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**Review of the Doctoral Dissertation by Maryna Khorkova, MA, entitled
“The impact of the Eduball method on selected parameters of creativity
and motor fitness in early age school children”**

The doctoral dissertation by Maryna Khorkova, MA, consists of a collection of published and thematically interrelated scientific articles entitled “The impact of the Eduball method on selected parameters of creativity and motor fitness in early age school children”.

This is another scientific analysis of the use of Eduball educational balls in early childhood and preschool education. The research team, led by Professor Andrzej Rokita from the Academy of Physical Education in Wrocław, developed an original concept for using Eduball educational balls in the first stage of primary school education. This innovative proposal enables early childhood education teachers to integrate the teaching of reading and counting skills with physical activity. The presented research is therefore the result of a collaboration between Professor Michał Bronikowski's team and the originators of Eduball, introducing a new element: an analysis of the impact of the Eduball method on selected parameters of creativity and motor fitness in young schoolchildren.

The doctoral dissertation under review consists of a monothematic series of two scientific publications:

1. Khorkova M., Bojkowski Ł., Korcz A., Łopatka M., Adamczak D., Krzysztozek J., Bronikowski M. (2024): *The relationship of creativity and motor creativity with physical activity and motor fitness in a gender perspective among 8–9-year-old children*. Children, 11(12), 1501. <https://doi.org/10.3390/children11121501>.
2. Khorkova M., Bojkowski Ł., Korcz A., Łopatka M., Adamczak D., Krzysztozek J., Bronikowski M. (2025): *Impact of the Eduball method on cognitive creativity, motor creativity, and motor fitness during physical education classes in 8- to 9-year-old*

children. Frontiers in Public Health, 13, 1660650.
<https://doi.org/10.3389/fpubh.2025.1660650>.

Both papers were published in journals with an Impact Factor, and their total bibliometric value amounts to 140 Ministry of Science points and an IF of 5.4. In her statement, the Doctoral Candidate characterises her contribution to these publications, emphasising that she participated in the following stages:

- formulating the research problem,
- developing the concept, structure, and methodology of the research,
- organising the entire research process,
- securing project funding and preparing project documentation for the bioethics committee,
- recruiting research participants,
- conducting baseline and follow-up examinations,
- participating in the educational intervention, coordinating classes with physical education teachers, and providing ongoing supervision over the implementation of the program in school settings,
- processing data and reporting research results,
- reviewing domestic and international literature, preparing scientific publications, and developing their final versions after incorporating co-authors' feedback, formatting articles according to journal requirements, and preparing responses to reviewers.

It should be emphasised that this research was funded by the National Science Centre (Poland) program for students and scientists from Ukraine without a doctoral degree, implemented under the Basic Research Program in the third edition of the Norwegian and EEA funds for 2014-2021. The Bioethics Committee of the Karol Marcinkowski University of Medical Sciences in Poznań approved the study protocol.

The doctoral dissertation under review (the summary of research achievements) is an 82-page printout consisting of the following parts:

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| 1. Basic data about the candidate | 5. Introduction |
| 2. List of abbreviations | 6. Aims and hypothesis |
| 3. Abstract | 7. List of publications |
| 4. Streszczenie | 8. Material and methods |

9. Results
10. Discussion
11. Conclusions
12. References
13. Acknowledgements
14. Funding
15. Academic and professional career – additional information
16. Attachments

In the introduction, the Author synthesises the literature on the use of games, activities, and physical activity as factors stimulating child development in early childhood. She did not omit key facts concerning neurology, brain development, and the physiological aspects of how physical activity affects the development of young children. Against this background, she outlined the results of previous scientific research on Eduball and its comprehensive impact on the development of preschool and early primary school children. In this chapter, M. Khorkova, MA, demonstrated thorough scientific preparation not only in neurology but also in physiology and elements of early childhood pedagogy. She based her analyses on the latest global literature in the field. Furthermore, she briefly summarised nearly all the most significant scientific achievements regarding the Eduball method published over the last dozen or so years by Professor A. Rokita's team.

