The Impact of Technology on Italian Students During the COVID-19 Pandemic: Learning, Emotions, Behaviour and Support

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Abstract: The COVID-19 pandemic has profoundly affected our lives in almost every area, including school. Students have experienced a transformation in their learning environments with the widespread shift, almost always from face-to-face to online lessons, that has impacted their academic performance and feelings of isolation. This paper examines the impact of technology on the learning, social, and human aspects of Italian students during the COVID-19 pandemic, which accelerated their immersion in the digital world. To this aim, the paper analyses the positive and negative aspects of technology usage during the pandemic on students' lives, specifically on academic performance, emotional well-being, behaviours, and the support they received during this period. Data from 152 Italian students aged 18 and above were collected to understand how technology helped them cope with school activities, isolation, and psychological well-being. Students appreciated the convenience and accessibility of digital lessons and materials, but they also faced challenges such as concentration difficulties, reduced social contact, and accessibility issues. The results confirm but also expand previous research findings. Statistical analysis highlights that higher levels of support are associated with better academic performance, and better Internet connectivity is linked to higher students' autonomy.

1 INTRODUCTION

The COVID-19 pandemic has had a significant impact on school life worldwide, with 90% of students affected by its restrictions (Gore et al., 2021). Schools were suddenly closed and replaced by distance learning, revealing both benefits and limitations (Nguyen et al., 2020). This shift from face-to-face to online lessons significantly impacted student academic performance, affecting enrolment, withdrawal, and failure rates (Dekhane et al. 2024). Students appreciated the possibility of not traveling to school and being able to access educational content anywhere and anytime. However, discomfort, accessibility problems, difficulty concentrating, and other issues also emerged (Pfefferbaum & North, 2020; Sitarz et al., 2021). This study investigates the role of technology in supporting Italian students aged 18 and above during the COVID-19 pandemic, with special attention to scholastic performance, emotions,

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behaviour, and support received. Data from 152 students in Italy were collected via an online survey. The paper is organized into six sections: Introduction (Section 1), Related Work (Section 2), Study Description (Section 3), Results (Section 4), Main Findings (Section 5), and Conclusions (Section 6).

2 RELATED WORK

Since the rapid spread of COVID-19 in 2020, governments worldwide have adopted restrictive measures to stop virus transmission. Educational institutions were suddenly closed, with nearly all activities shifted online. In recent years, many studies have investigated the impact of COVID-19 isolation on students, highlighting negative effects on both physical and mental health (Dragun et al., 2021; Forte et al., 2021; Takács et al., 2023).

Several works have also reported findings about the use of technology during the COVID-19 pandemic. A 2024 study from South Korea investigated student learning preferences and satisfaction. Responses from 302 Korean students suggest that students who took offline classes had significantly higher learning satisfaction than those who took online classes (Han et al., 2024). A qualitative study in Vietnam analysed students' perceptions towards hybrid learning implementation during the pandemic on a sample of 250 students. Results revealed that students were well-prepared with technology, and their perceived benefits included flexibility, effectiveness, student engagement, convenience, and personalization, while negative aspects were technical issues and distant interaction (Thi et al., 2023). A study in the United Arab Emirates to identify the most significant pedagogical, psychological, and technological factors that impacted on students' online learning experience amid COVID-19, concluded that there is a positive relationship between the instructors' teaching style and use of technology, and the students' perception of successful online delivery (Ahmed et al., 2023).

Beyond positive aspects, there are also concerns about the use of technology during the pandemic. Donnelly & Winkelmann (2024) affirmed that the sudden transition to remote learning during the COVID-19 pandemic resulted in a significant increase in reliance on instructional technology. Neethipudi & Fann (2024) confirmed that distancing due to the COVID-19 pandemic has caused adolescents to increase their dependency on technology. Findings from a study on Dutch students' satisfaction with online classes during the COVID-19 pandemic suggested that students who perceive themselves as having higher technological skills are more likely to reject online education, as they see significant shortcomings in how classes are administered compared to the potential for real innovation (Matczak et al., 2023). Moreover, the shift to a highly interactive digital environment may have contributed to social isolation, digital educational inequality, and tensions around the commercialization of higher education (Zhen, 2025).

