ ), standard deviation (SD), median (Me), and percentiles ( $C_{25}$  and  $C_{75}$ ). The significance of differences between the analyzed groups was assessed using the Mann-Whitney nonparametric test. Correlations between selected somatic variables and the level of leisure-time physical activity were analyzed using Spearman's rank correlation method. A significance level of  $\alpha = 0.05$  was assumed. All statistical analyses were conducted using Statistica 13.3 software (StatSoft).

## **Results**

Detailed somatic characteristics, including central tendency and dispersion measures, are

presented in Table 1. In general, female students in the analyzed group demonstrated lower body mass, body height, and BMI values compared to male students. Most students had a BMI within the normal range, with a smaller proportion classified as either above or below the normal range. The p-values for differences between sexes were calculated using the Mann-Whitney test.

The classification of BMI with regard to sex for the entire group of students is presented in Table 2. Statistically significant differences were observed in BMI distribution between male and female students. Female students showed a higher percentage of individuals with underweight and normal body mass. In contrast, male students had a greater percentage of individuals classified as overweight or obese. Overall, the proportion of students above the normal BMI range was higher among males than females. The p-values for differences in BMI distribution between sexes were calculated using the chi-square test of independence.

The somatotype components by sex are presented in Table 3. In the tested group, endomorphy was the most common somatotype component among female students, while mesomorphy was most common among male students. These differences were highly statistically significant ( $p < 0.001$ ). For ectomorphy, however, no statistically significant differences between sexes were observed. The p-values were calculated using the Mann-Whitney test.

The detailed results of LTPA levels by sex are presented in Table 4. Analysis using the MLTPAQ showed that male students reported higher levels of leisure-time physical activity than female students, including more activity across low, medium, and high intensities. However, a statistically significant correlation ( $p < 0.001$ ) between sex and leisure-time physical activity was observed only for high-intensity activity and the total physical activity measure. Additionally, it was noted that one in four female students (Total = 671 kcal/week) and one in four male students (Total = 950 kcal/week) did not reach the recommended leisure-time physical activity level of 1000 kcal/week. The p-values were calculated using the Mann-Whitney test.

The correlations between somatotype components and LTPA level and intensity are presented in Table 5. Among female students, endomorphy showed a significant negative correlation only with high-intensity physical activity. In contrast, among male students, endomorphy demonstrated a significant negative correlation with both medium- and high-intensity physical activity, as well as with total LTPA. No statistically significant correlations were observed for mesomorphy or ectomorphy in either group.

**Table 1.** Somatic characteristics of the study group (n = 309, n=154 – female, n=155 – male)

Variables	Sex	X±SD	Me	c <sub>25</sub>	c <sub>75</sub>	p-Value
BH (cm)	Female	165.0±5.7	165.0	161.0	169.0	<0.001
	Male	177.8±6.8	178.0	172.0	183.0	
BW (kg)	Female	58.9±9.8	57.5	52.8	64.0	<0.001
	Male	75.5±11.9	74.6	67.4	83.4	
BMI (kg/ m <sup>2</sup> )	Female	21.6±3.2	21.4	19.6	23.3	<0.001
	Male	23.9±3.7	23.5	21.4	26.1	

Note. C<sub>25</sub> and C<sub>75</sub> = percentiles, BH - body height, BW - body weight, BMI - body mass index

**Table 2.** Classification of BMI

Classification of BMI (kg/m <sup>2</sup> )	Sex (p - Value <0.001)		Total (n = 309) n (%)
	Female (n = 154) n (%)	Male (n = 155) n (%)	
Underweight	21 (13.6)	8 (5.2)	29 (9.4)
Normal weight	112 (72.7)	99 (63.9)	211 (68.3)
Overweight	19 (12.3)	35 (22.6)	54 (17.5)
Obesity	2 (1.3)	13 (8.4)	15 (4.8)

**Table 3.** Components of the somatotype of the study group by sex

Components of the somatotype	Sex	X±SD	Me	c <sub>25</sub>	c <sub>75</sub>	p-Value
Endomorphy	Female	3.50±0.97	3.40	2.80	4.10	<0.001
	Male	2.72±1.10	2.40	1.90	3.30	
Mesomorphy	Female	2.80±1.22	2.95	1.90	3.70	<0.001
	Male	3.98±1.50	3.90	3.00	5.00	
Ectomorphy	Female	2.66±1.39	2.60	1.70	3.50	0.323
	Male	2.49±1.48	2.50	1.20	3.60	

Note. C<sub>25</sub> and C<sub>75</sub> = percentiles

**Table 4.** Level of leisure-time physical activity by sex based on MLTPAQ

Intensity activity (kcal/week)	Sex	X±SD	Me	c <sub>25</sub>	c <sub>75</sub>	p-Value
Light (L)	Female	488±497	398	184	622	0.195
	Male	595±663	434	198	796	
Moderate (M)	Female	386±493	219	61	495	0.184
	Male	493±628	256	62	635	
Hight (H)	Female	932±1798	377	149	845	<0.001
	Male	1579±1986	884	219	1846	
Total (L+M+H)	Female	1806±2071	1158	671	2039	<0.001
	Male	2669±2449	1931	950	3220	

Note. C<sub>25</sub> and C<sub>75</sub> = percentiles

## Discussion

The aim of this study was to analyze the level and intensity of leisure-time physical activity (LTPA) among Polish university students and to examine the correlations between LTPA and somatotype components. The findings revealed that

male students had higher levels of LTPA across all intensities compared to female students. Significant negative correlations were observed between endomorphy and high-intensity LTPA in both sexes. Among male students, a negative correlation was also found between endomorphy and medium-intensity LTPA. No significant correlations were

**Table 5.** Correlation of body type with leisure-time physical activity intensity level by sex

Components of the somatotype	Sex	L	M	H	Total
Endomorphy	Female	-0.02	0.05	-0.16*	-0.09
	Male	-0.16	-0.17*	-0.21*	-0.28*
Mesomorphy	Female	0.08	0.09	0.06	0.15
	Male	-0.09	0.05	-0.02	-0.02
Ectomorphy	Female	0.02	-0.05	0.04	-0.05
	Male	0.08	0.02	0.00	0.02

Note. \* -  $p < 0.05$

identified for mesomorphy or ectomorphy with LTPA levels.

These results align with existing studies on physical activity (PA) among Polish and international students, which show that men engage in physical activity more frequently than women [21, 22, 38]. However, a study by Motevalli et al. [23] did not find significant sex-related differences in the frequency of leisure-time physical activity among students, except for sports club participation, which was significantly more common among male participants. Our previous international studies indicated that the average level of leisure-time physical activity among women is approximately one-third lower than that of men [24]. Similarly, global trends in PA show that men are generally more physically active than women. According to the OECD/WHO report from 2023 [5], in Europe, 73% of men and 58% of women aged 15–24 participate in sports or exercise at least once a week.

The results of our study indicate that the prevalence of overweight and obesity among Polish students was 22.3%, slightly below the average of 26% for young adults aged 18–24 with higher education in Poland, reported in 2019 [39]. This finding is notably higher than results from other studies, such as those on Austrian students (17.8%) [23] and Spanish students (16.5%) [22]. In our sample, male students (31%) made up a larger proportion of individuals with excess body weight according to BMI, compared to female students (13.6%).

The obtained results on the somatotype of the tested group indicate a more frequent occurrence of endomorphy among women than men, a finding also reported in a study by Chandel et al. [33] involving individuals aged 18–40. Among the Polish female students, the endomorphic component was predominant over the other somatotype components (3.5 – 2.8 – 2.6). In contrast, among male students, the mesomorphic component was dominant (2.7 – 3.9 – 2.4). Portuguese studies on siblings observed that participants who were more physically active showed higher values of mesomorphy [28]. Research on Polish university students has also demonstrated that the intensity

and duration of additional physical activity are correlated with body composition [25, 40, 41].

This study has shown a significant correlation between the endomorphic component and both the level and intensity of LTPA. In both sexes, the correlation between endomorphy and LTPA was negative, particularly for high-intensity physical activity. This suggests that for healthy individuals at this age, physical activity should not rely solely on low-intensity exercises. Therefore, if physical activity is to serve a health-protective role, the intensity level of activity is crucial, as supported by other studies [2, 15, 42, 43, 44, 45]. It has been observed, for example, that changes in HDL cholesterol are more favorable in groups with high physical activity compared to those with a sedentary lifestyle or low activity [43]. High-intensity exercises also appear to be more effective than moderate-intensity activities in reducing cardiovascular risk factors [2].

In a Spanish male population aged 20–90, assessment of physical activity using the MLTPAQ showed that only high-intensity activity (H) was associated with cardiorespiratory fitness (CRF) [42]. Similar conclusions were drawn by Tuero et al. [44], who found that high-intensity physical activity, as estimated by the MLTPAQ, was significantly correlated with VO<sub>2</sub>max values in both women and men. Another study confirmed that LTPA intensity is significantly correlated with CRF, noting that CRF is influenced more by the intensity of LTPA than by its duration [15]. Additionally, a study of Turkish students showed that intensive physical activity is correlated with mindful awareness, suggesting that increased physical activity, particularly at high intensity, may have a positive effect on mindful awareness [45].

One prospective study on the optimal dose of physical exercise for reducing risk factors associated with ischemic heart disease found that in the Polish population, given regional dietary habits, this dose, measured as energy expenditure, ranges from 1000 to 2000 kcal per week. Physical activity with an energy expenditure of 2000 kcal or more per week is linked to additional benefits, particularly in positively

modifying HDL cholesterol levels [43]. In our study, however, one in four female students had an energy expenditure of 671 kcal per week, and one in four male students had 950 kcal per week. This indicates that 25% of the students tested do not reach a level of leisure-time physical activity sufficient to achieve health-protective energy expenditure.

These findings align with those of Moreno [46], who observed that approximately one in four students in his study did not meet the PA levels recommended by the WHO. Our previous observations also indicated that women made up the largest percentage of individuals with physical activity levels below recommended health standards (below 1000 kcal/week) [24]. Studies on university students suggest that those most at risk of not reaching the WHO-recommended PA level are women with a normal or below-normal body fat percentage who are not employed outside the home [46]. This pattern suggests that maintaining a lifestyle with low levels of leisure-time physical activity among young adults may lead to an increased risk of noncommunicable diseases in the future.

A certain limitation of this study is that the female group included more underweight individuals than the male group. This may be due to the inclusion criterion of self-reported health status, which excluded women with overweight or obesity who did not participate in the PE curriculum. Although high-intensity physical activity is negatively correlated with the endomorphy component, this correlation is slightly stronger in the male group, potentially due to the higher proportion of

overweight and obese individuals. A broader study focusing exclusively on individuals with diagnosed overweight and obesity is recommended to confirm or refute these observations.

## Conclusions

This study underscores the importance of achieving sufficient levels of leisure-time physical activity (LTPA) for health protection among university students. The findings highlight the critical role of high-intensity activity in contributing to beneficial health outcomes, particularly for individuals with higher endomorphic components. These observations suggest that physical activity guidelines for young adults should emphasize not only the quantity but also the intensity of LTPA to effectively support health and prevent lifestyle-related diseases.

## Funding

The data presented here are part of a larger study, “Selected Aspects of Students’ Health in the Light of Their Physical Activity and Cardiorespiratory Fitness,” conducted under the grant “Development of Academic Sport” (No. NRSA4 016 54) and funded by the Ministry of Science and Higher Education in Poland. The project received approval from the Institutional Review Board of the University of Rzeszów (Approval No. 20/12/2015, dated 2 December 2015).

## Conflicts of Interest

The authors declare no conflicts of interest.

