

GRZELAK, Alicja and LANGNER, Sara. Health Implications of COVID-19 for New Generations: From Physical to Mental Health Challenges. *Quality in Sport*. 2024;36:56738. eISSN 2450-3118.  
<https://dx.doi.org/10.12775/QS.2024.36.56738>  
<https://apcz.umk.pl/QS/article/view/56738>

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

© The Authors 2024;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 06.12.2024. Revised: 15.12.2024. Accepted: 16.12.2024. Published: 16.12.2024.

## **Health Implications of COVID-19 for New Generations: From Physical to Mental Health Challenges**

**Alicja Grzelak**

Medical University of Lodz, al. Tadeusza Kościuszki 4, 90-419 Łódź

[alagrzelak7@gmail.com](mailto:alagrzelak7@gmail.com)

<https://orcid.org/0009-0009-6951-6113>

**Sara Langner**

Central Teaching Hospital of the Medical University of Lodz, Pomorska 251, 92-213 Łódź

[sanilla.langner@gmail.com](mailto:sanilla.langner@gmail.com)

<https://orcid.org/0009-0009-4306-4024>

### **ABSTRACT**

**Introduction:** The COVID-19 pandemic has left a lasting impact on global health, affecting not only physical well-being but also mental and emotional health. New generations face unique challenges, shaped by disrupted lifestyles, prolonged isolation, and evolving healthcare needs.

These implications demand a comprehensive understanding of both immediate and long-term health outcomes.

**Purpose of Work:** This paper explores the multifaceted health impacts of COVID-19 on new generations, emphasizing physical, mental, and social dimensions. By synthesizing current research, the study seeks to highlight key challenges and propose strategies for addressing these health concerns.

**State of Knowledge:** Emerging evidence reveals a dual burden of physical and mental health issues in younger populations. Long COVID symptoms, reduced physical activity, and developmental delays are prominent physical concerns. Simultaneously, heightened levels of anxiety, depression, and emotional stress reflect the pandemic's toll on mental health. Socioeconomic disparities further exacerbate these outcomes, while digital reliance during the pandemic has introduced new behavioral patterns requiring attention.

**Material and methods:** This study utilized a systematic literature review methodology, involving a search across prominent scientific databases like PubMed and Google Scholar, followed by a rigorous screening process to identify relevant studies for in-depth examination.

**Summary:** COVID-19 has imposed unprecedented health challenges on new generations, blending physical ailments with pervasive mental health struggles. This paper underscores the importance of integrative health approaches and policy-driven interventions to mitigate long-term impacts. Future research must focus on preventive measures, equitable healthcare access, and innovative strategies to foster resilience and holistic recovery.

**Keywords:** covid-19; mental health; adolescents; lockdown; social isolation

## **INTRODUCTION**

The COVID-19 pandemic has profoundly impacted the global health system, rendering adolescents a vulnerable population affected not only by the disease itself but also by its consequences [1][2]. Adolescence is a critical stage of life when physiological, mental, and social health are interrelated, and an unsupportive environment can adversely impact one or more of these aspects, hindering proper growth and development. The pandemic's unprecedented onslaught has brought adolescent health deficiencies to the forefront, necessitating targeted attention in the post-pandemic era.

This review aims to provide a comprehensive understanding of the health challenges faced by adolescents in the post-COVID era. It focuses on examining the physical health-related problems, including the persistence of post-COVID symptoms, changes in nutritional status and musculoskeletal complications, as well as the mental health issues related to anxiety, depression, and prolonged social isolation [3]. Furthermore, it explores the interrelationship of these health challenges with disturbances in the social and developmental contexts, such as the disruption of education and the retardation of social skills [4].

This review examines three key aspects: physical health, mental health, and social well-being, drawing upon relevant peer-reviewed studies and scientific literature [5]. These dimensions provide a comprehensive overview of how the pandemic has transformed the health landscape for adolescents globally, with a particular emphasis on long-term implications. By underscoring the pervasiveness and gravity of these challenges, this review underscores the pressing need for tailored interventions to support adolescent recovery and resilience.