Digital educational inequality has also impacted students with disabilities. A recent study analysed the difficulties of using information and communication technology (ICT) for 122 students with disabilities and 314 students without disabilities. Results showed that students with disabilities were more positive about using ICT and showed significantly higher levels of resistance. However, a comparison of the amount of change in perceptions before and after the course revealed that students with disabilities showed significantly more improvement in negative items before the course (Kishira & Sasaki, 2024).

Our study aimed to analyse how technology impacted and supported students during the lockdown in Italy, focusing on Distance Learning and Scholastic Performance, Emotions, Behaviour, and Support Received. Focusing on the technology impact allowed us to widen previous studies with a perspective not already addressed. Moreover, our study includes many high school students (over 50% of the sample), while most studies focus on children or college students.

3 THE STUDY

We have performed an exploratory study through an online web survey, created with LimeSurvey, completely anonymous and composed of five sections: General Data, Technology and Distance Learning, Emotions, Behaviour, and Support Received.

The questionnaire content and the study were authorized by the Research Ethics and Integrity Committee of CNR, the largest public Italian research organization (authorization n. 23078/2022). Data processing complies with current regulations, such as the General Data Protection Regulation (GDPR). No personal data of participants has been collected, and they explicitly provided consent to participate. The questionnaire usability and content were validated by piloting them with some teachers not involved in its design process, and then with two students, one male and one female (aged 18 and 20, respectively). The

questionnaire was distributed over two months, utilizing social media and school mailing lists. The time for its completion is around 10-15 minutes.

3.1 The Sample

A total of 152 participants completed the online questionnaire. The sample was balanced with 79 females (52%), 71 males (46.7%), and 2 students who preferred not to specify their gender (1.3%). Participants' ages are shown in Tab. 1. The majority of participants in the sample were high school students (85 users, 55.92%), followed by university (or higher education) students (63 users, 41.45%) and 4 Professional training course students (2.63%).

Table 1: Sample ages.

Sample	#	%
18	56	36.8
19	32	21.1
20	25	16.4
21	13	8.6
22	15	9.9
23	4	2.6
24	1	0.7
>= 25 years	6	3.9
Total	152	100

A last question investigates the degree of autonomy when performing different activities: School and study, Sport activities, Recreational activities/free time, and Commuting (school-home, home-gym, etc.). Most participants (> 86% for all areas) affirmed they are autonomous. It therefore seems that the sample does not include (or in a minimal percentage) students with autonomy problems.

3.2 Statistical Analysis

A descriptive analysis was conducted to evaluate the answers provided to each questionnaire dimension. Furthermore, a structural equation model (SEM) was generated to explore the interrelationships among key variables assessed through the questionnaire. Confirmatory factor analysis (CFA) was used to test an overall measurement model that included correlated latent variables. The CFA process determines whether the hypothesized structure provides a good fit to the data or whether a relationship between the observed variables and their underlying latent, or unobserved, constructs exists. High coefficient values mean that the observed variable contributes or weighs a lot in the construction of the latent variable. Overall model fit was assessed using different statistics. First, aχ2 analysis was used. Other indices were the root mean square error of approximation (RMSEA: values between 0.05 and 0.10 indicate an acceptable fit, and values < 0.05 indicate a good fit) and standardized root mean square residual (SRMR: values < 0.10 indicate a good fit). Comparative Fit Index (CFI) and Tucker - Lewis Index (TLI) were also calculated (values > 0.90 indicate a good fit). The level of significance was set at $P < .05$. All statistical analyses were performed using Stata/SE 13.1 and SPSS Version 24. Categorical variables are expressed as percentages, while continuous variables are expressed as the means and standard deviations (SDs).

4 RESULTS

4.1 Descriptive Analysis

This section presents a summary of the answers provided to each questionnaire dimension.

Distance Learning and Scholastic Performance. During the COVID-19 lockdown, almost all students had at least one device for distance learning (DL): only 1 student (0.7%) did not have any device. Mostly used devices were computers (95.4%) and mobile phones (93.4%), followed by tablets (37.5%). Technological devices were used for studying (75%), Socialization (67.1%), and Physical activity (32.9%). The Internet connection used for DL allows the students to follow the lessons well in most cases (92.7%). Most participants confirmed they had a quiet place to take DL classes (81.6%). Video conferencing tools were considered adequate by most students (60%), but more than 10% of participants found them poor. Before the COVID-19 pandemic, most participants had sufficient academic results (98%). The pandemic had a balanced effect on academic performance that remained on average unchanged: 41.45% of students maintained their academic performance during DL, 28.95% adapted well and even improved, while 29.6% have worsened their performance.

