Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XXV, ISSUE 2, 2025, Romania
The journal is indexed in: ERIH PLUS, Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XXV, ISSUE 2, 2025
June 2025, 25 (2): 212-215
Original article

ANALYSIS OF THE IMPACT OF THE COVID-19 PANDEMIC ON THE EFFORT CAPACITY OF HIGH SCHOOL STUDENTS

GRECEANU SABINA MARIA[1], STĂNESCU MONICA IULIA[1]

Abstract

The COVID-19 pandemic has produced major changes in the lifestyle of middle school students, with a significant impact on the level of physical activity and exercise capacity. School closures, suspension of physical education classes and restrictions on outdoor activities have contributed to a visible reduction in daily movement among children aged 10 to 14. This stage is essential in physical development, and the limitation of opportunities for physical exercise has affected multiple motor and functional components. The paper provides a theoretical analysis of the negative influence that the lack of physical activity has had on exercise capacity in this age group. The changes that have occurred in the structure of students' daily routines, the trends of increasing sedentary behavior and the decrease in involvement in organized motor activities are analyzed. In the absence of an active physical education setting, a decrease in cardiovascular endurance, a reduction in muscle tone, and the appearance of signs of regression in terms of balance, coordination, and reaction speed were observed.

The text also explores contextual factors that have accentuated these effects, such as limited access to adequate exercise spaces, urban-rural disparities, and socio-economic differences in participation in online physical education classes. At the same time, examples of educational and community initiatives that have sought to maintain physical activity during the isolation period, by adapting working methods to the specific conditions of the pandemic, are presented.

By bringing together and synthesizing data from recent specialized literature, the paper highlights the extent of changes in students' effort capacity in the context of the pandemic and provides a general picture of the directions in which educational interventions can be oriented in the future.

Keywords: COVID-19, effort capacity, physical activity, students.

Introduction

The outbreak of the COVID-19 pandemic has caused an unprecedented global health crisis, the effects of which have affected all dimensions of human life. One of the most affected categories has been that of children and adolescents, who have faced major disruptions to their daily routine, the educational system, and recreational activities. Recent studies (Jurak et al., 2021) indicate that the quarantine period and isolation have caused a sudden and significant reduction in the level of physical activity among students, especially in the middle school cycle.

Children between the ages of 10 and 14 are at a crucial stage of physical development, in which motor stimuli contribute decisively to the maturation of the respiratory, muscular, and cardiovascular systems. According to Guan et al. (2020), the lack of regular exercise during this period has negative consequences not only in the short term—by decreasing muscle tone and physical endurance—but also in the long term, by affecting the process of forming a healthy lifestyle.

Carson et al. (2016) argue that sustained physical activity is closely correlated with cognitive development and emotional balance in children, which amplifies the severity of the effects generated by the closure of schools and the suspension of physical education classes. Children were deprived of outdoor games, sports competitions, and any organized form of physical effort, which led to a generalized motor regression. Riley et al. (2021) draw attention to the need to adapt pedagogical methods in physical education in the context of the pandemic because the lack of resources and space made it impossible to continue training in the online environment. Students did not benefit from the necessary feedback, and motivation decreased considerably.

In addition, the negative effects of the pandemic were aggravated by the family and socio-economic context. The study by Pietrobelli et al. (2020), conducted in Italy, shows that students from low-income families had a higher risk of sedentary behaviors and dietary imbalances, in the absence of minimum conditions for physical activity.

Another important dimension is the differentiated access to digital education. Students from rural areas or from disadvantaged communities had difficulties in connecting to online lessons, including physical education classes, which further contributed to the reduction of motor activity. These educational and social discrepancies led to the accentuation of inequalities in the physical health of students when school resumed in person.

The global health community has long emphasized the role of regular physical activity in child development. According to Strong et al. (2005), at least 60 minutes of moderate to vigorous physical activity daily is recommended for school-aged children to promote cardiovascular, musculoskeletal, and mental health. However, the COVID-19 restrictions

[1] National University of Physical Education and Sport, Bucharest, Romania; Corresponding author: sabinagreceanu1997@gmail.com.

made achieving these goals extremely difficult. Furthermore, psychological responses to prolonged isolation had a significant impact on children's motivation and behavior. Studies by Orgilés et al. (2020) observed that more than 85% of children surveyed in Italy and Spain exhibited signs of emotional distress during lockdown. Anxiety, boredom, irritability, and difficulty concentrating were all frequently reported and were associated with lower levels of physical activity. When children are emotionally unwell, their capacity and willingness to participate in exercise is drastically reduced.