The following section provides a critical examination of the research methodologies employed in the epidemiological studies, clinical trials, and cross-sectional surveys that have investigated the health outcomes among adolescents in the post-COVID-19 era. These studies elucidate the nature of the health challenges faced by this population and lay the groundwork for developing effective mitigation strategies to address them [6].

Developing a robust healthcare framework that safeguards adolescents' well-being during future public health emergencies will be crucial.

## **PHYSICAL HEALTH**

The aftermath of COVID-19 has introduced numerous physical health challenges for adolescents, with serious long-term complications extending beyond the acute phase. These

include, but are not limited to, the persistence of symptoms commonly referred to as "Long COVID," alterations in nutritional status and lifestyle behaviors, as well as an increase in other physical disorders such as musculoskeletal and vision problems.

### **Post-COVID Symptoms in Adolescents (Long COVID)**

Studies indicate that adolescents who have recovered from COVID-19 often experience lingering symptoms, commonly referred to as "Long COVID-19," which can adversely impact their quality of life [7]. One prominent symptom is persistent fatigue, with data showing that approximately 30% of recovered individuals continue to suffer from severe tiredness for many weeks or even months after their initial infection [7]. Additionally, respiratory issues such as shortness of breath and chronic coughing have been observed in a substantial proportion of COVID-19 patients, suggesting the potential for long-lasting changes to their pulmonary physiology [8].

Emerging evidence suggests that COVID-19 infection can lead to cardiovascular complications, such as myocarditis and pericarditis, particularly among those who experienced severe acute illness or required hospitalization [9]. These rare but concerning complications indicate the potential long-term cardiovascular risks associated with COVID-19 and underscore the need for close medical follow-up during recovery. Additionally, the persistent symptoms experienced by many individuals often result in reduced physical activity, which can further exacerbate their overall health conditions, creating a detrimental cycle.

### **Changes in Nutritional Health and Lifestyle**

The COVID-19 pandemic and associated lockdowns have disrupted the normal dietary and physical activity habits of adolescents, leading to increased rates of obesity and malnutrition [10]. In urban settings, the lack of access to outdoor recreational facilities has further exacerbated these issues. Similarly, the closure of educational and leisure venues has prompted adolescents to adopt more sedentary lifestyles, characterized by increased screen time and reduced physical exercise.

On the other hand, the pandemic exacerbated nutritional problems among adolescents from low-income families. The economic instability resulting from the public health crisis restricted their access to nutritious food items, leading to a surge in undernourishment in certain regions

[11]. This dual burden of obesity and malnutrition underscores the far-reaching impact of the pandemic on the nutritional health of adolescents, with long-lasting implications for their physical development and metabolic well-being [12].

The COVID-19 pandemic has led to disruptions in eating patterns, contributing to the development of eating disorders such as anorexia nervosa and binge-eating disorder among adolescents [13]. Stress, anxiety, and prolonged social isolation resulting from the pandemic have further exacerbated these conditions. Addressing these issues requires a multifaceted approach, including community-based nutrition programs and interventions focused on physical activity and mental health, to provide comprehensive support for adolescents' well-being.

### **Other Physical Disorders**

The COVID-19 pandemic has exacerbated musculoskeletal issues among adolescents due to their increased engagement with screens for educational, social, and recreational activities. Research indicates that prolonged screen time, often in suboptimal postures, has led to a notable rise in the prevalence of neck pain, back pain, and poor posture among this population [14]. A cross-sectional study found that more than half of adolescents experienced musculoskeletal discomfort while learning online, with girls reporting significantly higher rates of these problems [10].