The preference between in-person lessons and DL was slightly in favour of in-person lessons. Most penalized lessons by DL were Physical Education (80.3%), Science/Chemistry/Physics Laboratories (52%), and Technical-Scientific subjects (40.8%). Preferences regarding DL (multiple answers were allowed) reported that most students would like to have the lessons recorded so they can then review the material (81.6%) and to have both remote and in-

person learning (80.3%). Few participants (3.3%) prefer to only use distance learning.

Emotions
Most participants confirmed some changes (>90%) in their lives as a result of the pandemic. Family relationships at home during the COVID-19 lockdowns were better for 31.6%, and worse for 23.7% participants. A set of questions was aimed at understanding whether the students had experienced emotional changes during the lockdown periods.
Results indicated that the pandemic had a significant negative impact, with increases in: feeling of safety (67.8%), quantity of fears (73.7%), tiredness and listlessness (66.4%), nervousness (54.6%), and loneliness (68.4%).

Behaviour
The pandemic had a balanced impact on participants' physical activity levels that remained, on average, unchanged. Conversely, it had a stronger effect on average hours spent in front of a screen for leisure activities, which increased for more than 85% of participants. Almost all participants engaged in time outside (98%) in their free time before the pandemic, especially for sport, practiced by 63.2% of students, but during the pandemic, many participants were unable to find a way to continue their previous outdoor activities (40.8%). The remaining ones found a way, possibly by shifting to online mode, to practice the activities totally (13.8%), partially (19.1%), or only for some of them (26.3%). Further questions investigated whether the students had experienced changes in some behaviours during the lockdown periods. Results indicated that the pandemic had a significant impact on:

- Going out decreased for 77.6% users
- Desire to socialize decreased for 40.8% users
- Relationships decreased for 40.8% users
- Eating increased for 30.3% participants
- Crying increased for 48.7% participants.

Support Received
The first question was on who provided support (multiple answers were allowed). As expected, family (67.1%) and friends (65.8%) were the most frequently chosen options. Interestingly, about a third of the sample (34.9%) reported that they kept themselves active with sports and other recreational activities to receive support. The last question asked whether students had started during the lockdown new recreational activities that they had not done before. Most users (94.6%) did not start any.

4.2 Model-Driven Analysis

Model-driven analysis aims at investigating whether the support received during COVID-19 and personal autonomy were related to other aspects, such as Internet connection and academic performance. The standardized paths of two latent variables and their respective observed variables are specified in Figure 1. Rectangles represent observed variables while ellipses represent latent variables. The structural model fit indices indicated that the proposed model fit the data (RMSEA = 0.079; SRMR = 0.089; CFI = 0.903; TLI = 0.912). The significant and positively related standardized paths ($P < .05$) were between the “Support received” latent variables and “Academic performance” observed variables ($\beta = 0.271$, $P < 0.001$). The use of Tablet ($\beta = 0.693$) and Smartphone ($\beta = 0.690$) represents the most important observed variables related to the “Support received” latent variable. A negative relationship was observed between the “Autonomy” latent variables and “Academic performance” observed variables ($\beta = -0.176$, $P < 0.047$). Autonomy, on the other hand, was positively correlated with Internet connection ($\beta = 0.189$, $P < 0.031$). Regarding the “Autonomy” latent variable, the most important observed variables were Sport activities ($\beta = 0.817$) and Recreational activities ($\beta = 0.768$). However, no significant relationships were found between “Autonomy” and “Support received” ($\beta = -0.067$, $P < 0.501$), or between “Internet connection” and “Academic performance”($\beta = -0.024$, $P < 0.760$). Key Relationships indicate: a) a positive relationship between "Support received" and "Academic performance" ($\beta = 0.271$, $P < 0.001$), thus higher levels of support are associated with better academic performance. Tablets ($\beta = 0.693$) and smartphones ($\beta = 0.690$) are the most influential observed variables within the "Support received" latent variable; b) a negative relationship between "Autonomy" and "Academic performance" ($\beta = -0.176$, $P < 0.047$). This indicates that higher autonomy might be associated with lower academic performance; c) “Autonomy" is positively correlated with "Internet connection" ($\beta = 0.189$, $P < 0.031$), suggesting that better Internet connectivity is linked to higher autonomy. Sport activities ($\beta = 0.817$) and recreational activities ($\beta = 0.768$) are the most important observed variables within the "Autonomy" latent variable; d) no significant relationship was found between "Autonomy" and "Support received" ($\beta = -0.067$, $P < 0.501$). Similarly, no significant relationship was observed between "Internet connection" and "Academic performance" ($\beta = -0.024$, $P < 0.760$).