---

## References

1. Crooke R, Haseler C, Haseler T, Collins J, Crockett A. Physical Activity and Moving More for Health. *Journal of the Royal College of Physicians of Edinburgh*, 2020;50(2): 164–165. <https://doi.org/10.4997/jrcpe.2020.223>
2. Franklin BA, Eijvogels TMH, Pandey A, Quindry J, Toth PP. Physical activity, cardiorespiratory fitness, and cardiovascular health: A clinical practice statement of the American Society for Preventive Cardiology Part I: Bioenergetics, contemporary physical activity recommendations, benefits, risks, extreme exercise regimens, potential maladaptations. *American Journal of Preventive Cardiology*, 2022;12: 100424. <https://doi.org/10.1016/j.ajpc.2022.100424>
3. WHO. *Physical activity* [Internet]. 2022 [updated 2022 Jun; cited 2023 Aug 24]. Available from: <https://www.who.int/news-room/fact-sheets/detail/physical-activity>
4. Haseler T, Haseler C. Lack of physical activity is a global problem. *BMJ*, 2022; o348. <https://doi.org/10.1136/bmj.o348>
5. OECD/WHO. *OECD. Physical activity in Europe: Trends and patterns* [Internet]. 2023 [updated 2022 Jun; cited 2024 Oct 1]. Available from: [https://www.oecd.org/en/publications/2023/02/step-up-tackling-the-burden-of-insufficient-physical-activity-in-europe\\_20fba4c9/full-report/component-6.html](https://www.oecd.org/en/publications/2023/02/step-up-tackling-the-burden-of-insufficient-physical-activity-in-europe_20fba4c9/full-report/component-6.html)
6. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, 2020;54(24): 1451–1462. <https://doi.org/10.1136/bjsports-2020-102955>
7. Strain T, Flaxman S, Guthold R, Semanova E, Cowan M, Riley LM, et al. National, regional, and global trends in insufficient physical activity among adults from 2000 to 2022: a pooled analysis of 507 population-based surveys with 5-7 million participants. *The Lancet Global Health*, 2024;12(8): e1232–e1243. [https://doi.org/10.1016/S2214-109X\(24\)00150-5](https://doi.org/10.1016/S2214-109X(24)00150-5)
8. WHO. *Global levels of physical inactivity in adults: off track for 2030* [Internet]. 2022 [updated 2022 Jun; cited 2024 Oct 1]. Available from: <https://www.who.int/publications/i/item/9789240096905>

9. Pengpid S, Peltzer K, Kassean HK, Tsala Tsala JP, Sychareun V, Müller-Riemenschneider F. Physical inactivity and associated factors among university students in 23 low-, middle- and high-income countries. *International Journal of Public Health*, 2015;60(5): 539–549. <https://doi.org/10.1007/s00038-015-0680-0>
10. Castro O, Bennie J, Vergeer I, Bosselut G, Biddle SJH. How Sedentary Are University Students? A Systematic Review and Meta-Analysis. *Prevention Science*, 2020;21(3): 332–343. <https://doi.org/10.1007/s11121-020-01093-8>
11. He F, Li Y, Hu Z, Zhang H. Association of domain-specific physical activity with depressive symptoms: A population-based study. *European Psychiatry*, 2023;66(1): e5. <https://doi.org/10.1192/j.eurpsy.2022.2350>
12. Ramirez Varela A, Hallal PC. Does every move really count towards better health? *The Lancet Global Health*, 2024;12(8): e1215–e1216. [https://doi.org/10.1016/S2214-109X\(24\)00173-6](https://doi.org/10.1016/S2214-109X(24)00173-6)
13. Yang J, Zheng X, Song G. *The Relationship Between Leisure-time Physical Activity and Sleep Disorders in American Adults*. 2024 Sep [Accessed 13th November 2024]. <https://doi.org/10.21203/rs.3.rs-4845991/v1>
14. Cao Y, Hu Y, Lei F, Zhang X, Liu W, Huang X, et al. Associations between leisure-time physical activity and the prevalence and incidence of osteoporosis disease: Cross-sectional and prospective findings from the UK biobank. *Bone*, 2024;187: 117208. <https://doi.org/10.1016/j.bone.2024.117208>
15. Singhal N, Siddhu A. Association of Leisure-Time Physical Activity With Cardiorespiratory Fitness in Indian Men. *Journal of Physical Activity and Health*, 2014;11(2): 296–302. <https://doi.org/10.1123/jpah.2012-0029>
16. Drygas W, Jegler A, Kunski H. Study on Threshold Dose of Physical Activity in Coronary Heart Disease Prevention. Part I. Relationship Between Leisure Time Physical Activity and Coronary Risk Factors\*. *International Journal of Sports Medicine*, 1988;09(04): 275–278. <https://doi.org/10.1055/s-2007-1025021>
17. Taliaferro LA, Rienzo BA, Pigg RM, Miller MD, Dodd VJ. Associations Between Physical Activity and Reduced Rates of Hopelessness, Depression, and Suicidal Behavior Among College Students. *Journal of American College Health*, 2009;57(4): 427–436. <https://doi.org/10.3200/JACH.57.4.427-436>
18. Molina-García J, Castillo I, Pablos C. Determinants of Leisure-time Physical Activity and Future Intention to Practice in Spanish College Students. *The Spanish journal of psychology*, 2009;12(1): 128–137. <https://doi.org/10.1017/S1138741600001542>
19. Zadarko E, Barabasz Z, Nizioł-Babiarz E, Zadarko Domaradzka M, Barabasz M, Sobolewski M, et al. Leisure time physical activity of young women from the Carpathian Euroregion in relation to the Body Mass Index. *Annals of Agricultural and Environmental Medicine*, 2014;21(3): 622–626. <https://doi.org/10.5604/12321966.1120614>
20. Joseph RP, Royse KE, Benitez TJ, Pekmezi DW. Physical activity and quality of life among university students: exploring self-efficacy, self-esteem, and affect as potential mediators. *Quality of Life Research*, 2014;23(2): 659–667. <https://doi.org/10.1007/s11136-013-0492-8>
21. Zadarko-Domaradzka M, Zadarko E, Barabasz Z. Leisure-Time Physical Activity as a Component of University Students' Lifestyle in Selected Countries of the Carpathian Euroregion. *Sci Rev Phys Cult*. 2016;6:107–14.
22. Acebes-Sánchez J, Diez-Vega I, Rodriguez-Romo G. Physical Activity among Spanish Undergraduate Students: A Descriptive Correlational Study. *International Journal of Environmental Research and Public Health*, 2019;16(15): 2770. <https://doi.org/10.3390/ijerph16152770>
23. Motevalli M, Drenowatz C, Tanous DR, Wirnitzer G, Kirschner W, Ruedl G, et al. Determinants of Engagement in Leisure-Time Physical Activity and Club Sports among University Students: A Large-Scale Study. *Journal of Functional Morphology and Kinesiology*, 2024;9(3): 151. <https://doi.org/10.3390/jfkm9030151>
24. Zadarko E, Zadarko-Domaradzka M, Barabasz Z, Czarny W. The level of leisure time physical activity of students vs. the health locus of control. *Studia sportiva*, 2016;10(1): 70–75. <https://doi.org/10.5817/StS2016-1-6>
25. Janiszewska R. Evaluation of body composition in students with different degrees of physical activity by the method of bioelectrical impedance. *Med Ogólna Nauki O Zdrowiu*, 2013;19(2):173–6. (In Polish).
26. Carter JEL. *The Heath-Carter Anthropometric Somatotype - Instruction Manual* - [Internet]. San Diego, CA. U.S.A.: Department of Exercise and Nutritional Sciences San Diego State University; 2002 [updated 2002 Jun; cited 2024 Oct 1]. Available from: <https://www.mdthinducollege.org/ebooks/statistics/Heath-CarterManual.pdf>
27. Peeters MW, Thomis MA, Claessens AL, Loos RJJ, Maes HHM, Lysens R, et al. Heritability of somatotype components from early adolescence into young adulthood: a multivariate analysis on a longitudinal twin study. *Annals of Human Biology*, 2003;30(4): 402–418. <https://doi.org/10.1080/0301446031000102744>
28. Pereira S, Katzmarzyk PT, Gomes TN, Souza M, Chaves RN, Santos FKD, et al. Multilevel modelling of somatotype components: the Portuguese sibling study on growth, fitness, lifestyle and health. *Annals of Human Biology*, 2017;44(4): 316–324. <https://doi.org/10.1080/03014460.2016.1243727>
29. Andreenko E. Changes in somatotype characteristics in the middle-aged Bulgarian men. *Nutricion Hospitalaria*, 2015;(6): 2910–2915. <https://doi.org/10.3305/nh.2015.32.6.9810>
30. Villaroman AA. The Role of Macromolecules in the Metabolism and Health of Different Somatotypes. *Glob. Sci. J.* 2022;10:1220–1226.
31. Skibińska A. Typologia budowy ciała [Body build typology]. In: Charzewski JI, editor. *Antropologia* [Anthropology]. Warsaw, Poland: AWF Publishing;

1999. P. 183–225. (In Polish)
32. Longkumer T. Physical Activity and Somatotypes among Ao Naga Boys. *The Anthropologist*, 2014;17(2): 669–675. <https://doi.org/10.1080/09720073.2014.11891476>
  33. Chandel S, Rhetso A, Malik SL, Kulshreshtha M. The association between Body Physique and Physical Fitness: a cross-sectional study among a tribal community of Dadra and Nagar Haveli, India. *International Journal of Applied Exercise Physiology*, 2017;7(1): 11–20. <https://doi.org/10.22631/ijaep.v7i1.161>
  34. Koleva M, Nacheva A, Boev M. Somatotype and Disease Prevalence in Adults. *Reviews on Environmental Health*, 2002;17(1). <https://doi.org/10.1515/REVEH.2002.17.1.65>
  35. WHO. *A healthy lifestyle - WHO recommendations* [Internet]. 2023 [updated 2023 Jun; cited 2024 Oct 1]. Available from: <https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle---who-recommendations>
  36. Barabasz M, Lwow F, Zadarko E. Minnesota Leisure Time Physical Activity Questionnaire in medical practice and health promotion. *Physiotherapy*, 2015;23(2). <https://doi.org/10.1515/physio-2015-0009>
  37. Taylor HL, Jacobs DR, Schucker B, Knudsen J, Leon AS, Debacker G. A questionnaire for the assessment of leisure time physical activities. *Journal of Chronic Diseases*, 1978;31(12): 741–755. [https://doi.org/10.1016/0021-9681\(78\)90058-9](https://doi.org/10.1016/0021-9681(78)90058-9)
  38. Duda M, Rżany M, Dudło A, Suszyński K, Górka D, Dogońska A. Students' attitude towards taking up physical activities apart from university classes. *Quality in Sport*, 2015;1(2): 53–59. <https://doi.org/10.12775/QS.2015.011>
  39. World Obesity Federation. *World Obesity Federation Global Obesity Observatory. Poland - Overweight/obesity by age and education*. [Internet]. 2024 [updated 2024 Jun; cited 2024 Oct 6]. Available from: [https://data.worldobesity.org/country/poland-173/#data\\_population-breakdowns](https://data.worldobesity.org/country/poland-173/#data_population-breakdowns)
  40. Saczuk J, Wasiluk A. *Wpływ aktywności ruchowej na poziom rozwoju fizycznego i wytrzymałość krążeniowo-oddechową studentek wychowania fizycznego. Aktywność Ruchowa Ludzi W Różnym Wiek* [The influence of physical activity on the level of physical development and cardiorespiratory endurance of female students of physical education. Physical activity of people of different ages] [Internet]. 2004 [updated 2024 Jun; cited 2024 Oct 10]. Available from: <http://agro.icm.edu.pl/agro/element/bwmeta1.element.agro-e382b8b4-d393-435f-ac91-80197cfa2d7d> (In Polish)
  41. Jaremków A, Markiewicz-Górka I, Hajdusianek W, Czerwińska K, Gać P. The Relationship between Body Composition and Physical Activity Level in Students of Medical Faculties. *Journal of Clinical Medicine*, 2023;13(1): 50. <https://doi.org/10.3390/jcm13010050>
  42. Elosua R, Marrugat J, Molina L, Pons S, Pujol E. Validation of the Minnesota Leisure Time Physical Activity Questionnaire in Spanish Men. *American Journal of Epidemiology*, 1994;139(12): 1197–1209. <https://doi.org/10.1093/oxfordjournals.aje.a116966>
  43. Drygas W, Kostka T, Jegier A, Kuński H. Long-Term Effects of Different Physical Activity Levels on Coronary Heart Disease Risk Factors in Middle-Aged Men. *International Journal of Sports Medicine*, 2000;21(4): 235–241. <https://doi.org/10.1055/s-2000-309>
  44. Tuero C, De Paz JA, Marquez S. Relationship of measures of leisure time physical activity to physical fitness indicators in Spanish adults. *J Sports Med Phys Fitness*. 2001;41(1):62–7.
  45. Yıldız ME, Günel İ, Dalbudak İ. The relationship between physical activity and mindful awareness of university students. *Physical Education of Students*, 2024;28(4): 234–241. <https://doi.org/10.15561/20755279.2024.0406>
  46. Moral Moreno L. Perfil del estudiante universitario con un estilo de vida insuficientemente activo (Profile of university student with an inadequately active lifestyle). *Retos*, 2023;48: 610–618. (In Spanish). <https://doi.org/10.47197/retos.v48.95840>

### Information about the authors:

**Maria Zadarko-Domaradzka**; <https://orcid.org/0000-0003-4330-3944>; [mzadarko@ur.edu.pl](mailto:mzadarko@ur.edu.pl); Institute of Physical Culture Sciences, Medical College of Rzeszow University, University of Rzeszów; Rzeszów, Poland.