Beyond musculoskeletal problems, the COVID-19 pandemic has also given rise to vision-related disorders among adolescents [8]. Increased screen time has led to a continuous rise in myopia progression, dry eye syndrome, and digital eye strain. According to the available research, the long-term consequences of these vision issues for teenagers are expected to be quite serious and cannot be mitigated without specific precautions, such as taking regular breaks from screens and ensuring proper lighting conditions.

Another emerging concern is the disruption of sleep patterns due to the COVID-19 pandemic, which is strongly associated with both physical and mental health outcomes among adolescents. Research indicates that increased exposure to screen time, particularly before bedtime, contributes to delayed sleep onset and poor sleep quality in this population. These sleep disturbances exacerbate fatigue and impair cognitive performance, further complicating the recovery process. The interconnected nature of these health challenges underscores the need for a comprehensive approach to supporting adolescent well-being in the post-pandemic era.

The physical health of adolescents in the post-COVID era will be shaped by a multifaceted interplay of long-term symptoms, lifestyle changes, and the emergence of new physical disorders. The pervasiveness of "Long COVID" symptoms, including persistent fatigue, respiratory issues, and cardiovascular complications, necessitates close medical follow-up and management. Concurrently, the dual burden of obesity and malnutrition, coupled with musculoskeletal and vision problems, underscores the far-reaching indirect impacts of the pandemic on adolescent health. Addressing these challenges will require a comprehensive, multidisciplinary approach, encompassing medical care, targeted nutritional interventions, and behavioral modifications that foster recovery and resilience among this population.

## **MENTAL HEALTH**

The COVID-19 pandemic significantly impacted the mental health of adolescents, with a dramatic increase in psychological disorders, exacerbated social isolation, and negative effects from heightened screen time. These challenges highlight the interplay between environmental stressors and adolescent development during and following the pandemic.

### **Rise in Psychological Disorders**

Research indicates that anxiety and depression have become the most prevalent psychological disorders among adolescents during and following the COVID-19 pandemic. Studies have reported an approximately 25% increase in anxiety symptoms globally among this population, with females disproportionately affected [\[15\]](#). Similarly, the rates of moderate to severe depressive symptoms have risen, with around 30% of adolescents experiencing such symptoms, largely attributed to disruptions in their routine, academic uncertainty, and heightened family stress during lockdowns.

Post-traumatic stress disorder emerged as a critical mental health consequence of the pandemic, particularly among adolescents who experienced the loss of family members or endured prolonged isolation [\[16\]](#). Research estimates that around 15% of adolescents exhibited PTSD symptoms, such as intrusive thoughts, hypervigilance, and emotional dysregulation. These findings underscore the need for targeted interventions that address the unique experiences and vulnerabilities of this population.

Research indicates that the COVID-19 pandemic significantly exacerbated mental health issues among adolescents. For example, a longitudinal study conducted in the United States found that emergency department visits related to mental health concerns increased during the pandemic period compared to pre-pandemic levels [17]. This surge in mental health-related incidents underscores the pressing need for accessible mental health services and the integration of comprehensive psychological care into routine pediatric healthcare for this population [17].

### **Impact of Social Isolation**

The COVID-19 pandemic's characteristic social isolation drastically altered adolescents' perspectives on mental health. Without peer interactions during this critical developmental phase, their self-esteem deteriorated, leading to heightened feelings of loneliness [18]. Those who relied on social engagement as a therapeutic outlet now found themselves isolated and alone, resulting in a breakdown of interpersonal relationships and communication skills.

Prolonged social isolation further compromised the well-being of adolescents, especially those with pre-existing low self-esteem, by negatively impacting their sense of identity and self-worth. Research indicates that social isolation is associated with increased risks of self-harm and suicidal thoughts, with these behaviors roughly doubling among socially isolated adolescents during the pandemic period. Consequently, fostering social connectedness and rebuilding the social support networks of adolescents have emerged as crucial priorities in the post-pandemic era.

