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Physical activity outcomes among high school and university students in the Visegrad Group countries: a synthesis of the V4MoRe study

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A. Study design/planning
B. Data collection/entry
C. Data analysis/statistics
D. Data interpretation
E. Preparation of manuscript
F. Literature analysis/search
G. Funds collection

Insufficient physical activity remains a major contributor to the burden of chronic non-communicable diseases across Europe, including obesity, diabetes and cardiovascular disease [1-3]. In response, the World Health Organization has issued clear recommendations on physical activity and sedentary behavior across the course of one's life [4]. However, effective prevention requires more than guidelines alone: it depends on reliable surveillance, consistent methodology and an understanding of why young people move, or do not move, in their everyday contexts [1].

This special issue builds directly upon the Letter to the Editor published at the launch of the V4MoRe (V4 Movement Research) collaboration within the V4More Visegrad Fund project (No. 22420149) [5]. As outlined, the project was conceived as a continuation and expansion of an earlier V4 joint initiative conducted in 2015, with the shared aim of strengthening scientific cooperation and monitoring changes in physical activity patterns among youth over time [6-8]. The present collection represents one of the key outcomes of this renewed collaboration: seven thematically focused papers, developed from a harmonized study design and aligned measurement approach, yet analyzed through different complementary lenses.

Keywords: V4 project, comparative study, physical activity, high school, students

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A defining feature of this research program is its common methodological backbone. Across countries, data collection was standardized, allowing cross-national comparisons and coherent interpretation within a shared conceptual framework. Questionnaire-based assessments of 4,776 participants using the International Physical Activity Questionnaire (IPAQ long form) provide comparability across domains of activity and sedentary time, while selected sub-studies incorporate device-based accelerometry to strengthen objectivity and deepen insight into intensity patterns. Importantly, these movement metrics are not treated in isolation: they are integrated with health indicators and behavioral correlates to create an evidence base that is both internally consistent and thematically diverse.

A paper by Baj-Korpak et al. examines gender differences in the mean values of physical activity and sitting time among nearly 2,700 university students using the IPAQ-LF [9]. The findings confirm gender as a significant differentiator of vigorous and moderate activity, as well as specific domains (work and household activity), with males generally reporting higher activity levels. Notably, the study also shows that country context shapes both total activity and sedentary time, with work-related physical activity contributing substantially to total physical activity in certain settings – an observation that is highly relevant when interpreting self-reported activity in young adults [9].

Complementing this, another paper by Stelmach et al. adds an objective dimension to V4 student surveillance by reporting accelerometer-derived physical activity and its health correlates among university students across four countries [10]. Using a seven-day ActiGraph protocol and established cut-off points, the study demonstrates that while most participants meet the WHO recommendations, daily activity profiles are dominated by moderate-intensity movement, with relatively little vigorous activity. The cross-country differences in light, moderate and total MVPA underscore that "meeting guidelines" can mask meaningful variation in the structure of movement behaviors, and the authors highlight the importance of promoting higher-intensity efforts and considering low-intensity activity in assessments and interventions [10].

While movement behaviors remain central, the special issue deliberately widens its perspective to related lifestyle domains. One contribution focuses on dietary patterns among university students in Poland and Slovakia, using a standardized FFQ-based approach [11]. The complementary study of Salonna et al. identifies meaningful gender-specific and cross-country differences, including higher vegetable and fruit intake among females and higher consumption of red/processed meat, refined grains, animal fats and energy drinks among males. These results position diet as a parallel behavioral target in student health promotion, and they provide a valuable context for interpreting physical activity findings within broader everyday routines [11].

Two papers specifically address adolescent populations, thereby strengthening the life-course perspective and enabling comparison across educational stages. One study examines domain-specific physical activity and sedentary behavior among adolescents in the Czech Republic, Hungary, Poland and Slovakia using the IPAQ long form [12]. The results of Salonna et al. in their second paper highlight consistent gender disparities (males generally more active), alongside clear country patterns, particularly among females, with Polish adolescents often reporting the highest activity and Slovak adolescents the lowest, especially in transport and active transport. These findings underline the need for context-sensitive policies that recognize both gender and national patterns in adolescent movement behavior [12].

The paper by Šedová et al. evaluates self-perceived health and its relationship with physical activity in both secondary school and university students across V4 countries [13]. Using the WHO-referenced recreational physical activity thresholds and self-rated health as a validated well-being indicator, the

authors show that meeting activity recommendations is associated with better self-rated health in most contexts. Interestingly, the strength and consistency of this association differ by country and educational stage, reinforcing the value of comparative designs when translating evidence into practice within national education and health systems [13].

Moving beyond single behaviors, the paper of Makai et al. introduces an integrated paradigm by examining adherence to the 24-hour movement behavior (24hMB) framework among 2,611 university students [14]. By combining physical activity, sedentary time and sleep within one model, the study demonstrates that full adherence is low, despite higher proportions meeting individual components. This is a particularly actionable message for universities and public health stakeholders: interventions focusing on only one behavior are unlikely to capture the reality of students' daily time-use constraints, whereas a whole-day approach may better reflect how movement, sitting and sleep interact in everyday life [14].

Finally, the paper by Prémusz et al. connects movement behaviors to a broader subjective well-being outcome – life satisfaction – again using the integrated 24-hour framework [15]. In a large V4 university sample, adherence to 24hMB emerged as the strongest behavioral correlate, alongside regular sport participation, while higher BMI showed a modest negative association. Although the explained variance is necessarily limited in such a multifactorial construct, the findings emphasize that balanced daily routines – activity, reduced prolonged sitting and sufficient sleep – represent modifiable targets with relevance not only for physical health but also for students' perceived quality of life [15].