5 DISCUSSION

Our study aimed to analyse how technology impacted and supported students during the lockdown in Italy, focusing on Distance Learning, Scholastic Performance, Emotions, Behaviour, and Support Received. Including technology features allowed us to take a perspective that previous studies had not addressed. Moreover, our study includes many high school students (over 50% of the sample), while most studies focus on children or college students. The literature acknowledges that COVID-19 restrictions negatively impacted students' mental health and fostered unhealthy management of individual time and space (Millán-Jiménez et al., 2021; Morganti et al., 2022; Riboldi et al., 2023). Results from our study confirm previous findings on significant consequences of lockdown on students' mental and physical health, but also add some insights. More details regarding the four topics investigated are presented in the following sections.

5.1 Distance Learning and Scholastic Performance

Literature confirmed several issues due to pandemic restrictions on students' academic performance: lack of a quiet place to study, distractions, inadequate access to course materials, insufficient digital skills, and poor network bandwidth with unstable Internet connections (Carlana et al., 2023; Contini et al., 2025; Dekhane et al., 2024; Moulin & Soncin, 2025). Considering the average, our sample reported balanced changes in scholastic performance both positively and negatively, with 28.9% users who performed better and 29.6% who performed worse. However, the sample academic performances were quite good before the COVID-19 pandemic (76.3% users with excellent or good performance levels), and this could have affected the results. Although most participants evaluated positively the use of distance learning (as in previous studies: Ahmed et al., 2023; Thi et al., 2023), they slightly prefer in-person lessons over DL, as confirmed by the literature (Csorba & Dabija, 2024; Pfefferbaum & North, 2020; Sitarz et al., 2021). These results reflect the diversity of user needs: some students are more comfortable with video conferences (e.g., emotive people, people with difficulties in social skills, or who do not suffer from isolation), while others are not (e.g., people with attention deficits, people missing contact with peers). Literature indeed confirms that students with special needs often struggle to interact adequately when using distance learning (Zhen, 2025) and video conference tools (Kishira & Sasaki, 2024; Leporini et al., 2023; Matczak et al., 2023).

In this context (Distance learning), the use of technology has been fundamental to allow students to continue their school career as well as interact with teachers and classmates.

5.2 Emotions

Most participants (90.8%) declared their lives had changed due to the pandemic, and more than two-thirds reported feeling less safe. In addition, during lockdowns, fear (73.7%), feelings of tiredness and listlessness (66.4%), nervousness (54.6%), and loneliness (68.4%) affected most participants. These findings align with literature (de Figueiredo et al., 2021; Millán-Jiménez et al., 2021; Morganti et al., 2022). Students experienced both positive and negative emotions during COVID-19, with negative emotions being significantly related to internalizing problems (Sun & Fredrick, 2024).

In this context (Emotions), the use of technology supported the maintenance of social contacts and any requests for emotional support.

5.3 Behaviours

According to literature (Magklara & Kyriakopoulos, 2023; Okuyama et al., 2021), data on physical activity revealed changes: 34.8% of the sample increased their level of physical activity, and 40.2% became less active. Similarly, time spent in front of a screen for leisure activities increased for most users (>85%). Previous findings confirmed that time spent using electronic devices had the highest increase (Gallè et al., 2020) and increased adolescents' dependency on technology (Neethipudi & Fann, 2024). Before COVID-19, very few participants (2%) did not spend time outdoors during their free time. Collected data indicates that the pandemic significantly impacted users' recreational activities, with many students (40.8%) unable to practice their activities at all. Data also highlights an impact on participants' desire to go out (77.6% less than before), to socialize (decreased for almost 41% of the sample), and to cry (increased for 48.78% of students). These results are in line with previous studies (Forte et al., 2021; Magson et al., 2020; Takács et al., 2023). For most participants (62.5%), eating habits remained unchanged during the pandemic. However, among those who experienced changes, an increase in food consumption was more common (34.3%). These results are consistent with previous findings (de Figueiredo et al., 2021; Parker et al., 2023).