The pandemic also highlighted the role of family dynamics, with some adolescents experiencing benefits from increased time at home, while others faced heightened stress due to familial conflicts or abusive household environments. Adolescents from unstable home backgrounds were particularly vulnerable, lacking the emotional and social resources to navigate the prolonged crisis effectively.

### **Increased Screen Time and Its Effects**

The COVID-19 pandemic led to a significant, and in some cases, a substantial increase in screen time among adolescents [19]. This can be attributed to the reliance on digital platforms for educational purposes, social interactions, and leisure activities. While screen time served as a necessary means to facilitate learning and maintain peer connections during this period,

excessive engagement with digital media has been strongly linked to detrimental mental health consequences for this population [19].

Excessive screen time commonly disrupts sleep patterns in adolescents. The blue light emitted from digital devices can interfere with the natural production of melatonin, leading to poor sleep quality and duration. A cross-sectional study found a significant link between increased screen exposure (over 6 hours per day) and higher risks of insomnia and daytime fatigue, compared to adolescents with average screen time [20]. Moreover, sleep deprivation can exacerbate symptoms of anxiety and depression, creating a self-perpetuating cycle that hinders recovery efforts.

Furthermore, research has shown that excessive screen time is linked to heightened anxiety and addictive tendencies among adolescents. During the pandemic, many young people reported experiencing increased feelings of restlessness, irritability, and a reliance on digital media as a means of mood regulation [21]. The overuse of social media, in particular, exposed adolescents to harmful content, cyberbullying, and unrealistic social comparisons, which subsequently led to body image concerns and social anxiety [21].

The transition to remote learning during the pandemic presented significant challenges for adolescents. While digital platforms enabled the continuation of academic instruction, many students struggled with the loss of in-person interactions and the increased workload, leading to feelings of being overwhelmed and disconnected. Without the structure and support of traditional classroom settings, it was particularly difficult for students to maintain motivation, which further exacerbated the negative impact on their mental well-being.

The mental health challenges facing adolescents in the post-COVID era are multifaceted, reflecting the complex interplay between psychosocial and environmental factors. The observed increase in anxiety, depression, and post-traumatic stress disorder among this population underscores the need for comprehensive mental health services tailored to their specific needs. Social isolation experienced during the pandemic disrupted key developmental milestones, leading to a loss of self-esteem and impaired interpersonal skills. Additionally, excessive screen time further exacerbated sleep disturbances, anxiety, and addictive behaviors. Addressing these issues requires integrative solutions that raise awareness about mental health, facilitate healthy social interactions, and promote responsible digital media use. Sustained efforts in these areas can help minimize the long-term effects of the pandemic on adolescent mental health and foster resilience.



## **SOCIAL AND DEVELOPMENTAL ISSUES**

The COVID-19 pandemic has highlighted and exacerbated a range of social and developmental challenges facing adolescents, disrupting educational pathways and slowing social development, while also exacerbating economic disparities.

### **Educational Interruptions**

Prolonged school closures and the shift to exclusively remote learning during the pandemic had significant adverse effects on students' education. Studies have estimated that the disruptions resulted in an overall reduction in academic achievement equivalent to over one additional year of learning, particularly in under-resourced areas. The lack of in-person, interactive learning experiences hindered the development of essential skills and higher-order cognitive abilities in children and adolescents.

The disparity in access to technology further exacerbated the educational achievement gap. Underprivileged adolescents lacked the financial means to participate in online classes that necessitated constant internet connectivity and digital devices, thereby creating unequal educational opportunities [22]. These challenges not only impact immediate academic performance but also pose long-term risks to higher education and career prospects, particularly for adolescents from disadvantaged communities.