**Edyta Nizioł-Babiarz**; <https://orcid.org/0000-0001-6316-6030>; [edyta.niziol-babiarz@pans.krosno.pl](mailto:edyta.niziol-babiarz@pans.krosno.pl); Department of Physical Education, Institute of Health and Economy, State Academy of Applied Sciences in Krosno; Krosno, Poland.

**Zbigniew Barabasz**; <https://orcid.org/0000-0002-3096-2206>; [zbigniew.barabasz@pans.krosno.pl](mailto:zbigniew.barabasz@pans.krosno.pl); Department of Physical Education, Institute of Health and Economy, State Academy of Applied Sciences in Krosno; Krosno, Poland.

**Emilian Zadarko**; (Corresponding Author); <http://orcid.org/0000-0001-7423-1790>; [ezadarko@ur.edu.pl](mailto:ezadarko@ur.edu.pl); Institute of Physical Culture Sciences, Medical College of Rzeszow University, University of Rzeszów; Rzeszów, Poland.

---

Cite this article as:

Zadarko-Domaradzka M, Nizioł-Babiarz E, Barabasz Z, Zadarko E. Relationship between leisure-time physical activity and components of somatotype among university students. *Physical Education of Students*, 2024;28(6):362–370.

<https://doi.org/10.15561/20755279.2024.0605>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 19.10.2024

Accepted: 27.11.2024; Published: 30.12.2024

# Analysis of the relationship between leisure satisfaction and life satisfaction among students participating in outdoor recreational activities

Fatih Yaşartürk<sup>1ABDE</sup>, Gürkan Elçi<sup>1ACD</sup>, Sercan Kural<sup>1ABE</sup>, Yusufcan Keskin<sup>2ADE</sup>

<sup>1</sup> Bartın University, Faculty of Sport Sciences, Bartın, Turkey

<sup>2</sup> İstanbul Gedik University, Faculty of Sport Sciences, Turkey

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Participation in outdoor recreational activities contributes to psychological well-being and overall life satisfaction. Since leisure satisfaction is closely associated with quality of life, examining this relationship can offer valuable insights into the role of recreation in academic settings. The objective of this study is to examine the relationship between students' life satisfaction and leisure satisfaction during outdoor recreational activities.

**Material and Methods** The study group consisted of 647 willing participants (413 men and 234 women) randomly selected from a larger pool of university students who engage in various leisure activities during their free time. Researchers utilized a personal information form, the Leisure Satisfaction Scale (LSS), and the Satisfaction with Life Scale (SWLS) as data collection instruments. The data were analyzed using frequency analysis, arithmetic mean, standard deviation, independent samples t-test, ANOVA, and Pearson correlation.

**Results** The t-test results showed no significant differences between gender and the sub-dimensions of the LSS and SWLS. The ANOVA test revealed that students in the Recreation Department scored higher on average compared to those in the Coaching Education and Sports Management departments in the LSS sub-dimensions. Additionally, students in the Physical Education and Sports Teaching Department scored higher on the SWLS compared to those in the Coaching Education Department. A statistically significant difference was found between the mean scores of the LSS's Curriculum and Instruction, Social, Physiological, and Aesthetic components based on the variable of sports participation. Students who participated in sports for leisure scored higher. Furthermore, as levels of life satisfaction increased, levels of leisure satisfaction also increased.

**Conclusions** Engaging in leisure activities contributes to higher levels of life satisfaction by fulfilling psychological and social needs. The findings suggest that participation in outdoor recreational activities can positively influence well-being, helping students manage stress, develop social connections, and improve their overall quality of life. Encouraging leisure activities within academic environments may serve as an effective strategy for enhancing both personal and academic outcomes.

**Keywords:** outdoor recreation, leisure satisfaction, satisfaction with life

## Introduction

Today, outdoor recreational activities are essential for people to escape daily work stress, relax, boost motivation, and establish social relationships. These activities are considered an important tool for meeting physical, psychological, and social needs. They offer many positive effects, such as improving health, coping with stress, enhancing quality of life, and fostering a connection with nature [1, 2, 3]. The increasing stress of daily life and growing dependence on technology have heightened the need for outdoor activities [4, 5]. It is well established that outdoor recreation increases physical activity levels, helping individuals lead healthier lives and preventing chronic diseases such as obesity and diabetes [6, 7]. Furthermore,

outdoor recreation activities strengthen social ties and support psychological resilience by enhancing individuals' self-efficacy. Regular participation in these activities also develops environmental awareness and contributes to social solidarity.

Outdoor recreation activities are highlighted as an ideal tool for enhancing the quality of life of university students, supporting their physical and mental health, and strengthening social bonds [8, 9]. Furthermore, participation in outdoor recreational activities has been shown to positively contribute to university students' stress management, academic performance, overall life satisfaction, and leisure satisfaction [10, 11, 12, 13].

The meaningful and productive use of leisure time increases individuals' satisfaction levels, providing both personal and societal benefits. The joy, contentment, and sense of personal

significance that people experience when engaging in leisure activities are referred to as leisure satisfaction [14, 15, 16]. Leisure satisfaction significantly contributes to strengthening social bonds, fostering personal development, and enhancing overall happiness [17, 18].

Leisure satisfaction refers to the happiness, fulfillment, and sense of personal meaning individuals experience through participation in leisure activities. This satisfaction depends on how individuals spend their leisure time, the benefits they gain from these activities, and how well these experiences meet their psychological, social, and physical needs [19]. Participation in outdoor recreational activities is considered an effective way to enhance leisure satisfaction. These activities offer opportunities to connect with nature, engage in physical exercise, and build social relationships [20, 21]. Leisure fulfillment plays a crucial role in maintaining psychological health and significantly increasing overall happiness [22, 23]. Therefore, leisure satisfaction, as a measure of happiness and fulfillment derived from leisure activities, is closely related to life satisfaction.

Satisfaction with life is described as the state or outcome derived from comparing what individuals wish to achieve with what they actually possess [24, 25]. It serves as a subjective indicator of well-being, reflecting individuals' overall assessments of their lives and the satisfaction they derive from these evaluations [26].

Satisfaction with life not only enhances personal well-being but also fosters positive interactions and social cohesion within society [27, 28]. Participation in leisure activities plays a fundamental role in improving university students' satisfaction with life by meeting their psychological, social, and physical needs. While leisure satisfaction refers to the happiness and fulfillment individuals experience from leisure activities, life satisfaction represents a holistic evaluation of the contentment individuals derive from various aspects of their lives [25, 29].

Despite the existence of numerous studies exploring the relationships between leisure satisfaction and life satisfaction, the specific dynamics among university students participating in outdoor recreational activities remain insufficiently understood. Previous research has highlighted general benefits, but gaps persist in identifying how different factors, such as demographic characteristics and types of activities, influence these outcomes. Therefore, this topic requires a more in-depth investigation to comprehensively understand the role of leisure satisfaction in enhancing life satisfaction among students.

Considering the strong relationship between outdoor recreational activities, leisure satisfaction, and life satisfaction, students who engage in leisure activities can enhance both their quality of life and

overall life satisfaction. Given this, the objective of this study is to examine the relationship between students' life satisfaction and leisure satisfaction during outdoor recreational activities.

## Materials and Methods

This study employed a relational survey model, a type of correlational research designed to identify relationships between two or more variables and provide insights into potential cause-and-effect dynamics [30, 31].

### *Participants*

The research group consisted of 647 voluntary university students: 413 males ( $M_{\text{age}} = 21.42 \pm 1.89$ ) and 234 females ( $M_{\text{age}} = 20.79 \pm 1.96$ ). The overall mean age of the participants was 21.19 years ( $M_{\text{age}} = 21.19 \pm 1.93$ ). Participants were selected through convenience sampling from students engaged in various leisure activities, including social, cultural, and physical activities.

### *Research Design*

#### *Data Collection Tools*

The data were collected using a personal information form developed by the researchers. This form inquired about independent variables, including gender, age, academic department, and participation in sports during leisure time.

The data were collected using a personal information form developed by the researchers. This form inquired about independent variables, including gender, age, academic department, and participation in sports during leisure time.

The Leisure Time Satisfaction Scale (LTSS), created by Beard and Ragheb and translated into Turkish by Karlı et al., was used to measure the degree of participants' satisfaction with leisure activities [32, 33]. According to validity and reliability tests, the 39 items in the LTSS were divided into six sub-dimensions: psychological, educational, social, relaxation, physiological, and aesthetic.

The internal consistency coefficient of the Turkish adaptation of the LTSS was determined to be 0.92 for the overall scale, and the sub-dimension values were as follows: 0.96 for psychological, 0.84 for educational, 0.82 for social, 0.79 for relaxation, 0.82 for physiological, and 0.79 for aesthetic. In this study, the internal consistency coefficient was 0.96 for the overall scale. The sub-dimension coefficients were 0.86 for psychological, 0.89 for educational, 0.84 for social, 0.85 for relaxation, 0.80 for physiological, and 0.80 for aesthetic.

The Satisfaction with Life Scale (SWLS) created by Diener et al. and translated into Turkish by Yetim, was used to measure the life satisfaction of the participants [25, 34]. The five-item life satisfaction scale was constructed using a seven-point Likert scale for scoring. "Strongly disagree (1)", "disagree

(2)', 'partially disagree (3)', 'undecided (4)', 'partially agree (5)', 'agree (6)' and 'strongly agree (7)' are seven-point Likert possibilities. While the internal consistency coefficient of the scale used in the adaptation study was .86, the internal consistency coefficient determined for the data collected for this study was .85.

The Satisfaction with Life Scale (SWLS), created by Diener et al. and translated into Turkish by Yetim, was used to measure participants' life satisfaction [25, 34]. The scale consists of five items, each rated on a seven-point Likert scale: "Strongly disagree (1)", "Disagree (2)", "Partially disagree (3)", "Undecided (4)", "Partially agree (5)", "Agree (6)", and "Strongly agree (7)". The internal consistency coefficient of the scale in the adaptation study was 0.86, while the internal consistency coefficient for the data collected in this study was 0.85.

#### Data Collection Process

Participants were asked to complete the scales using their mobile devices, and all data collection tools were administered digitally. The instructions provided necessary explanations regarding the study's purpose and detailed guidance on how to complete the data collection tools. The responses were submitted voluntarily by individuals who engaged in various leisure activities. After collecting the forms, the researcher reviewed them and excluded those with missing information or errors. The valid and complete data were then transferred to a computer for analysis.

#### Ethical Standards

This study was conducted in accordance with ethical guidelines for research involving human participants. Before participating, all students were provided with detailed information about the purpose and procedures of the study. Informed consent was obtained from all participants, emphasizing the voluntary nature of their participation and their right to withdraw at any time without penalty. To ensure confidentiality and privacy, no identifying information was collected, and all data were anonymized and securely stored. The study received ethical approval from the University Ethics Committee.

#### Statistical Analysis

The statistical analysis was conducted using SPSS 20.0. The methods applied to assess the data included frequency analysis, numerical mean, standard deviation, independent samples t-test, ANOVA, and Pearson correlation tests. To determine the suitability of parametric tests, the results of Levene's test for equality of variances and the Skewness and Kurtosis values for normality of the data were analyzed [35]. The equality of variances was confirmed, as the significance value for Levene's test was greater than  $p < 0.05$  [30]. Additionally, the Cronbach's Alpha coefficient was calculated to assess the reliability of the scales.