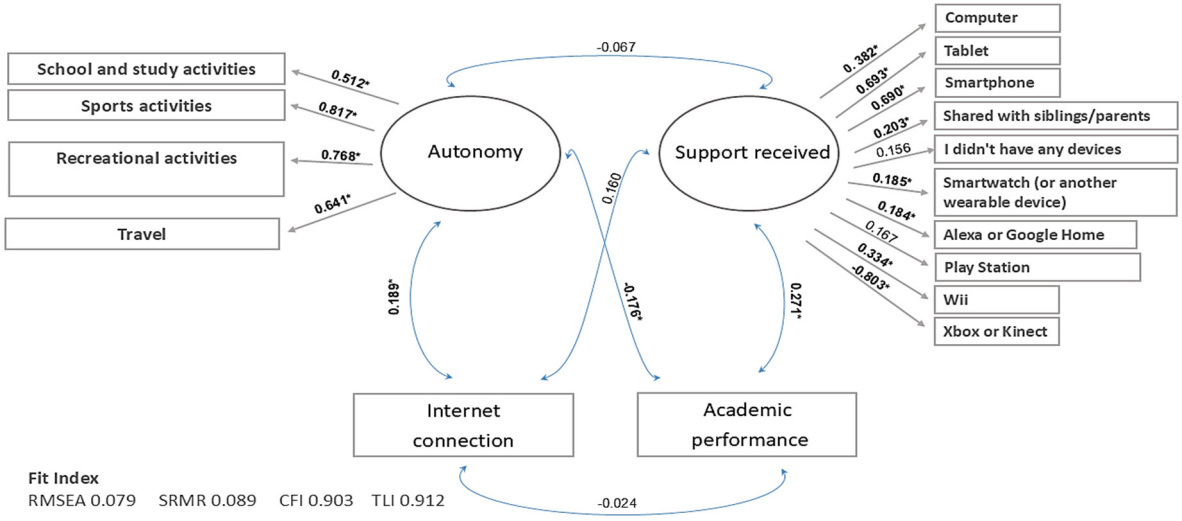

Figure 1: The structural equation (SEM), comparative fit index; root mean square error of approximation; SRMAR, standardized root mean square residual; TLI, Tucker-Lewis Index. *P<.05: significant correlation between variables.

In the Behaviours context, the use of technology has been important to allow people to continue some type of physical activity even while staying at home, for entertainment and leisure activities, as well as to satisfy the desire to socialize.

5.4 Support Received

Support was mainly provided by family, friends, and romantic partners. A third of the sample (33.6%) empowered themselves with sports or recreational activities. Teachers supported 20.4% of participants: considering school as the main institution for students, this agrees with Davoody et al. (2025), for whom institutions have a crucial role to assist students in overcoming challenges. Psychotherapists provided support to a few students (3.3%), while 14.5% participants did not receive any support at all.

In this context, intuitively, the use of technology played a key role during the pandemic, allowing students to maintain (or establish new) social relationships, to continue their activities, and to receive emotional and psychological support. However, in order to understand if technology has had a specific impact on participants, we have further analysed correlation data. The statistical analysis revealed significantly positively related standardized paths ($P < .05$) between the “Support received” latent variables and “Academic performance” observed variables ($\beta = 0.271$, $P < 0.001$). The use of Tablet ($\beta = 0.693$) and Smartphone ($\beta = 0.690$) represents the most important observed variables related to the “Support received” latent variable. The positive impact of support on academic performance underscores the importance of providing adequate resources and assistance. On the other hand, the negative relationship between autonomy and academic performance might suggest that while independence is valuable, it needs to be balanced with guidance and support for optimizing academic outcomes. This could also be a reason for the negative relationship between "Autonomy" and "Academic performance," indicating that higher autonomy might be associated with lower academic performance: students with higher values of autonomy and less supervision may have been overwhelmed by the pandemic situation and turned too much to social and leisure activities instead of studying.

5.5 Study Limitations

The sample size (#152) is limited, but the insights gained can be valuable for guiding future, more comprehensive studies. Furthermore, the distribution of scholastic performance in the sample is not balanced: only 2% of participants had low academic performance before COVID-19, which thus affects the results. With this narrow representation, it is not possible to understand if the pandemic restrictions accounted differently for low, medium, and high academic performance students. Different findings could be obtained by including in the sample social and cultural conditions not considered in our study.