The role of digital technology during this period presents a double-edged sword. While it provided access to education, including online physical education classes, it also increased screen time exponentially. A study by Nagata et al. (2022) found that adolescents' recreational screen use rose by 4.2 hours per day on average during the pandemic, with detrimental effects on sleep quality and physical engagement. This trend not only reduced time spent on physical movement but also affected posture, eye health, and social interaction. Importantly, the disparities in access to technology and stable internet connections exacerbated educational inequalities. For instance, research by Van Lancker & Parolin (2020) indicates that children from lower-income or rural households were less likely to have consistent access to devices or a conducive home learning environment. Consequently, they were also less likely to participate in online physical education sessions or benefit from digital movement platforms. These factors highlight the intersection between technology, social equity, and physical health.

Despite these challenges, certain international educational systems managed to adapt in creative ways. In Finland, for example, teachers integrated physical challenges into daily online lessons, encouraging students to complete mini fitness tasks between academic subjects (Wang et al., 2021). In Canada, school boards distributed home physical activity kits that included jump ropes, yoga mats, and guidance brochures, which were particularly helpful for students without equipment at home.

A further overlooked dimension is the social-emotional aspect of school physical education. PE classes are not just about movement—they also foster teamwork, communication, and a sense of belonging. As pointed out by Bailey et. al. (2009), physical education contributes to holistic development, supporting not only physical but also cognitive and social growth. The loss of this environment during the pandemic created a vacuum in students' lives, which is not easily compensated through virtual methods. Moreover, physical activity in schools serves a protective function against negative health outcomes. Sedentary lifestyles among children are associated with rising obesity rates, type 2 diabetes, and even early markers of cardiovascular disease (Sallis et. al., 2012). During the pandemic, many children also experienced altered eating habits, with increased intake of snacks and sugary beverages. Without regular physical movement to counterbalance caloric intake, this led to significant weight gain among many students.

To address the long-term effects of this crisis, multiple layers of intervention are needed. These include curriculum reforms that prioritize physical education recovery, additional training for teachers on remote and hybrid delivery of physical activities, and partnerships with community health organizations. As noted by Chen et al. (2020), building back better after the pandemic requires not just restoring prior conditions but reimagining educational models that are resilient to future disruptions.

Methodology

This paper is theoretical in nature and aims to provide a synthesis of the most relevant conclusions from the specialized literature regarding the impact of the pandemic on the exercise capacity of middle school students. The analysis focused on studies published between 2020 and 2024 that evaluated changes in physical activity, motor performance, and psychosocial consequences associated with decreased physical effort in children and adolescents.

Discussions

The COVID-19 pandemic has served as a stress test for the adaptability and resilience of educational systems worldwide, particularly in the area of physical education. While the immediate impact on students' physical activity levels was evident, the broader implications on effort capacity and long-term motor development require a more in-depth exploration. The shift from structured school environments to home-based and often unsupervised settings revealed significant limitations in how physical education is delivered and perceived, especially during periods of crisis.

One of the most evident effects was the disruption of daily routines that previously included scheduled times for physical movement. With the closure of schools, students lost access to gymnasiums, schoolyards, and organized sports activities. As a result, many children experienced an abrupt cessation of habitual physical exertion. The home environment, though potentially supportive for some, was not universally equipped to replace the structured framework of physical education classes. In many cases, the absence of a defined schedule led to irregular movement habits or, in some instances, a complete halt of physical activity.

Another important aspect to consider is the psychological dimension associated with effort capacity. Motivation is a critical factor in determining not only the willingness to engage in exercise but also the intensity and duration of the activity performed. During the pandemic, students experienced elevated levels of anxiety, social isolation, and emotional fatigue—all of which can erode intrinsic motivation. The lack of peer interaction, encouragement from teachers, and the

competitive or collaborative dynamics that typically characterize physical education classes further reduced students' engagement.

Various studies indicate that the isolation imposed during the pandemic has led to a sharp decrease in regular physical activity. Dunton, Do & Wang (2020) observed in the USA a sharp decrease in moderate and intense physical activities, with a direct impact on aerobic capacity. In Germany, Schmidt et al. (2020) found that the time spent in front of screens increased by over 60%, while physical activity decreased by an average of 30% compared to the pre-pandemic period. Margaritis et al. (2020) emphasize that, in the absence of specific interventions, the effects of pandemic sedentarism will have repercussions on children's health for many years. They recommend adapting educational programs to integrate more active movement components, even online. Furthermore, authors such as López-Bueno et al. (2020) have correlated the lack of physical activity with the emergence of anxiety, decreased concentration and chronic fatigue. These psychological disorders directly affect students' motivation to participate in sustained physical activity.