#### Results

The various dimensions of satisfaction, including psychological, educational, social, relaxation, physiological, and aesthetic factors, were assessed in this study. These dimensions are summarized in Table 1.

The "Relaxation" sub-dimension had the greatest mean (3.68), while the "Physiological" sub-dimension had the lowest mean (3.51) when the arithmetic means of the participants' scores on the Leisure Satisfaction Scale were analyzed by factor (see Table 1). Participants' overall Satisfaction with Life Scale scores had an arithmetic mean of 4.36. Furthermore, it was determined that the data has a normal distribution after looking at the skewness and kurtosis values of the scale scores.

Table 2 reveals the results of the t-test, indicating no statistically significant differences in the scores of any LSS sub-dimension based on the gender variable. Additionally, the t-test results for the gender variable showed no statistically significant differences in the mean scores of the SWLS.

Table 3 shows statistically significant differences in the mean scores of all LSS sub-dimensions based on the participants' department of study. A comparison of the mean scores for all LSS sub-dimensions indicates that students in the "Recreation" department had higher mean scores than those in the "Coaching Education" and "Sports Management" departments. Additionally, the mean

**Table 1.** Distribution of scale scores

Well-Being Categories	n	Mean	Sd	Skewness	Kurtosis	Min.	Max.	
SWLS	647	4.36	1.46	-0.19	-0.76	1.00	7.00	
LSS	Psychological	647	3.53	0.81	-0.40	-0.20	1.00	5.00
	Education	647	3.57	0.82	-0.34	-0.12	1.00	5.00
	Social	647	3.61	0.76	-0.40	0.12	1.00	5.00
	Relaxation	647	3.68	0.94	-0.49	-0.25	1.00	5.00
	Physiological	647	3.51	0.80	-0.36	0.05	1.00	5.00
	Aesthetics	647	3.59	0.89	-0.49	0.02	1.00	5.00

**Table 2.** T-test results by gender variable

Well-Being Categories	Gender	N	Mean	Sd	sd	t	p
SWLS	Female	234	4.32	1.44	645	-.343	.732
	Male	413	4.37	1.47			
Psychological	Female	234	3.50	.82	645	-.746	.456
	Male	413	3.55	.79			
Education	Female	234	3.56	.84	645	-.182	.856
	Male	413	3.57	.80			
Social	Female	234	3.62	.77	645	.237	.813
	Male	413	3.60	.74			
Relaxation	Female	234	3.68	.96	645	.088	.930
	Male	413	3.67	.91			
Physiological	Female	234	3.48	.84	645	-.443	.658
	Male	413	3.51	.77			
Aesthetics	Female	234	3.53	.93	645	-1.071	.284
	Male	413	3.61	.86			

**Table 3.** ANOVA results by department variable

Source of Variance		Sum of Squares	sd	Mean Square	F	p	Difference*
SWLS	Intergroup	19.075	3	6.358	3.005	.030	1 > 2
	Intragroup	1360.638	643	2.116			
	Total	1379.713	646				
Psychological	Intergroup	16.291	3	5.430	8.677	.000	3 > 2.4
	Intragroup	402.402	643	.626			
	Total	418.693	646				
Education	Intergroup	15.674	3	5.225	8.102	.000	3 > 2.4
	Intragroup	414.635	643	.645			
	Total	430.309	646				
Social	Intergroup	9.086	3	3.029	5.401	.001	3 > 2.4
	Intragroup	360.562	643	.561			
	Total	369.648	646				
Relaxation	Intergroup	17.176	3	5.725	6.723	.000	3 > 2.4
	Intragroup	547.610	643	.852			
	Total	564.786	646				
Physiological	Intergroup	8.625	3	2.875	4.574	.004	3 > 2.4
	Intragroup	404.188	643	.629			
	Total	412.813	646				
Aesthetics	Intergroup	13.291	3	4.430	5.703	.001	3 > 2.4
	Intragroup	499.468	643	.777			
	Total	512.759	646				

\*p<0,05 - 1. Physical Education and Sports Teaching 2. Coaching Education, 3. Recreation, 4. Sports Management

scores varied statistically significantly depending on the students' study major ( $F(3, 646) = 3.005$ ;  $p < 0.05$ ). The results of the Tukey test revealed that students in the "Physical Education and Sports

Teaching" department had higher average scores than those in the "Coaching Education" department.

Table 4 shows that the mean scores for the "Psychological" and "Relaxation" sub-dimensions

**Table 4.** T-test results according to the variable of participation in sports activities

Participation in Sports Events		N	Mean	Sd	sd	t	p
SWLS	No	231	4.28	1.47	645	-0.958	.732
	Yes	416	4.39	1.45			
Psychological	No	231	3.43	.80	645	-2.249	.456
	Yes	416	3.58	.79			
Education	No	231	3.44	.84	645	-2.875	.004*
	Yes	416	3.64	.79			
Social	No	231	3.48	.76	645	-3.178	.002*
	Yes	416	3.68	.74			
Relaxation	No	231	3.59	.96	645	-1.754	.080
	Yes	416	3.72	.91			
Physiological	No	231	3.37	.80	645	-3.220	.001*
	Yes	416	3.58	.78			
Aesthetics	No	231	3.43	.93	645	-3.238	.001*
	Yes	416	3.67	.85			

\*p<0,05

**Table 5.** Correlation results of the participants between LSS and SWLS according to independent variables

Variables	SWLS	LSS						
		Psychological	Education	Social	Relaxation	Physiological	Aesthetics	
Age	r	0.00	-0.03	-0.02	-0.02	-0.05	-0.02	-0.02
	p	0.99	0.50	0.67	0.69	0.22	0.67	0.57
Monthly Income	r	.125	.124	.116	.103	.087	.114	.078
	p	0.00	0.00	0.00	0.01	0.03	0.00	0.04
Participation Duration in Leisure Time	r	0.01	0.03	0.00	0.01	0.04	0.00	0.02
	p	0.91	0.52	1.00	0.75	0.31	0.96	0.64
SWLS	r	-	.398	.365	.361	.369	.356	.303
	p	-	0.00	0.00	0.00	0.00	0.00	0.00

of the LSS were not statistically significantly different based on the t-test results for participants' engagement in sports activities ( $p > 0.05$ ). However, for the "Education", "Social", "Physiological", and "Aesthetic" sub-dimensions of the LSS, there were statistically significant differences in mean scores depending on participation in leisure sports activities ( $p < 0.05$ ). Analysis of these mean scores revealed that participants who engaged in sports activities during their leisure time had higher scores in these sub-dimensions. Additionally, the t-test results for the Satisfaction with Life Scale (SWLS) showed no statistically significant differences based on sports participation ( $t(645) = -0.958$ ;  $p > 0.05$ ).

According to Table 5, the results of the correlation analysis conducted to test the relationships between participants' age, monthly income, duration of participation in leisure activities, SWLS, and LSS sub-dimensions show the following:

- A positive, low-level statistically significant relationship was found between monthly income and the SWLS average scores ( $r = .12$ ,  $p < 0.05$ ).

- Similar low-level positive correlations were observed between monthly income and the LSS sub-dimensions:
  - Psychological ( $r = .12$ ),
  - Educational ( $r = .11$ ),
  - Social ( $r = .10$ ),
  - Relaxation ( $r = .08$ ),
  - Physiological ( $r = .11$ ), and
  - Aesthetic ( $r = .07$ ), all at  $p < 0.05$ .
- Additionally, a positive, moderate-level statistically significant relationship was found between the SWLS average scores and the following LSS sub-dimensions:
  - Psychological ( $r = .39$ ),
  - Educational ( $r = .36$ ),
  - Social ( $r = .36$ ),
  - Relaxation ( $r = .36$ ),
  - Physiological ( $r = .35$ ), and
  - Aesthetic ( $r = .30$ ), all at  $p < 0.05$ .

These findings suggest that as monthly income levels increase, both life satisfaction and leisure satisfaction levels tend to increase.

## Discussion

The current research aims to explore how university students participating in outdoor recreational activities perceive their life satisfaction and leisure satisfaction. The obtained results have been analyzed within the context of existing research findings.

Outdoor recreation refers to leisure activities conducted in natural environments, where individuals engage directly with the outdoors [36]. In recent years, activities that involve close contact with nature have gained increasing popularity [37]. Given this trend, the present study investigates the relationship between students' levels of life satisfaction and leisure satisfaction as they participate in outdoor recreational activities.

There was no discernible variation in the LSS sub-dimensions based on the gender of the participants. Similar findings were reported by Mamak [38], who found no significant difference in leisure satisfaction levels according to gender among university students participating in leisure activities. Consistent with these results, Ardahan and Yerlisu [39] also found no significant gender differences in leisure satisfaction levels among university students. Likewise, Yiğit [40] observed no significant gender-based differences in leisure satisfaction among students involved in university recreational activities. Furthermore, Gökçe [41] found no significant difference in leisure satisfaction levels among students preparing for the university entrance exam.

Ragheb and Griffith [29] determined that gender did not create a significant difference among the factors influencing individuals' leisure satisfaction levels. Additionally, Iso-Ahola and Weissinger [42] suggested that while participation in leisure activities enhances individuals' perceptions of satisfaction, these perceptions are independent of demographic variables such as gender. In conclusion, it can be inferred that the leisure satisfaction levels of both female and male individuals may be similar. This finding suggests that the nature of the activities and individual preferences might have a more significant effect on leisure satisfaction than gender.

Regarding the gender variable, there was no discernible variation in the participants' mean SWLS scores. A study by Küçük Kılıç et al. [43] found no significant difference in life satisfaction based on gender among attendees of summer sports schools. Similarly, Yaşartürk and Bilgin [44] found no clear variation in life satisfaction between male and female college students. Ayhan and Özel [45] also reported no significant difference in life satisfaction based on gender among university students.

This conclusion aligns with existing research suggesting that factors such as personal experience,

individual values, and living circumstances, rather than gender, determine life satisfaction [46]. Furthermore, Pavot and Diener [26] concluded that life happiness is not significantly influenced by gender.

The results of this study reveal that life satisfaction levels among male and female university students participating in outdoor activities are quite similar. This could reflect the shared sources of pleasure, rejuvenation, and relaxation that outdoor activities provide. Additionally, the similarity in living circumstances and access to outdoor activities among university students may contribute to reducing gender disparities in life satisfaction.

Based on the findings, university students of both sexes perceive leisure and life satisfaction at equivalent levels. In this context, gender may not be a determining factor for personal evaluations like leisure and life satisfaction, which depend more on personal interests, expectations, and experiences. Therefore, the degrees of satisfaction and fulfillment derived from leisure activities can develop independently of gender.

Based on the participants' majors, there was a notable variation among the LSS sub-dimensions. Students in the "Recreation" department outperformed those in the "Coaching Education" and "Sports Management" departments across all LSS sub-dimension mean scores. Research suggests that students' leisure experiences and satisfaction may be influenced by various factors, including their lifestyles, hobbies, and stress levels associated with different academic disciplines [47]. However, a study by Bakar and Yaşartürk [48] reported results contrary to ours, showing no significant variation in LSS sub-dimensions based on students' academic departments. Considering that students in the Recreation department typically receive more training in efficiently and effectively evaluating leisure activities, our findings align with the existing literature. Furthermore, the observed differences in leisure satisfaction among students from different departments suggest that leisure activities should be designed to align with the academic needs, interests, and lifestyles of students.

The SWLS mean scores of the participants varied significantly based on their academic department. The results showed that students in the "Coaching Education" department had lower mean scores than those in the "Physical Education and Sports Teaching" department. A study by Yaşartürk et al. [49] similarly found a significant difference in life satisfaction based on department. Their findings indicated that students in the "Physical Education and Sports Teaching" department had higher life satisfaction compared to those in the "Sports Management" department. This suggests that the academic field of study may be a key factor influencing life satisfaction among university

students. The study supports this view, indicating that individuals' professional or academic fields can directly or indirectly affect their life satisfaction [25]. Conversely, a study by Aktop and Göksel [50] found significant differences in life satisfaction based on department, while Çolak and Ünal [51] reported no such significant differences. In this context, academic expectations, career goals, and daily life routines of students in different departments likely play a determining role in their life satisfaction [52]. To help university students maximize the benefits of outdoor recreational activities and enhance their life satisfaction, it is essential to design these activities to meet both their physical and psychological needs.