This project aimed to assess the impact of the Eduball method on selected parameters of creativity and motor fitness during PE classes in early school-aged children. She specified four specific aims and five hypotheses. Such a structure is clear and reflects both the main objective and the rationale for undertaking this topic, as established in the introduction.

The research tools were appropriately selected. For the Creativity Assessment, *the Test for Creative Thinking-Drawing Production* was chosen. The reliability and validity of the test have been confirmed in numerous studies. In Polish standardisation studies, internal consistency was assessed using Cronbach's alpha, with the coefficient ranging around 0.80 (for preschool children). Motor Creativity Assessment was evaluated using *the Thinking Creatively in Action and Movement Test*. This tool has been used in scientific research for years, with a high overall test reliability coefficient of 0.84. Children's motor fitness level was assessed using selected tests from *the Eurofit battery*. The level of moderate-to-vigorous physical activity was determined using *the Physical Activity Screening Measure* created by Prochaska and coauthors. In part 4.3, the study procedure was described. The study followed a pre-test–post-test experimental design. The eight-week intervention program using the Eduball method was conducted during PE classes in two experimental groups. The Statistical Analyses tools

described in part 4.5 were correctly selected and allow for the verification of the formulated research hypotheses.

The study included 195 second-grade primary school children, aged 8-9 years, all of whom attended a standard curriculum in three urban primary schools in Poznań. Exclusion criteria were prepared. All necessary consents to conduct the research were obtained. Considering how complex the research design is, including the eight-week intervention program using the Eduball method, this number is not only sufficient but indeed impressive.

The research objective formulated by the Doctoral Candidate, the adopted working hypotheses, the research tools utilised, and the applied research procedure are valid and allow for a statistical analysis of the obtained research results. The questionnaires are characterised by high reliability indicators, such as Cronbach's alpha. Concluding the assessment of the research methodology, I consider the selection of methods and the research tools used to be correct and appropriate for addressing the formulated research hypotheses. The number of subjects is substantial and sufficient for conducting statistical analyses. The description of the research methods and techniques is detailed and enables the replication of the study by interested parties. The applied statistical analysis tools were appropriately selected, allowing for the assessment of the significance of differences between variables and the identification of potential correlations.

The research results are presented briefly in the summary of research achievements, divided into the findings of individual articles. In the published papers, the results were presented in accordance with the requirements and constraints of scientific journals. The terminology used in the papers is correct and characteristic of physical culture sciences. The tables are clear, and the description of the results is accurate, facilitating the understanding of the illustrated calculations. A strong point of both publications is the 'Discussion' section, which provides a valuable summary of the presented research results. The Doctoral Candidate contrasts her own research findings with current international scientific literature; the selection of sources is appropriate, and the Author demonstrated the ability to scientifically reflect on her own research results. The selected references are appropriate, up-to-date, and fully support the analysis of the collected research material against the background of other studies.

The conclusions are justified by the conducted research and the results of the statistical analyses. The Author rightly supplemented them with Recommendations, in which she noted, among other things, that:

'it is advisable to implement teaching strategies that incorporate open-ended tasks, problem-solving situations, and exploratory movement activities that foster autonomous and creative engagement'.

In the context of the conclusions and recommendations from the conducted research, I would like to know the Author's opinion. Does the Doctoral Candidate believe that early childhood education teachers are capable of meeting these tasks, or should physical education teachers be integrated into movement classes in early childhood education?

Final Conclusion:

The doctoral dissertation submitted for review, authored by Maryna Khorkova, MA, entitled “The impact of the Eduball method on selected parameters of creativity and motor fitness in early age school children”, meets the substantive requirements outlined in the Act of July 20, 2018 – Law on Higher Education and Science. The subject of the doctoral dissertation constitutes an original solution to a scientific problem, and the collection of thematically interrelated articles consisting of two publications has demonstrated that the Author possesses the required theoretical knowledge in the field of physical culture sciences.

Therefore, I request the Scientific Council of the Academy of Physical Education in Poznań to admit the Candidate to the public defence of her doctoral dissertation.