### **Delayed Social Development**

The COVID-19 pandemic hindered the crucial socio-emotional development that typically occurs during adolescence. With reduced peer interaction during this critical stage, adolescents experienced declines in key social-emotional skills, including friendship formation, empathy, and resilience. Many young people reported heightened feelings of loneliness and difficulty navigating social challenges, as schools and community spaces were forced to close their doors. Research has shown long-term impairments in adolescents' emotional regulation and interpersonal competencies due to social isolation during this developmental period. Adolescents who experienced delays in reaching social milestones, such as participating in group activities and milestone celebrations, exhibited less confidence in social settings and increased social anxiety. These significant delays underscore the necessity for immediate social

reintegration of such adolescents to mitigate the cascading effects on their overall developmental trajectory.

### **Economic Inequities and Health Outcomes**

The COVID-19 pandemic disproportionately impacted adolescents from economically disadvantaged backgrounds. Stark disparities were observed in healthcare access and health outcomes for this vulnerable population [23]. Adolescents from low-income families experienced heightened risks, including nutritional deficiencies, inadequate mental health support, and additional stressors stemming from parental job loss or housing insecurity.

## **DISCUSSION**

Developing comprehensive strategies that engage policymakers, educational institutions, families, and international partners is crucial for promoting the recovery of adolescent health in the post-COVID era. These robust interventions should aim to address the persistent physical, mental, and social challenges confronting this population.

### **Policy Recommendations**

Governments and health organizations must implement comprehensive interventions to support adolescent health in the post-COVID era. These should encompass expanding access to mental health services, physical rehabilitation programs, and nutritional assistance initiatives [24]. It is also crucial to strengthen telehealth platforms, ensuring they cater to the specific needs of adolescents in underserved regions. This can be achieved by integrating youth-focused recovery modules into national public health plans, which would sustain the recovery process and build resilience. Additionally, the government should allocate dedicated funding to make these initiatives accessible and effective. Increasing the availability of resources and outreach programs will enable timely and relevant care for the adolescent population.

## **Role of Schools and Families**

Schools play a crucial role in the recovery process, as they provide health education and counseling within the curriculum. Promoting physical activities like after-school sports or yoga sessions can help mitigate the sedentary lifestyle effects caused by lockdowns [25]. Families are equally instrumental in fostering a nurturing environment. Open communication, the encouragement of healthy habits, and limitations on screen time are key strategies to support adolescents' mental and physical well-being. Furthermore, the facilitation of family-centered activities and stress-reduction behaviors at home can greatly contribute to holistic recovery. Active participation of families, both emotionally and physically, with a focus on adolescents' life balance and personal care, is essential.

## **Global and Local Initiatives**

International organizations have launched numerous adolescent health recovery programs. For example, UNICEF's "Healthy Minds, Healthy Futures" initiative has successfully expanded access to psychological support in low-income nations. At the community level, peer mentoring and recreational programs have demonstrated promising outcomes in enhancing the social skills and confidence of adolescents. Collaborative efforts between global and local stakeholders can help develop comprehensive strategies that address the diverse cultural and socioeconomic needs of this population. Furthermore, encouraging public-private partnerships would broaden the scope and depth of these initiatives, ensuring their effectiveness and widespread reach across various regions and communities.

## **CONCLUSIONS**

The COVID-19 pandemic has had a profound and lasting impact on the health of adolescents across physical, mental, and social domains. Physically, key concerns include long-term COVID-19 symptoms such as fatigue and respiratory complications, as well as disruptions in lifestyle factors leading to issues like obesity and musculoskeletal problems. On the mental health front, the pandemic has led to a rise in anxiety, depression, and post-traumatic stress among this population. Furthermore, the emotional well-being of adolescents has been significantly affected by social isolation and excessive screen time, with potentially long-lasting consequences. Socially, the disruption of schooling, delays in social development, and

widening economic disparities have exacerbated the divergence between different groups of adolescents. These interconnected issues and their long-term implications underscore the need for immediate and comprehensive interventions to support the health and resilience of this vulnerable population.