The mean scores of the LSS sub-dimensions "Education," "Social," "Physiological," and "Aesthetic" showed a statistically significant difference based on participation in sports activities. In contrast, the "Psychological" and "Relaxation" sub-dimensions showed no statistically significant difference. Further analysis revealed that these significant differences favoured individuals who engage in sports during their free time. The literature supports these findings, indicating that sports activities positively impact leisure satisfaction by fulfilling both physical and psychological needs [53, 54]. Individuals who participate in sports activities tend to experience benefits such as strengthened social bonds, improved physical health, and opportunities for self-actualization. Additionally, the positive effects of sports, such as competition, a sense of achievement, and the release of endorphins through physical activity, directly enhance leisure satisfaction [55, 56].

As a result, it is suggested that sports activities should play an important role in the planning of outdoor recreation programs. Encouraging university students to participate in these activities can enhance their leisure satisfaction and support both their physical and psychological well-being. Moreover, such activities can contribute to overall satisfaction with university life by fostering social engagement and participation.

No statistically significant difference was found in satisfaction with life mean scores based on participants' involvement in sports activities. This suggests that life satisfaction may emerge independently of participation in sports during outdoor activities. The literature highlights that life satisfaction is influenced by various factors, including overall living conditions, psychological well-being, and social environment [25].

Research indicates that university students' life satisfaction is affected not only by sports activities but also by multidimensional factors such as academic success, social relationships, economic status, and the achievement of personal goals [57]. Therefore, strategies aimed at increasing life satisfaction should not focus solely on one type of

activity. Offering a variety of activities that cater to different interests and needs can encourage broader participation in outdoor activities alongside sports events.

The following LSS sub-dimensions: "Psychological," "Educational," "Social," "Relaxation," "Physiological," and "Aesthetic" were investigated in conjunction with the SWLS mean scores. The findings revealed a statistically significant, moderately positive relationship between these variables. Küçük Kılıç et al. [43] reported a strong positive association between the Leisure Satisfaction Scale and the Satisfaction with Life Scale sub-dimensions. Their study also found that individuals' levels of leisure satisfaction are strong predictors of their life satisfaction. Similarly, among international college students, Uluç et al. [58] identified a positive and statistically significant relationship between life satisfaction and leisure satisfaction. Moreover, considerable positive correlations between SWLS and the LSS sub-dimensions (psychological, educational, social, relaxation, and aesthetic) were reported by Huang [59] and Acar and Yılmaz [60].

The correlation analysis reveals several reasons for the positive and significant connections between SWLS and LSS sub-dimensions. Psychological well-being and, consequently, overall life satisfaction may improve when individuals effectively and satisfactorily use their spare time. Leisure activities, particularly those addressing psychological, social, educational, relaxation, and artistic aspects, can enhance mental and emotional health, thereby increasing life satisfaction levels. Moreover, leisure activities can strengthen social bonds, help individuals manage stress more effectively, and promote self-actualization, all of which significantly improve the overall quality of life. Therefore, the positive relationship between SWLS and LSS sub-dimensions can be explained by the way leisure activities fulfill various needs, thus fostering life satisfaction. Additionally, the study examined the effects of gender, academic department, and participation in sports on the relationship between LSS and SWLS. The findings suggest that gender has a limited impact on leisure satisfaction and life satisfaction. Differences in LSS and SWLS scores based on academic department may be attributed to variations in students' academic fields and interests.

A positive and significant correlation was found between the LSS and SWLS sub-dimensions, indicating that leisure activities are a factor that enhances life satisfaction. The study highlights that leisure activities improve quality of life and satisfaction by addressing individuals' physical, social, and psychological needs [53, 61, 62]. Leisure satisfaction is known to support various aspects such as self-actualization, building social connections, and managing stress. The role of leisure satisfaction

in enhancing life satisfaction can be explained by the positive emotions individuals derive from leisure activities and the contribution these activities make to their overall happiness.

#### Research Limitations

This study has several limitations that should be acknowledged. The research relied on self-reported data, which may introduce biases such as social desirability or inaccurate recall. The sample consisted solely of university students, limiting the generalizability of the findings to other populations. Additionally, the study focused on outdoor recreational activities; therefore, the results may not fully capture the effects of other types of leisure activities on life satisfaction.

This study confirms the significant relationship between leisure satisfaction and life satisfaction among university students participating in outdoor recreational activities, consistent with findings from another research. The results align with the general understanding that leisure activities contribute to psychological, social, and physical well-being, thereby enhancing overall life satisfaction. While some variations exist depending on factors such as academic department or personal preferences, the overall trend supports the positive influence of leisure satisfaction on life satisfaction.

Future research should build on these insights by exploring different demographic groups and using longitudinal approaches. Examining various types of leisure activities and contextual factors can provide a more comprehensive understanding of how leisure satisfaction impacts life satisfaction.

#### Conclusions

This study aimed to examine the relationship between leisure satisfaction and life satisfaction, and the findings revealed a significant positive correlation between these two variables. Outdoor activities support life satisfaction by allowing individuals to connect with nature, engage in physical exercise, and spend quality time with their social circles. The results indicate that satisfaction derived from leisure activities positively influences overall life satisfaction.

These findings align with the broader understanding that leisure activities contribute to individuals' physical, psychological, and social well-being. Regular and fulfilling participation in leisure activities can play a crucial role in enhancing life satisfaction. In conclusion, leisure activities that meet psychological and social needs significantly enhance individuals' overall satisfaction with life.

---



---

#### References

1. Ho YCJ, Chang D. To whom does this place belong? Whiteness and diversity in outdoor recreation and education. *Annals of Leisure Research*. 2022;25(5): 569-582. <https://doi.org/10.1080/11745398.2020.1859389>
2. Pröbstl-Haider U, Gugerell K, Maruthaveeran S. Covid-19 and outdoor recreation – Lessons learned? Introduction to the special issue on “Outdoor recreation and Covid-19: Its effects on people, parks and landscapes”. *Journal of Outdoor Recreation and Tourism*, 2023;41: 100583. <https://doi.org/10.1016/j.jort.2022.100583>
3. Martin AL, Adams AE, Stein TV. Equity, identity, and representation in outdoor recreation: ‘I am not an outdoors person’. *Leisure Studies*, 2024;43(4): 531–544. <https://doi.org/10.1080/02614367.2023.2232558>
4. Chiesura A. The role of urban parks for the sustainable city. *Landscape and Urban Planning*, 2004;68(1): 129–138. <https://doi.org/10.1016/j.landurbplan.2003.08.003>
5. Fagerholm N, Eilola S, Arki V. Outdoor recreation and nature's contribution to well-being in a pandemic situation - Case Turku, Finland. *Urban Forestry & Urban Greening*, 2021;64: 127257. <https://doi.org/10.1016/j.ufug.2021.127257>
6. Pretty J, Peacock J, Sellens M, Griffin M. The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 2005;15(5): 319–337. <https://doi.org/10.1080/09603120500155963>
7. Høyem J. Outdoor recreation and environmentally responsible behavior. *Journal of Outdoor Recreation and Tourism*, 2020;31: 100317. <https://doi.org/10.1016/j.jort.2020.100317>
8. Henderson KA, Bialeschki MD. Leisure and Active Lifestyles: Research Reflections. *Leisure Sciences*, 2005;27(5): 355–365. <https://doi.org/10.1080/01490400500225559>
9. Wray-Lake L, Flanagan CA, Osgood DW. Examining Trends in Adolescent Environmental Attitudes, Beliefs, and Behaviors Across Three Decades. *Environment and Behavior*, 2010;42(1): 61–85. <https://doi.org/10.1177/0013916509335163>
10. Bailey R, Hillman C, Arent S, Petitpas A. Physical Activity: An Underestimated Investment in Human Capital? *Journal of Physical Activity and Health*, 2013;10(3): 289–308. <https://doi.org/10.1123/jpah.10.3.289>
11. Tian HB, Qiu YJ, Lin YQ, Zhou WT, Fan CY. The Role of Leisure Satisfaction in Serious Leisure and Subjective Well-Being: Evidence From Chinese Marathon Runners. *Frontiers in Psychology*, 2020;11: 581908. <https://doi.org/10.3389/fpsyg.2020.581908>
12. Tokay Argan M, Mersin S. Life satisfaction, life quality, and leisure satisfaction in health professionals. *Perspectives in Psychiatric Care*, 2021;57(2): 660–666. <https://doi.org/10.1111/ppc.12592>
13. Lee KJ, Casper J, Powell R, Floyd MF. African Americans' outdoor recreation involvement, leisure

- satisfaction, and subjective well-being. *Current Psychology*, 2023;42(31): 27840–27850. <https://doi.org/10.1007/s12144-022-03905-2>
14. Coleman D, Iso-Ahola SE. Leisure and Health: The Role of Social Support and Self-Determination. *Journal of Leisure Research*, 1993;25(2): 111–128. <https://doi.org/10.1080/00222216.1993.11969913>
  15. Yaşartürk F, Akay B, Ayhan B. The Relationship Between Leisure Management and Exam Anxiety Levels of University Students. *Pakistan Journal of Medical and Health Sciences*, 2021;15(10): 2915–2921. <https://doi.org/10.53350/pjmhs2115102915>
  16. Özkan A, Yaşartürk F, Elçi G. The relationship between leisure satisfaction, physical activity level and healthy life-style behaviors of sport science students during the COVID-19 pandemic. *Physical education of students*, 2021;25(5): 257–264. <https://doi.org/10.15561/20755279.2021.0501>
  17. Ragheb MG, Beard JG. Measuring Leisure Attitude. *Journal of Leisure Research*, 1982;14(2): 155–167. <https://doi.org/10.1080/00222216.1982.11969512>
  18. Stebbins RA. Project-based leisure: theoretical neglect of a common use of free time. *Leisure Studies*, 2005;24(1): 1–11. <https://doi.org/10.1080/0261436042000180832>
  19. Iso-Ahola SE. Exercise and freedom. *World Leisure Journal*, 2009;51(3): 134–149. <https://doi.org/10.1080/04419057.2009.9728266>
  20. Driver BL, Brown PJ, Peterson GL. *Benefits of leisure*. Pennsylvania: Venture Publishing; 1991.
  21. Tarrant MA, Smith EK. The use of a modified importance-performance framework to examine visitor satisfaction with attributes of outdoor recreation settings. *Managing Leisure*, 2002;7(2): 69–82. <https://doi.org/10.1080/13606710210137246>
  22. Ragheb MG, Tate RL. A behavioural model of leisure participation, based on leisure attitude, motivation and satisfaction. *Leisure Studies*, 1993;12(1): 61–70. <https://doi.org/10.1080/02614369300390051>
  23. Đuranović M. Leisure Activities of Young People as a Predictor of Life Satisfaction. *International Journal of Instruction*, 2024;17(3): 475–490. <https://doi.org/10.29333/iji.2024.17326a>
  24. Neugarten BL, Havighurst RJ, Tobin SS. The Measurement of Life Satisfaction. *Journal of Gerontology*, 1961;16(2): 134–143. <https://doi.org/10.1093/geronj/16.2.134>
  25. Diener E, Emmons RA, Larsen RJ, Griffin S. The Satisfaction With Life Scale. *Journal of Personality Assessment*, 1985;49(1): 71–75. [https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
  26. Pavot W, Diener E. Review of the Satisfaction With Life Scale. *Psychological Assessment*, 1993;5(2): 164–172. <https://doi.org/10.1037/1040-3590.5.2.164>
  27. Cummins RA. On the trail of the gold standard for subjective well-being. *Social Indicators Research*, 1995;35(2): 179–200. <https://doi.org/10.1007/BF01079026>
  28. Diener E. Subjective well-being. *Psychological Bulletin*, 1984;95(3): 542–575. <https://doi.org/10.1037/0033-2909.95.3.542>
  29. Ragheb MG, Griffith CA. The Contribution of Leisure Participation and Leisure Satisfaction to Life Satisfaction of Older Persons. *Journal of Leisure Research*, 1982;14(4): 295–306. <https://doi.org/10.1080/00222216.1982.11969527>
  30. Büyüköztürk Ş, Çakmak EK, Akgün ÖE, Karadeniz Ş, Demirel F. *Bilimsel Araştırma Yöntemleri* [Scientific Research Methods]. Ankara: Pegem Academy Publishing; 2021. (In Turkish).
  31. Karasar N. *Bilimsel Araştırma Yöntemi: Kavramlar İlkeler Teknikler*. Ankara: Nobel Academic Publishing; 2022. (In Turkish).
  32. Beard JG, Ragheb MG. Measuring Leisure Satisfaction. *Journal of Leisure Research*, 1980;12(1): 20–33. <https://doi.org/10.1080/00222216.1980.11969416>
  33. Karlı Ü, Polat E, Yılmaz B, Koçak S. Validity and reliability study of the Leisure Satisfaction Scale (LSS-Long Version). *Journal of Sports Sciences*. 2008;19(2): 80–91.
  34. Yetim Ü. Life satisfaction: A study based on the organization of personal projects. *Social Indicators Research*, 1993;29(3): 277–289. <https://doi.org/10.1007/BF01079516>
  35. Kline RB. *Principles and practice of structural equation modelling* (3rd ed.). New York: Guilford Press Publishing; 2011.
  36. Plummer R. *Outdoor Recreation*. New York and London: Routledge Publishing; 2009.
  37. Gözen E. Açık Alan Rekreasyon Aktivitelerine Katılmayı Motive Eden Faktörlere Yönelik Ölçek Geliştirme Çalışması [Scale Development Study for Factors Motivating Participation in Outdoor Recreation Activities]. *Türk Turizm Arastirmalari Dergisi*, 2020;4(3): 2197–2209. (In Turkish). <https://doi.org/10.26677/TR1010.2020.475>
  38. Mamak H. An Analysis of Life Satisfaction, Psychological Well-Being and Leisure Satisfaction in University Students Doing Exercise as Leisure Activity. *Social Mentality and Research Thinkers Journal*, 2020;6(28): 211–216. <https://doi.org/10.31576/smryj.444>
  39. Ardahan F, Yerlisu LT. Examination of university students' leisure satisfaction levels by gender and income. *Journal of Sports Sciences*. 2010;1(4): 129–136.
  40. Yiğit I. *Examination of leisure satisfaction levels of individuals participating in recreational activities in university communities*. (Master's thesis, Institute of Health Sciences). Malatya: İnönü University; 2018.
  41. Gökçe H. The impact of recreational activities on self-efficacy, exam anxiety, and leisure satisfaction levels of individuals preparing for university entrance exams (PhD Thesis, Institute of Health Sciences). Ankara: Ankara University; 2015.
  42. Iso-Ahola SE, Weissinger E. Perceptions of Boredom in Leisure: Conceptualization, Reliability and Validity of the Leisure Boredom Scale. *Journal of Leisure Research*, 1990;22(1): 1–17. <https://doi.org/10.1080/00222216.1990.11969811>
  43. Küçük Kılıç SK, Lakot Atasoy KL, Gürbüz B, Öncü E. Examination of the relationship between recreational satisfaction and life satisfaction.