Taken together, the studies in this special issue form a coherent evidence package: a shared methodology applied across countries and populations, analyzed through distinct thematic focus that collectively describes lifestyle: how young people in Central Europe move, sit, sleep, eat and perceive their health and well-being. Beyond advancing surveillance, the collaboration also demonstrates the added value of regional scientific partnerships for generating comparable data, identifying context-specific needs and informing realistic, culturally sensitive interventions. Importantly, while reporting mean physical activity levels is essential for describing population-level movement patterns, their interpretation requires contextual framing using objective measurements and adherence to guidelines, as self-reported physical activity alone may obscure meaningful differences in intensity structure and cross-country behavioral profiles.

As in the earlier Letter to the Editor, we also wish to acknowledge the legacy of Professor Józef Bergier, whose scientific leadership and community-building efforts helped establish the foundations for long-term V4 collaboration. We hope that this special issue reflects the continuity of that vision – methodologically rigorous, collaborative and oriented towards practical public health impact.

References:

1. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJF, Martin BW, et al. Correlates of physical activity: why are some people physically active and others not?. Lancet. 2012; 380(9838): 258-271. https://doi.org/10.1016/S0140-6736(12)60735-1
2. Myers J, Kokkinos P, Nyelin E. Physical activity, cardiorespiratory fitness, and the metabolic syndrome. Nutrients. 2019; 11(7): 1652. https://doi.org/10.3390/nu11071652
3. Cleven L, Krell-Roesch J, Nigg CR, Woll A. The association between physical activity with incident obesity, coronary heart disease, diabetes and hypertension in adults: a systematic review of longitudinal studies published after 2012. BMC Public Health. 2020; 20: 726. https://doi.org/10.1186/s12889-020-08715-4

4. 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. Br J Sports Med. 2020; 54(24): 1451-1462. https://doi.org/10.1136/bjsports-2020-102955
5. Ács P, Niźnikowska E, Stelmach MJ, Weiner M, Makai A, Prémusz V, et al. Physical activity patterns among high school and university students in the V4 countries: a comparative study. Health Prob Civil. 2024; 18(4): 370-372. https://doi.org/10.5114/hpc.2024.144705
6. Niźnikowska E, Bergier J, Bergier B, Ács P, Junger J, Salonna F. Factors influencing level of physical activity among female students from the Visegrad countries. Health Prob Civil. 2019; 13(1): 19-29. https://doi.org/10.5114/hpc.2018.80225
7. Ács P, Bergier J, Salonna F, Junger J, Melczer C, Makai A. Gender differences in physical activity among secondary school students in the Visegrad countries (V4). Health Prob Civil. 2016; 10(3): 21-29. https://doi.org/10.5114/hpc.2016.61363
8. Niźnikowska E, Bergier J, Bergier B, Acs P, Junger J, Salonna F. Diversity of factors determining physical activity in youth in Visegrad countries. Balt J Health Phys Act. 2017; 9(4): 125-134. https://doi.org/10.29359/BJHPA.09.4.101
9. Baj-Korpak J, Stelmach MJ, Weiner M, Niźnikowska EA, Makai A, Prémusz V, et al. Gender and physical activity among university students from the Visegrad Group countries: a cross-sectional study. Health Prob Civil. 2026; 20(1): 5-15. https://doi.org/10.5114/hpc.2025.156328
10. Stelmach MJ, Baj-Korpak J, Weiner M, Niźnikowska EA, Ács P, Salonna F, et al. Accelerometer-derived physical activity and health correlates among students in Visegrad Group countries. Health Prob Civil. 2026; 20(1): 16-29. https://doi.org/10.5114/hpc.2025.156756
11. Salonna F, Bigosińska M, Horbacz AD, Potok H. Dietary patterns among university students in Central Europe: a comparison between Slovakia and Poland. Health Prob Civil. 2026; 20(1): 30-41. https://doi.org/10.29316/hpc/215628
12. Salonna F, Junger J, Baj-Korpak J, Weiner M, Makai A, Prémusz V, et al. Physical activity and sedentary behavior among adolescents in the Visegrad countries: a cross-country comparison. Health Prob Civil. 2026; 20(1): 42-54. https://doi.org/10.29316/hpc/217532
13. Šedová L, Hajduchová H, Ács P, Melczer C, Junger J, Salonna F, et al. Self-perceived health status and physical activity levels among students in the Visegrád countries: a cross-sectional analysis. Health Prob Civil. 2026; 20(1): 55-56. https://doi.org/10.29316/hpc/217244
14. Makai A, Salonna F, Baj-Korpak J, Stelmach MJ, Sedova L, Hallósy E, et al. Adherence to the 24-hour movement guidelines among university students in the Visegrad countries: a cross-sectional study. Health Prob Civil. 2026; 20(1): 67-78. https://doi.org/10.29316/hpc/216481
15. Prémusz V, Salonna F, Niźnikowska EA, Weiner M, Hajdochova H, Makai A, et al. Integrated 24-hour movement behaviour as a key correlate of life satisfaction among university students in the Visegrád Four countries. Health Prob Civil. 2026; 20(1): 79-93. https://doi.org/10.29316/hpc/217769