Comprehensive and coordinated interventions are essential to ensure the well-being of adolescents in the post-COVID era. Policymakers must implement targeted health programs that integrate mental and physical health support, address educational disparities, and bridge socioeconomic gaps. Schools and families should actively participate in cultivating supportive environments, while global and local stakeholders collaborate to develop tailored recovery strategies for diverse adolescent populations. By addressing these challenges holistically, society can mitigate the pandemic's negative impact and foster resilience among adolescents, enabling them to thrive in the post-pandemic landscape.

## **DISCLOSURE**

### **Authors contribution:**

Conceptualization: Alicja Grzelak

Methodology: Alicja Grzelak

Software: Sara Langner

Check: Sara Langner

Formal Analysis: Sara Langner

Investigation: Alicja Grzelak

Resources: Alicja Grzelak

Data Curation: Sara Langner

Writing-Rough Preparation: Alicja Grzelak

Writing-Review and Editing: Sara Langner

Visualization: Sara Langner

Supervision: Alicja Grzelak

Project Administration: Alicja Grzelak

All authors have read and agreed with the published version of the manuscript.

Funding Statement: The Study Did Not Receive Special Funding.

Institutional Review Board Statement: Not Applicable.

Informed Consent Statement: Not Applicable.

Data Availability Statement: Not Applicable.

Conflict Of Interest: All authors declare no conflict of interest.

## REFERENCES

- [1] J. M. D. de Oliveira et al., “Mental health effects prevalence in children and adolescents during the COVID-19 pandemic: A systematic review,” Mar. 01, 2022, Wiley. doi: 10.1111/wvn.12566.
- [2] R. Loewenson et al., “Equitable recovery from COVID-19: bring global commitments to community level,” Jan. 01, 2021, BMJ. doi: 10.1136/bmjgh-2020-004757.
- [3] R. Shidhaye, “Global priorities for improving access to mental health services for adolescents in the post-pandemic world,” Jul. 13, 2023, Elsevier BV. doi: 10.1016/j.copsyc.2023.101661.
- [4] H. Samji et al., “Review: Mental health impacts of the COVID-19 pandemic on children and youth – a systematic review,” Aug. 28, 2021, Wiley. doi: 10.1111/camh.12501.
- [5] E. Power, S. Hughes, D. Cotter, and M. Cannon, “Youth mental health in the time of COVID-19,” Jul. 02, 2020, Cambridge University Press. doi: 10.1017/ipm.2020.84.
- [6] E. R. Garagiola et al., “Adolescent Resilience during the COVID-19 Pandemic: A Review of the Impact of the Pandemic on Developmental Milestones,” Jul. 01, 2022, Multidisciplinary Digital Publishing Institute. doi: 10.3390/bs12070220.
- [7] V. Fainardi et al., “Long COVID in Children and Adolescents,” Feb. 14, 2022, Multidisciplinary Digital Publishing Institute. doi: 10.3390/life12020285.
- [8] B. Zhang et al., “Post-Acute Cardiovascular Outcomes of COVID-19 in Children and Adolescents: An EHR Cohort Study from the RECOVER Project,” May 15, 2024, Cold Spring Harbor Laboratory. doi: 10.1101/2024.05.14.24307380.
- [9] J. D. Palacio-Ortíz, J. P. Londoño-Herrera, A. Nanclares-Márquez, P. Robledo-Rengifo, and C. P. Quintero-Cadavid, “Psychiatric disorders in children and adolescents during the COVID-19 pandemic,” Oct. 01, 2020, Elsevier BV. doi: 10.1016/j.rcpeng.2020.11.003.
- [10] L. da Costa et al., “Sedentary behavior is associated with musculoskeletal pain in adolescents: A cross sectional study,” Sep. 01, 2022, Elsevier BV. doi: 10.1016/j.bjpt.2022.100452.
- [11] N. Tumas and S. R. López, “Double burden of underweight and obesity: insights from new global evidence,” Feb. 29, 2024, Elsevier BV. doi: 10.1016/s0140-6736(24)00051-5.
- [12] X. Chi et al., “Mental health problems among Chinese adolescents during the COVID-19: The importance of nutrition and physical activity,” Dec. 24, 2020, Elsevier BV. doi: 10.1016/j.ijchp.2020.100218.
- [13] M. Graell et al., “Children and adolescents with eating disorders during COVID-19 confinement: Difficulties and future challenges,” Jul. 29, 2020, Wiley. doi: 10.1002/erv.2763.