- Istanbul University Journal of Sports Sciences*. 2016;6(3): 56-70.
44. Yaşartürk F, Bilgin B. Examination of leisure satisfaction and life satisfaction levels of university handball players. *International Journal of Current Educational Research*. 2018;4(2): 50-60. <https://doi.org/10.38021/asbid.1311046>
  45. Ayhan B, Özel B. Examining the relationship between leisure attitude and life satisfaction levels of university students. *International Journal of Sport Culture and Science*. 2020;8(3): 154-166.
  46. Diener E. Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, 2000;55(1): 34-43. <https://doi.org/10.1037/0003-066X.55.1.34>
  47. Haworth JT, Veal AJ, [eds.]. *Work and Leisure*. 0 ed. Routledge; 2004. <https://doi.org/10.4324/9780203489321> [Accessed 9th December 2024].
  48. Bakar M, Yaşartürk F. The relationship between leisure satisfaction and emotional intelligence level. *CBU Journal of Physical Education and Sport Sciences*. 2023;18(1): 124-137. <https://doi.org/10.33459/cbubesbd.1206424>
  49. Yaşartürk F, Akyüz H, Karataş I. Examination of the relationship between boredom perception in leisure time and life satisfaction levels of university students participating in recreational activities. *International Journal of Cultural and Social Studies*. 2017;3(2): 239-252.
  50. Aktop M, Göksel AG. Examination of the relationship between leisure interests and life satisfaction of sports science students. *Journal of Sports and Recreation for All*. 2023; 5(2): 99-109. <https://doi.org/10.56639/jsar.1386.975>
  51. Çolak H, Ünal H. Investigation of the effect of life satisfaction and hopelessness on substance use tendency in students of the Faculty of Sports Sciences. *IBAD Journal of Social Sciences*. 2020;7: 344-357. <https://doi.org/10.21733/ibad.685268>
  52. Ryan RM, Deci EL. On Happiness and Human Potentials: A Review of Research on Hedonic and Eudaimonic Well-Being. *Annual Review of Psychology*, 2001;52(1): 141-166. <https://doi.org/10.1146/annurev.psych.52.1.141>
  53. Beard JG, Ragheb MG. Measuring Leisure Motivation. *Journal of Leisure Research*, 1983;15(3): 219-228. <https://doi.org/10.1080/00222216.1983.11969557>
  54. Iso-Ahola SE. Motivation for leisure. In: Jackson EL, Burton TL. (eds.) *Understanding leisure and recreation: Mapping the past, charting the future*. Pennsylvania: State College PA, Venture Publishing; 1989.
  55. Csikszentmihalyi M. *Flow: The Psychology of Optimal Experience*. Harper & Row; 1990.
  56. Akay B, Ayhan B, Yaşartürk F. The relationship between coping strategies through leisure time and happiness levels. *International Journal of Contemporary Educational Studies*. 2022;8(2): 593-607.
  57. Lyubomirsky S, Sheldon KM, Schkade D. Pursuing Happiness: The Architecture of Sustainable Change. *Review of General Psychology*, 2005;9(2): 111-131. <https://doi.org/10.1037/1089-2680.9.2.111>
  58. Uluç EA, Duman S, Acar H. Examination of the effect of leisure satisfaction levels on life satisfaction of international students studying at university. *Mediterranean Journal of Sport Sciences*. 2020;3(2): 407-419. <https://doi.org/10.38021/asbid.8405>
  59. Huang CY. *The relationships among leisure participation, leisure satisfaction, and life satisfaction of college students in Taiwan* [PhD Thesis]. Texas: University of the Incarnate Word; 2003.
  60. Acar K, Yılmaz AK. The relationship between university students' leisure satisfaction and life satisfaction. *Journal of Physical Education and Sport Sciences*. 2021;15(1): 25-35.
  61. Brown BA, Frankel BG. Activity through the Years: Leisure, Leisure Satisfaction, and Life Satisfaction. *Sociology of Sport Journal*, 1993;10(1): 1-17. <https://doi.org/10.1123/ssj.10.1.1>
  62. Wang EST, Chen LSL, Lin JYC, Wang MCH. The relationship between leisure satisfaction and life satisfaction of adolescents concerning online games. *Adolescence*. 2008;43(169): 177185.

---

### Information about the authors:

**Fatih Yaşartürk**; (Corresponding Author); <https://orcid.org/0000-0003-4934-101X>; fatihyasarturk@gmail.com; Faculty of Sport Sciences, Bartın University; Bartın, Turkey.

**Gürkan Elçi**; <https://orcid.org/0000-0002-8889-9692>; gurkanelci@gmail.com; Faculty of Sport Sciences, Bartın University; Bartın, Turkey.

**Sercan Kural**; <https://orcid.org/0000-0002-2452-068X>; sercankural@hotmail.com; Faculty of Sport Sciences, Bartın University; Bartın, Turkey.

**Yusufcan Keskin**; <https://orcid.org/0000-0002-3604-4713>; yusufcankeskin10@gmail.com; Faculty of Sport Sciences, İstanbul Gedik University; İstanbul, Turkey.

---

Cite this article as:

Yaşartürk F, Elçi G, Kural S, Keskin Y. Analysis of the relationship between leisure satisfaction and life satisfaction among students participating in outdoor recreational activities. *Physical Education of Students*, 2024;28(6):371–381.

<https://doi.org/10.15561/20755279.2024.0606>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 23.11.2024

Accepted: 28.12.2024; Published: 30.12.2024

# Exercise addiction, muscularity-oriented eating and beliefs about sports nutrition supplements in students who regularly exercise

Sema Arslan Kabasaka<sup>ABCDE</sup>

*Faculty of Sport Science, Department of Sport Health Science, Yalova University, Turkey*

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

## Abstract

**Background and Study Aim** Regular exercise has a positive effect on physical, psychological, and social health. However, excessive participation in exercise and the need for compulsive exercise can lead to exercise addiction. This addiction may result in several issues, including injuries, unhealthy eating behaviors, and negative attitudes. To prevent these potential problems, it is important to identify the extent of exercise addiction among individuals who exercise regularly. In this regard the study aims to examine the potential relationships between exercise addiction, muscularity-oriented eating and belief levels in sports nutritional supplements among students.

**Material and Methods** The study included 377 participants with a mean age of  $24.46 \pm 6.18$ . All participants had been exercising regularly for at least one year, with a frequency of two days per week. Data were collected using a demographic form, the Exercise Addiction Scale, the Muscularity-Oriented Eating Test (MOET), and the Sport Nutritional Supplements Belief Scale.

**Results** The findings suggest that 84.6% of the participants may be classified as dependent on exercise addiction. There is a low-level but significant positive relationship between exercise addiction and muscularity-oriented eating levels ( $r = 0.189, p < 0.001$ ). A similar relationship exists between exercise addiction and beliefs in sports nutrition supplements ( $r = 0.179, p < 0.001$ ). Furthermore, a moderately significant positive relationship was found between muscularity-oriented eating and beliefs in sports nutrition supplements ( $r = 0.361, p < 0.001$ ). Analyses based on exercise addiction levels revealed notable differences. The dependent group showed higher levels of muscularity-oriented eating compared to the risk group. They also exhibited stronger beliefs in sports nutrition supplements.

**Conclusions** Regular exercise among students leads to a higher likelihood of developing exercise addiction. Exercise addiction is associated with muscularity-oriented eating behaviors and strong beliefs in the efficacy of sports nutritional supplements. These behavioral patterns increase the risk of potential health issues related to excessive exercise and unhealthy dietary practices. Providing education on the effects of exercise, proper nutrition, and the responsible use of nutritional supplements is essential to mitigate these risks and promote healthier habits.

**Keywords:** exercises, exercise addiction, muscularity-oriented eating, sports nutritional supplement, health

## Introduction

Regular exercise is widely recognized for its benefits to physical, psychological, and social health. However, when exercise becomes excessive and compulsive, it can lead to addiction and associated health risks. Exercise addiction may contribute to harmful behaviors, such as unhealthy eating patterns and a reliance on sports nutrition supplements. Understanding these relationships is essential to developing effective strategies for prevention and intervention.

Regular physical activity is an important lifestyle habit that positively impacts an individual's physical, mental, and social health [1]. Exercise, as a form of physical activity, supports physical, psychological, and psychosocial well-being. It also helps improve general health and

alleviates various psychopathological conditions [2, 3]. However, excessive exercise and compulsive exercise behavior can lead to exercise addiction [4]. Exercise addiction is a behavioral disorder where individuals lose control over their exercise habits. This addiction can negatively affect personal and social aspects of life [3, 5]. A strong desire to continue exercising despite injuries may cause several problems. These issues include feelings of deprivation, fatigue, and insomnia when exercise is not possible [6]. Additionally, exercise addiction can result in body image disturbances [7] and lead to eating disorders [8].

In recent years, muscularity-oriented eating behavior has gained attention as a factor closely associated with exercise addiction [9]. Muscularity-oriented eating refers to excessively manipulating eating habits to build muscle. This behavior is typically characterized by high-protein, low-carbohydrate diets [10]. While more common in

men, it is increasingly observed among female athletes [10, 11]. The relationship between exercise addiction and muscularity-oriented eating may be further reinforced by beliefs in sports nutritional supplements. These supplements are commonly used to accelerate muscle growth and enhance performance [12, 13]. However, false beliefs and exaggerated expectations about these products can lead to unhealthy eating habits [14]. The literature highlights that individuals with exercise addiction have a higher tendency to use sports supplements [13, 15, 16]. This behavior may result in negative health consequences [17, 18].