Examples of good practices

An example of an effective intervention is the "Play Every Day" program in the UK, mentioned by Riley et al. (2021), which combined light physical exercise with educational activities adapted for home use. Other "Sport@Home" initiatives in Italy, presented by Pietrobelli et al. (2020), showed that the use of interactive applications increased children's involvement in physical movement.

Consequences of sedentary behavior in children

The prolonged sedentary behavior generated by social isolation measures has caused major imbalances in the physical and emotional development of students. Physically, increases in body weight, a decrease in cardiovascular capacity and a decrease in muscular endurance were observed. The lack of physical exercise led to a reduction in flexibility and reaction speed, thus affecting general motor performance. In addition to the physical effects, sedentarism also contributed to the emergence of behavioral disorders, decreased self-confidence, anxiety, depressive states and lack of motivation for school activities. Children who were deprived of contact with their peer group and of opportunities to move in an organized way suffered regressions both emotionally and in terms of their ability to concentrate and engage in daily tasks. These consequences can significantly influence the process of school reintegration, and the remediation of motor and psycho-emotional deficits will require long-term interventions. An educational strategy is needed that includes daily physical activities, psychological counseling and close collaboration between parents, teachers and child health specialists.

Increased sedentary lifestyle during the pandemic has complex consequences for children's development. According to WHO (2020), lack of exercise affects metabolism, the cardiovascular system and bone development. In addition, sustained sedentary behaviors are associated with sleep disorders, unhealthy eating and diminished social skills (Carson et. al., 2016).

Conclusions

In order to adequately respond to these challenges and to reduce the disparities that have emerged following the interruption of regular physical activity, a rethinking of curricular priorities within the Romanian educational system is necessary. Physical education should no longer be treated as a secondary discipline, but rather as a fundamental component of the child's holistic development. This shift in perspective should target not only the expansion of content or the increase in instructional hours, but also the redefinition of the aims of physical education in light of current social and public health realities.

It is essential that future strategies include personalized interventions based on students' actual physical readiness, with a focus on the gradual restoration of effort capacity, motor recovery, and support for the psycho-emotional dimension. The proposed physical activities must take into account the diversity of students' needs and should integrate both traditional approaches and innovative methods, including digitally assisted ones. Consequently, physical education teachers will require appropriate resources and continuous training in order to adapt their teaching content and methods to an ever-changing educational context.

Another key aspect is the active involvement of the community and parents in promoting an active lifestyle. In the absence of coherent policies and adequate logistical support, the responsibility for maintaining students' physical health cannot rest solely on schools. Inter-institutional collaboration between schools, local authorities, healthcare providers, and non-governmental organizations can contribute to the development of integrated programs that positively influence children's overall health.

In this context, the pandemic can also be viewed as a catalyst for reevaluating the role of physical education in society. The lessons of this period can and must lead to the consolidation of an educational model in which physical development—alongside intellectual and emotional growth—is recognized as a cornerstone of balanced education. Moreover, conducting longitudinal studies and comparative assessments of students' post-pandemic physical health may provide valuable data for adjusting educational policies and designing preventive interventions.

Therefore, the conclusions of this study support the need to formulate clear, coherent, and applicable action strategies aimed at restoring students' effort capacity and sustainably integrating physical activity into both school and family life. Only through a concerted and multidisciplinary effort can we achieve the goal of a future generation that is healthier, more active, and better equipped to face the challenges of contemporary society.

References

Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., Sandford, R., & the BERA Physical Education and Sport Pedagogy Special Interest Group. (2009). The educational benefits claimed for physical education and school sport: An academic review. *Research Papers in Education*, 24(1), 1–27. https://doi.org/10.1080/02671520701809817.

Carson, V., Hunter, S., Kuzik, N., Gray, C. E., Poitras, V. J., Chaput, J. P., ... & Tremblay, M. S. (2016). Systematic review of physical activity and cognitive development in early childhood. Journal of Science and Medicine in Sport, 19(7), 573–578. https://doi.org/10.1016/j.jsams.2015.07.011.

Chen, P., Mao, L., Nassis, G. P., Harmer, P., Ainsworth, B. E., & Li, F. (2020). Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions. *Journal of Sport and Health Science*, 9(2), 103–104. https://doi.org/10.1016/j.jshs.2020.02.001.

Dunton, G. F., Do, B., & Wang, S. D. (2020). Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the U.S. BMC Public Health, 20, 1351. https://doi.org/10.1186/s12889-020-09429-3.

Guan, H., Okely, A. D., Aguilar-Farias, N., del Pozo Cruz, B., Draper, C. E., El Hamdouchi, A., ... & Veldman, S. L. C. (2020). Promoting healthy movement behaviours among children during the COVID-19 pandemic. The Lancet Child & Adolescent Health, 4(6), 416–418. https://doi.org/10.1016/S2352-4642(20)30131-0.