- [14] M. J. Babic, J. Smith, P. J. Morgan, N. Eather, R. C. Plotnikoff, and D. R. Lubans, “Longitudinal associations between changes in screen-time and mental health outcomes in adolescents,” Mar. 01, 2017, Elsevier BV. doi: 10.1016/j.mhpa.2017.04.001.
- [15] B. Marroquín, V. Vine, and R. M. Morgan, “Mental health during the COVID-19 pandemic: Effects of stay-at-home policies, social distancing behavior, and social resources,” Aug. 20, 2020, Elsevier BV. doi: 10.1016/j.psychres.2020.113419.
- [16] G. D. Martino et al., “Post-Traumatic Stress Disorder 4 Years after the COVID-19 Pandemic in Adolescents with Different Levels of Physical Activity Engagement: A Repeated Cross-Sectional Study,” Jul. 26, 2024, Multidisciplinary Digital Publishing Institute. doi: 10.3390/ijerph21080975.
- [17] N. Chadi, C. S.-D. Piano, E. Osmanlliu, J. Gravel, and O. Drouin, “Mental Health–Related Emergency Department Visits in Adolescents Before and During the COVID-19 Pandemic: A Multicentric Retrospective Study,” Aug. 05, 2021, Elsevier BV. doi: 10.1016/j.jadohealth.2021.07.036.
- [18] I. L. de L. Almeida, J. F. Rego, A. C. G. Teixeira, and M. R. Moreira, “Social isolation and its impact on child and adolescent development: a systematic review,” Oct. 04, 2021, Elsevier BV. doi: 10.1590/1984-0462/2022/40/2020385.
- [19] F. L. Santiago et al., “Association between screen time exposure, anxiety, and sleep quality in adolescents,” Jun. 09, 2022, Ramon de la Fuente National Institute of Psychiatry. doi: 10.17711/sm.0185-3325.2022.017.
- [20] Y. W. Mak et al., “Association between Screen Viewing Duration and Sleep Duration, Sleep Quality, and Excessive Daytime Sleepiness among Adolescents in Hong Kong,” Oct. 28, 2014, Multidisciplinary Digital Publishing Institute. doi: 10.3390/ijerph11111201.
- [21] C. E. Sagrera et al., “Social media use and body image issues among adolescents in a vulnerable Louisiana community,” Nov. 03, 2022, Frontiers Media. doi: 10.3389/fpsy.2022.1001336.
- [22] E. Treviño, C. Miranda, M. Hernández, and C. Villalobos, “Socioeconomic Status, Parental Involvement and Implications for Subjective Well-Being During the Global Pandemic of Covid-19,” Nov. 02, 2021, Frontiers Media. doi: 10.3389/feduc.2021.762780.
- [23] K. Rathmann et al., “Adolescents’ psychological health during the economic recession: does public spending buffer health inequalities among young people?,” Aug. 24, 2016, BioMed Central. doi: 10.1186/s12889-016-3551-6.
- [24] T. O. Afifi, S. Salmon, T. Taillieu, A. Stewart-Tufescu, J. Fortier, and S. M. Driedger, “Older adolescents and young adults willingness to receive the COVID-19 vaccine:

Implications for informing public health strategies,” May 12, 2021, Elsevier BV. doi: 10.1016/j.vaccine.2021.05.026.

[25] N. Desai, S. Holliday, and D. Braun-Courville, “Addressing Post-Pandemic Adolescent Health in Schools,” Jun. 08, 2024, Elsevier BV. doi: 10.1016/j.pcl.2024.05.001.