Previous research indicates a clear connection between exercise addiction, muscularity-oriented eating behaviors, and the use of sports nutritional supplements. These studies suggest that individuals who exhibit signs of exercise addiction are more likely to engage in rigid dietary practices aimed at muscle gain and rely heavily on supplements, often driven by false beliefs and unrealistic expectations. Such patterns can result in negative physical and psychological outcomes, including injuries, disordered eating, and body image disturbances.

The hypotheses addressed in this study are as follows:

H1a: There is a significant positive relationship between the level of exercise addiction, the level of muscularity-oriented eating, and the level of belief in sports nutritional supplements among individuals who exercise regularly.

H1b: There is a significant difference between the levels of muscularity-oriented eating and belief in sports nutritional supplements of individuals according to their level of exercise addiction.

In this regard I this regard, this study aims to examine the potential relationships between exercise addiction, muscularity-oriented eating

and belief levels in sports nutritional supplements among students.

## Materials and Methods

### Participants

The study participants were selected using a non-probability convenience sampling method. All participants exercised regularly for at least two days a week and resided in the Marmara region. A total of 377 individuals who had been exercising regularly for at least one year were included. The mean age of the participants was  $24.46 \pm 7.18$  years. The majority of the participants were male (79.6%) and university students (94.2%). Detailed demographic information is presented in Tables 1 and 2.

### Research Design

Ethics committee approval for the study was obtained from the University Ethics Committee on 01.10.2024, with protocol number 2024/228. All participants provided signed informed consent before participation. Individuals were included in the study voluntarily through the convenience sampling method. Participants completed a demographic form and the study scales. The entire process took approximately 15 minutes.

*Demographic Form.* The demographic form collected information on participants' age, gender, weight, height, and number of weekly workouts.

*Exercise Addiction Scale.* The Exercise Addiction Scale (EAS) was developed by Tekkurşun-Demir et al. [19] to measure exercise addiction levels. The scale consists of 17 items divided into three sub-dimensions, using a 5-point Likert-type rating (1 = Strongly Disagree; 5 = Strongly Agree).

The scoring categories are as follows:

- 1–17 points: Normal group;

**Table 1.** Descriptive information about the characteristics of the sample

Variables	N	$\bar{x} \pm SD$	Min.	Max.
Age (years)	377	$24.46 \pm 7.18$	18.00	50.00
Weight (kg)	377	$77.21 \pm 15.22$	42.00	150.00
Height (cm)	377	$176.88 \pm 8.43$	148.00	195.00

**Table 2.** Frequency information about the characteristics of the sample

Variables	Frequency	%	
Gender	Female	77	20.4
	Male	300	79.6
Number of weekly workouts	Minimum 2 days per week	162	43.0
	3-4 days a week	134	35.5
	4-5 days a week	49	13.0
	Over 5 days a week	32	8.5
Educational Level	University	355	94.2
	Postgraduate education	22	5.8

- 18–34 points: Low-risk group;
- 35–51 points: Moderate-risk group;
- 52–69 points: Dependent group;
- 70–85 points: Highly dependent group.

The Cronbach’s alpha value for the total scale was 0.88. In the current study, the total score of the scale was used, and the Cronbach’s alpha value was 0.83.

*Muscularity-Oriented Eating Test (MOET).* The Muscularity-Oriented Eating Test (MOET) was developed by Murray et al. [20], with Turkish validity and reliability established by Çalışkan and Alim [21]. The scale evaluates individuals’ irregular eating habits related to muscularity and associated malnutrition. Higher scores indicate higher levels of muscularity-oriented eating behavior. The MOET consists of 15 items within a single dimension. It uses a 5-point Likert scale (0 = *Definitely Not True* to 4 = *Always True*). There are no reverse-scored items. The Cronbach’s alpha value for the original scale was 0.88. In the current study, the total score of the scale was used, and the Cronbach’s alpha value was found to be 0.74, confirming the scale’s validity and reliability.

*Sport Nutritional Supplements Belief Scale.* The Sport Nutritional Supplements Belief Scale was developed by Hurst et al. [22], with Turkish validity and reliability established by Karafil et al. [23]. This scale assesses participants’ beliefs about the use of nutritional supplements. The scale consists of 6 items within a single sub-dimension. It employs a 5-point Likert structure (0 = *Definitely Not True* to 4 = *Always True*). The Cronbach’s alpha value for the original scale was 0.86. In the current study, the total score of the scale was used, and the Cronbach’s alpha value was found to be 0.92, indicating high reliability.

*Statistical Analysis*

Data were analyzed using the SPSS 25 software package. Skewness and kurtosis tests were performed to assess the normality of the scales. Skewness values between -1.5 and +1.5 and kurtosis values between -7 and +7 indicated that

the data were suitable for a normal distribution [24, 25]. Parametric testing techniques were applied to analyze the variables. Descriptive statistics, Independent Sample *t*-tests, and Pearson correlation tests were conducted. The level of statistical significance was set at  $p < 0.05$ .

**Results**

Table 3 presents the internal consistency coefficients, total mean scores, and normality indicators for each scale used in the study. The results show that the internal consistency coefficients for all scales are within acceptable ranges, indicating good reliability. The skewness and kurtosis values fall within the recommended thresholds for normal distribution [24, 25]. These findings suggest that the data meet the criteria for normality and are suitable for further parametric analyses.

In addition, as seen in Table 4, within the scope of the Exercise Addiction Scale results, 58 (15.4%) of the participants were found to be in the risk group in terms of exercise addiction and 319 (84.6%) were in the addicted group.

As shown in Table 4, participants were categorized into different exercise addiction levels based on their scores. Most participants were classified as dependent, while a smaller proportion fell into the risk group.

Table 5 indicates significant positive relationships between the scales. Exercise addiction is positively associated with both muscularity-oriented eating behaviors and beliefs in sports nutritional supplements. Additionally, there is a moderate positive relationship between muscularity-oriented eating and beliefs in sports nutritional supplements.

Table 6 demonstrates a significant difference in muscularity-oriented eating and beliefs about sports nutritional supplements based on exercise addiction levels. Participants with higher exercise addiction scores exhibited higher levels of muscularity-oriented eating and stronger beliefs in the efficacy of sports nutritional supplements.

**Table 3.** Information on total scale scores

Scales	N	$\bar{x} \pm SD$	Min.	Max.	Skewness	Kurtosis	Cronbach alfa
Exercise Addiction Scale	377	59.70 ± 8.52	30.00	83.00	-0.17	0.35	0.83
Muscularity Oriented Eating Test	377	30.21 ± 6.34	1.00	51.00	-1.36	4.41	0.74
Sport Nutritional Supplements Belief Scale	377	26.66 ± 5.81	6.00	36.00	-0.86	1.75	0.92

**Table 4.** Exercise addiction levels of participants according to Exercise Addiction Scale score ranges

Groups	Frequency	%
Exercise Addiction Level	Risk group	58 15,70
	Dependent group	319 84.6

**Table 6.** Participants' muscularity-orientated eating and sport nutritional supplement beliefs according to their level of exercise addiction

Scales	Exercise Addition Levels	n	$\bar{X} \pm SD$	t	df	p
Muscularity Oriented Eating Test	Risk group	58	27.98 ± 9.65	-2.019	63.79	0.048*
	Dependent group	319	30.61 ± 5.46			
Sport Nutritional Supplements Belief Scale	Risk group	58	23.71 ± 7.13	-3.547	69.29	0.001*
	Dependent group	319	27.19 ± 5.38			

Note. \* : p < 0.001

**Table 5.** The relationship between the total scores of the scales

Scales		1	2	3
Exercise Addiction Scale (1)	r	1		
	p			
Muscularity Oriented Eating Test (2)	r	0.189	1	
	p	0.000*		
Sport Nutritional Supplements Belief Scale (3)	r	0.179	0.361	1
	p	0.000*	0.000*	

Note. \* : p < 0.001

## Discussion

In this regard, this study aims to examine the potential relationships between exercise addiction, muscularity-oriented eating and belief levels in sports nutritional supplements among students. The findings revealed that a majority of participants exhibited signs of exercise addiction. Additionally, significant positive relationships were identified between exercise addiction, muscularity-oriented eating, and beliefs in sports nutritional supplements.

Today, the desire to be muscular and strong, common among men, and the desire to achieve a size-zero figure, common among women, often lead to body dissatisfaction [26]. This dissatisfaction can result in exercise addiction, driven by increased training and changes in eating behaviors and attitudes [9, 27, 28, 29]. Hamurcu [9] found a significant positive relationship between exercise addiction and muscularity-oriented eating. The current study supports these findings, showing that exercise addiction is related to muscularity-oriented eating behaviors. This suggests that individuals who exercise regularly exhibit more muscularity-oriented eating as their level of exercise addiction increases. However, this study did not measure whether this relationship is influenced by body dissatisfaction or the desire to be muscular. Future research should explore these factors to provide a deeper understanding of the motivations behind these behaviors.

Research shows that as the drive to become muscular increases among athletes, the use of sports supplements also rises [29, 30]. More than half of individuals who attend gyms reportedly

use nutritional ergogenic aids to enhance muscle growth [31, 32]. Studies have indicated that individuals at high risk of exercise dependence are more likely to use nutritional supplements compared to those not at risk [16]. Yurdakul [33] found that exercise addiction is associated with a belief in sports supplements and that muscularity-oriented eating contributes to excessive supplement use. Furthermore, sports supplement use has been shown to mediate the relationship between exercise addiction and eating disorders [15]. The results of the current study align with these findings. The study demonstrated that higher levels of exercise addiction correspond with stronger beliefs in sports nutrition supplements among regular exercisers. Additionally, muscularity-oriented eating behaviors were found to be associated with beliefs in sports supplements.

According to the results of the current study, 84.6% of individuals who engage in regular exercise are classified as addicted to exercise, while 15.4% are at risk of becoming addicted. This indicates that regular exercisers are prone to exercise addiction. However, research suggests that exercise addiction in athletes may stem from factors such as competitive drive, passion for their sport, and professional commitment, rather than pathological addiction [34]. Therefore, the high prevalence of exercise addiction observed in this study is unlikely to reflect a pathological condition.

Nevertheless, exercise addiction can lead to secondary issues. For example, studies show that exercise addiction is associated with eating disorders and that excessive exercise influences athletes' eating behaviors [35]. Smaoui et al. [36] found that

athletes at risk of exercise addiction had a higher risk of eating disorders compared to those who were not. In line with these findings, the current study revealed that exercise-addicted individuals exhibited higher levels of muscularity-oriented eating and stronger beliefs in sports supplements than those at risk of addiction. This suggests that regular exercisers may be prone to disordered eating and the unconscious use of sports nutrition supplements. Given that the misuse of sports supplements can lead to various health problems, it is important to raise awareness among this population regarding proper supplement use. Additionally, since muscularity-oriented eating behaviors can disrupt the boundaries of a healthy diet, individuals who exercise regularly should receive education on healthy eating practices.

#### *Limitations of the Study*

The participants were selected solely from individuals who exercise regularly, which may restrict the generalizability of the findings. Future research should consider analyzing larger and more diverse sample groups to enhance the validity of the results. Additionally, the study did not include factors such as body satisfaction and eating awareness, which could provide valuable insights into eating behaviors and nutritional habits. Further

research on the frequency and effectiveness of actual sports supplement use would also help clarify the alignment between beliefs and usage behaviors.

#### **Conclusions**

This study found significant relationships between exercise addiction, eating behaviors, and attitudes in individuals who exercise regularly. Positive relationships were observed between exercise addiction, muscularity-oriented eating, and beliefs in sports nutrition supplements. The level of exercise addiction in this population was higher than anticipated, suggesting that regular exercisers are more likely to engage in muscularity-oriented eating and hold strong beliefs in the benefits of sports supplements.

These patterns indicate that unhealthy eating behaviors and unnecessary supplement use may develop, potentially posing health risks. Given the high prevalence of exercise addiction, early detection and prevention strategies are crucial. Additionally, implementing educational programs on healthy nutrition and appropriate supplement use, supported by multidisciplinary teams, could promote healthier exercise habits and reduce associated risks.