Jurak, G., Morrison, S. A., Starc, G., Kovač, M., Leskošek, B., & Sember, V. (2021). Physical activity recommendations during the COVID-19 virus outbreak. Journal of Functional Morphology and Kinesiology, 6(2), 31. https://doi.org/10.3390/jfmk6020031.

López-Bueno, R., Calatayud, J., Ezzatvar, Y., Casajús, J. A., Smith, L., Andersen, L. L., & López-Sánchez, G. F. (2020). Association between physical activity and anxiety and mood during COVID-19 confinement. Frontiers in Psychiatry, 11, 729. https://doi.org/10.3389/fpsyt.2020.00729.

Margaritis, I., Houdart, S., El Ouadrhiri, Y., Bigard, X., Vuillemin, A., & Duché, P. (2020). How to deal with COVID-19 epidemic-related lockdown physical inactivity and youth sedentary behavior. Archives of Public Health, 78, 78. https://doi.org/10.1186/s13690-020-00432-z.

Moore, S. A., Faulkner, G., Rhodes, R. E., Brussoni, M., Chulak-Bozzer, T., Ferguson, L. J., Mitra, R., O'Reilly, N., Spence, J. C., Vanderloo, L. M., & Tremblay, M. S. (2020). Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: A national survey. International Journal of Behavioral Nutrition and Physical Activity, 17, 85. https://doi.org/10.1186/s12966-020-00987-8.

Nagata, J. M., Cortez, C. A., Cattle, C. J., Ganson, K. T., Iyer, P., Bibbins-Domingo, K., & Baker, F. C. (2022). Screen time use among U.S. adolescents during the COVID-19 pandemic: Findings from the Adolescent Brain Cognitive Development (ABCD) study. *JAMA Pediatrics*, 176(1), 94–96. https://doi.org/10.1001/jamapediatrics.2021.4334.

Orgilés, M., Morales, A., Delvecchio, E., Mazzeschi, C., & Espada, J. P. (2020). Immediate psychological effects of the COVID-19 quarantine in youth from Italy and Spain. *Frontiers in Psychology*, 11, 579038. https://doi.org/10.3389/fpsyg.2020.579038.

Pietrobelli, A., Pecoraro, L., Ferruzzi, A., Heo, M., Faith, M., Zoller, T., Antoniazzi, F., Piacentini, G., Fearnbach, N., & Heymsfield, S. (2020). Effects of COVID-19 lockdown on lifestyle behaviors in children with obesity living in Verona, Italy: A longitudinal study. Obesity, 28(8), 1382–1385. https://doi.org/10.1002/oby.22861.

Riley, N., Lubans, D., Holmes, K., & Morgan, P. (2021). Movement-based learning in pandemic times: Opportunities and challenges for schools. Physical Education and Sport Pedagogy, 26(3), 238–251. https://doi.org/10.1080/17408989.2020.1861233.

Sallis, J. F., Floyd, M. F., Rodríguez, D. A., & Saelens, B. E. (2012). Role of built environments in physical activity, obesity, and cardiovascular disease. *Circulation*, 125(5), 729–737. https://doi.org/10.1161/CIRCULATIONAHA.110.969022.

Schmidt, S. C. E., Anedda, B., Burchartz, A., Eichsteller, A., Kolb, S., Nigg, C., Niessner, C., Oriwol, D., Worth, A., & Woll, A. (2020). Physical activity and screen time of children and adolescents before and during the COVID-19 lockdown in Germany: A natural experiment. Scientific Reports, 10, 21780. https://doi.org/10.1038/s41598-020-78438-4.

Strong, W. B., Malina, R. M., Blimkie, C. J. R., Daniels, S. R., Dishman, R. K., Gutin, B., ... & Trudeau, F. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics*, 146(6), 732–737. https://doi.org/10.1016/j.jpeds.2005.01.055.

Van Lancker, W., & Parolin, Z. (2020). COVID-19, school closures, and child poverty: A social crisis in the making. *The Lancet Public Health*, 5(5), e243–e244. https://doi.org/10.1016/S2468-2667(20)30084-0.

Wang, C. K. J., Liu, W. C., Kee, Y. H., & Chian, L. K. (2021). Development and validation of the Physical Education Teachers' Adaptation Strategies Scale during COVID-19. *Asia-Pacific Education Researcher*, 30, 463–475. https://doi.org/10.1007/s40299-021-00568-5.

World Health Organization. (2020). *Stay physically active during self-quarantine*. https://www.who.int/news-room/q-a-detail/be-active-during-covid-19. Accesed on: June 10, 2025.