---

#### **References**

1. World Health Organization (WHO). *Physical activity*. WHO Online; [Internet]. 2024 [updated 2024 Jun 26; cited 2024 Sep 28]. Available from: <https://www.who.int/news-room/fact-sheets/detail/physical-activity>
2. Oswald F, Campbell J, Williamson C, Richards J, Kelly P. A scoping review of the relationship between running and mental health. *International Journal of Environmental Research and Public Health*. 2020;17:8059. <https://doi.org/10.3390/ijerph17218059>
3. Ordu F. Egzersiz Bağımlılığı: Bir Güncelleme [Exercise addiction: An update]. *Journal of Dependence*. 2022;23(4):536–546. (In Turkish). <https://doi.org/10.51982/bagimli.1058169>
4. Minutillo A, Di Trana A, Aquilina V, Ciancio GM, Berretta P, La Maida N. Recent insights in the correlation between social media use, personality traits and exercise addiction: a literature review. *Frontiers in Psychiatry*. 2024;15:1–8. <https://doi.org/10.3389/fpsy.2024.1392317>
5. Hausenblas HA, Downs DS. How much is too much? The development and validation of the exercise dependence scale. *Psychology and Health*. 2002;17(4):387–404. <https://doi.org/10.1080/0887044022000004894>
6. Landolfi E. Exercise addiction. *Sports Medicine*. 2013;43:111–119. <https://doi.org/10.1007/s40279-012-0013-x>
7. Levit M, Weinstein A, Weinstein Y, Tzur-Bitan D, Weinstein A. A study on the relationship between exercise addiction, abnormal eating attitudes, anxiety and depression among athletes in Israel. *Journal of Behavioral Addictions*. 2018;7(3):800–805. <https://doi.org/10.1556/2006.7.2018.83>
8. Adams J. Exercise Dependence. In: Petter MM, editor. *Principles of Addiction: Comprehensive Addictive Behaviors and Disorders*. Amsterdam: Elsevier; 2013. P. 827–835. <https://doi.org/10.1016/B978-0-12-398336-7.00083-8>
9. Hamurcu P. Düzenli egzersiz yapan üniversite öğrencilerinde kaslı olma dürtüsü, kaslılık odaklı yeme davranışı ve egzersiz bağımlılığı ile beden algısı, yeme bozukluğu riski ve fiziksel aktivite düzeyi ilişkisi: tanımlayıcı araştırma [The relationship of body perception, eating disorder risk and physical activity level with drive for muscularity, muscle-focused eating behavior and exercise dependence among university students who have regular exercise: Descriptive research]. *Türkiye Klinikleri Journal of Sports Sciences*. 2023;15(1):131–141. (In Turkish). <https://doi.org/10.5336/sports.2022-93275>
10. Lavender JM, Brown TA, Murray SB. Men, muscles, and eating disorders: an overview of traditional and muscularity-oriented disordered eating. *Current Psychiatry Reports*. 2017;19(32):1–7. <https://doi.org/10.1007/s11920-017-0787-5>
11. de Carvalho PHB, Bagolin V, Junqueira ACP, Nagata JM, Cattle CJ, Murray SB, Compte EJ, Costa TMB, Almeida SS, Laus MF. Validation and measurement

- invariance of the Muscularity-Oriented Eating Test among Brazilian men and women. *International Journal of Eating Disorders*. 2023;56(4):708–720. <https://doi.org/10.1002/eat.23702>
12. Mosler S. More energy with protein shakes & co? Nutritional supplements and their use in sports. *Aktuelle Ernährungsmedizin*. 2016;41(1):15–18. <https://doi.org/10.1055/s-0042-102719>
  13. Mudila H, Prasher P, Khati B, Kumar S, Punetha H. Nutraceuticals for healthy sporting. In: Amit V, Kajal S, Shivom S, editors. *Nutraceuticals and innovative food products for healthy living and preventive care*. Pennsylvania: IGI Global; 2018. P. 79–107. <https://doi.org/10.4018/978-1-5225-2970-5.ch004>
  14. Chandana KN, Syeda Farha S, Pallavi R, Veena BM. Comparative study on nutrition knowledge and consumption of dietary supplements among athletes and fitness practitioners. *International Journal of Health and Allied Sciences*. 2023;12(1):16–21. <https://doi.org/10.55691/2278-344X.1064>
  15. Köse H, Özgen C. Fit or Nothing! University Students' Exercise Addiction, Eating Disorders and Mediator Effect of Sports Supplement Use. *African Educational Research Journal*. 2020;8(2):381–386. <https://doi.org/10.30918/AERJ.82.20.095>
  16. Lichtenstein MB, Jensen ES, Szabo A. Exercise addiction, obsessive passion, and the use of nutritional supplements in fitness center attendees. *Translational Sports Medicine*. 2020;3(3):188–195. <https://doi.org/10.1002/tsm2.131>
  17. Richards JR, Scheerlinck PH, Owen KP, Colby DK. Bodybuilding supplements leading to copper toxicity, encephalopathy, fulminant hepatic failure and rhabdomyolysis. *The American Journal of Emergency Medicine*. 2020;38(11):2487.e1–2487.e5. <https://doi.org/10.1016/j.ajem.2020.05.096>
  18. Duiven E, van Loon LJ, Spruijt L, Koert W, de Hon OM. Undeclared doping substances are highly prevalent in commercial sports nutrition supplements. *Journal of Sports Science & Medicine*. 2021;20(2):328–338. <https://doi.org/10.52082/jssm.2021.328>
  19. Tekkurşun-Demir G, Hazar Z, Cicioğlu Hİ. Egzersiz bağımlılığı ölçeği (EBÖ): Geçerlik ve güvenilirlik çalışması [Exercise addiction scale (EAS): A study of validity and reliability]. *Kastamonu Education Journal*. 2018;26(3):865–874. (In Turkish). <https://doi.org/10.24106/kefdergi.413383>
  20. Murray SB, Brown TA, Blashill AJ, Compton EJ, Lavender JM, Mitchison D, Mond JM, Keel PK, Nagata JM. The development and validation of the muscularity-oriented eating test: A novel measure of muscularity-oriented disordered eating. *International Journal of Eating Disorders*. 2019;52(12):1389–1398. <https://doi.org/10.1002/eat.23144>
  21. Çalışkan G, Alim NE. Validity and reliability of the muscularity oriented eating test (MOET) in Turkish. *American Journal of Health Behavior*. 2021;45(5):856–866. <https://doi.org/10.5993/AJHB.45.5.6>
  22. Hurst P, Kavussanu M, Boardley I, Ring C. Sport supplement use predicts doping attitudes and likelihood via sport supplement beliefs. *Journal of Sports Sciences*. 2019;37(15):1734–1740. <https://doi.org/10.1080/02640414.2019.1589920>
  23. Karafil AY, Ulaş M, Atay E. Spor besin takviyeleri inanç ölçeği: Türkçeye uyarlama, geçerlik ve güvenilirlik çalışması [Sports nutritional supplements belief scale: Adaptation to Turkish, validity and reliability study]. In: Şakir Ç, editor. *Proceedings of the EJERCongress 2019 Conference; 2019 June 19-22; Ankara*. Ankara: Anı Publisher; 2019. P. 2290–2295. (In Turkish).
  24. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*. 5th ed. London: Pearson; 2007.
  25. Byrne BM. *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. 2nd ed. New York: Taylor and Francis; 2010.
  26. Selvi K, Bozo Ö. Turkish adaptation of the drive for muscularity scale: A validity and reliability study. *Nesne Psikoloji Dergisi*. 2019;7(14):68–82. <https://doi.org/10.7816/nesne-07-14-05>
  27. Lavender JM, Gratz KL, Anderson DA. Mindfulness, body image, and drive for muscularity in men. *Body image*. 2012;9(2):289–292. <https://doi.org/10.1016/j.bodyim.2011.12.002>
  28. Kong P, Harris LM. The sporting body: body image and eating disorder symptomatology among female athletes from leanness focused and nonleanness focused sports. *The Journal of Psychology*. 2015;149(1-2):141–60. <https://doi.org/10.1080/00223980.2013.846291>
  29. Yazar H, Fidan M, Yılmaz SK, Eskici G, Saraç OE. Sporcularda kaslı olma dürtüsü ve besinsel ergojenik destek ürünleri kullanımının değerlendirilmesi [Evaluation of the drive to be muscular and the use of nutritional ergogenic supplements in athletes]. *Journal of Sport Sciences Research*. 2022;7(1):162–173. (In Turkish). <https://doi.org/10.25307/jssr.1097200>
  30. Çağlayan D, Koz M. Vücut geliştirme sporu ile ilgilenen kişilerde kas yoksunluğu belirtilerinin incelenmesi: Samsun ili örneği. [An investigation of muscle dysmorphia symptoms in individuals related in bodybuilding sports: Samsun province example]. *SPORMETRE the Journal of Physical Education and Sport Sciences*. 2020;18(4):180–192. (In Turkish). <https://doi.org/10.33689/spormetre.734424>
  31. Oruç-Güler ÖE, Anul N. Spor salonunda spor yapan kişilerde gıda takviyesi kullanım durumunun saptanması [Determination of food supplement usage status of people in the gym]. *Sağlık ve Yaşam Bilimleri Dergisi*. 2020;2(2):43–48. (In Turkish). <https://doi.org/10.33308/2687248X.202022178>
  32. Katra H, Günar BB, Korkmaz N, Özçelik O. Vücut geliştirme egzersizi yapan erkeklerin ergojenik yardımcı kullanma durumlarına göre kaslı olma dürtüsü düzeylerinin incelenmesi [Investigation of the drive for muscularity among men performing bodybuilding exercises according to use of ergogenic aids]. *Gazi Journal of Physical Education and Sport Sciences*. 2022;27(1):57–68. (In Turkish). <https://doi.org/10.53434/gbesbd.1008883>
  33. Yurdakul HÖ. The relationship between exercise

- addiction and beliefs in sports nutritional supplements. *Turkish Journal of Sport and Exercise*. 2020;22(2):338–343.
34. Arslan Kabasakal S, Çelik E, Güvendi B, Keskin B. Kinesiophobia, exercise addiction and mindfulness in athletes. *Physical Education of Students*, 2024;28(2):97–105. <https://doi.org/10.15561/20755279.2024.0207>
35. Godoy-Izquierdo D, Ramírez MJ, Díaz I, López-Mora C. A systematic review on exercise addiction and the disordered eating-eating disorders continuum in the competitive sport context. *International Journal of Mental Health and Addiction*. 2023,21(1):529–561. <https://doi.org/10.1007/s11469-021-00610-2>
36. Smaoui N, Bouattour O, Feki R, Gassara I, Maalej M, Charfi N, Ben Thabet J, Maalej M, Omri S, Zouari L. Exercise addiction: is it linked to eating disorders? A cross-sectional study in a sample of Tunisian athlete students. *European Psychiatry*. 2024;67(1):S295–S295. <https://doi.org/10.1192/j.eurpsy.2024.614>
- 
- 

### Information about the author:

**Sema Arslan Kabasakal**; <https://orcid.org/0000-0002-4552-9640>; [sema.kabasakal@yalova.edu.tr](mailto:sema.kabasakal@yalova.edu.tr); Faculty of Sport Science, Department of Sport Health Science, Yalova University; Yalova, Turkey.

---

Cite this article as:

Arslan Kabasakal S. Exercise addiction, muscularity-oriented eating and beliefs about sports nutrition supplements in students who regularly exercise. *Physical Education of Students*, 2024;28(6):382–388. <https://doi.org/10.15561/20755279.2024.0607>

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 26.11.2024

Accepted: 27.12.2024; Published: 30.12.2024

### **CONTACT INFORMATION**

Apt. 111, Blg. 8, Polyova Street, Kharkiv, 61068, Ukraine

e-mail: [sportart@gmail.com](mailto:sportart@gmail.com)

<https://www.sportpedu.org.ua>

### **Information:**

#### **Sponsors, Partners, Sponsorship:**

Ukrainian Academy of Sciences.

SCIENTIFIC EDITION (journal)

Physical Education of Students, 2024;28(6)

Editorial to the publisher department:

certificate DK No 7472; 07.10.2021

-----  
designer - Sergii Iermakov

editing - Tetiana Yermakova T.

administrator of sites - Sergii Iermakov

designer cover - A. Bogoslavets  
-----