6 CONCLUSIONS

This study provides insights into how students coped

with the challenges of the COVID-19 lockdown and investigated how technology influenced students' lives during the restrictions, particularly in terms of scholastic performance, emotions, behaviour, and support received.

Technology and Internet connection can be important to sustain people during critical periods, helping them cope with restrictions and providing a comfortable way for maintaining a social life and alleviate discomfort. The sample students (and people in general) during the pandemic exploited technology to continue their school activities, stay connected with peers and relatives, receive and provide support, and more generally continue their lives and cope with the isolation. The statistical analysis showed that better Internet connectivity is linked to higher autonomy. The collected data highlights students' resilience and the importance of social connections and personal interests in supporting mental health during restricted times. Family and friends were crucial for emotional support during the lockdown, but technology also had an important role. The pandemic indeed led to a notable increase in online leisure activities for most participants, likely due to restrictions on outdoor activities and in-person social interactions. Results also confirmed previous findings on time spent using electronic devices, which greatly increased during the pandemic.

Our findings provide a foundation for understanding the impact of technology and support systems on students during challenging times, and highlight areas that may benefit from further investigation, such as whether increased screen time might affect students' academic performance or social skills in the long term.

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REFERENCES

Ahmed, V., Alzaatreh, A. & Saboor, S. (2023). Students' Perceptions of Online Teaching in Higher Education Amid COVID-19. *Journal Sci Educ Technol* 32, 629–642 https://doi.org/10.1007/s10956-023-10069-6

Carlana, M., La Ferrara, E. & Lopez, C. (2023). Exacerbated Inequalities: The Learning Loss from COVID-19 in Italy. In *AEA Papers and Proceedings, 113*, pp. 489–93. www.aeaweb.org/articles?id=10.1257/pandp.20231010

Contini, D., Della Giusta, M., Di Tommaso, M. L. & Piazzalunga D. (2025). The COVID-19 pandemic: learning loss and educational inequalities in Italy. In *Economics* 2025, pp. 296–309, https://doi.org/10.4337/9781035302765.00026

Csorba, L. M. & Dabija, D. C. (2024). The impact of the COVID-19 pandemic on students' future online education behaviour. In *Heliyon*, Vol. 10, Issue 20, 2024, https://doi.org/10.1016/j.heliyon.2024.e39560

Davoody, N., Stathakarou, N., Swain, C. & Bonacina, S. (2025). Exploring the Impact of the COVID-19 Pandemic on Learning Experience, Mental Health, Adaptability, and Resilience Among Health Informatics Master's Students: Focus Group Study. In *JMIR Medical Education*, Vol. 11, 2025, https://doi.org/10.2196/63708

de Figueiredo, C.S., Sandre P.C., Portugal L.C.L., Mázala-de-Oliveira T., da Silva Chagas L., Raony Í., Ferreira E.S., Giestal-de-Araujo E., Dos Santos A.A. & Bomfim P.O. (2021). Covid-19 pandemic impact on children and adolescents' mental health: Biological, environmental, and social factors. In *Prog Neuropsychoph. Biol Psychiatry*. Mar 2;106:110171. https://pubmed.ncbi.nlm.nih.gov/33186638/

Dekhane, S., Park, H., Jonassen, L. & Jin., W. (2024). Virtual Peer Mentoring to Develop a Sense of Belonging During Covid-19 - A Pilot Study. In *ACM SIGCSE 2024.* ACM, New York, NY, USA, 283–288 https://doi.org/10.1145/3626252.3630962

Donnelly, J. & Winkelmann, K. (2024). STEM Students' Sensemaking of Instructional Technology After the COVID-19 Pandemic. In *J Sci Educ Technol* https://link.springer.com/article/10.1007/s10956-024-10181-1

Dragun, R., Veček, N.N., Marendić, M., Pribisalić, A., Đivić, G., Cena, H., Polašek, O. & Kolčić, I. (2021). Have Lifestyle Habits and Psychological Well-Being Changed among Adolescents and Medical Students Due to Covid-19 Lockdown in Croatia? In *Nutrients* 2021, 13, 97. https://doi.org/10.3390/nu13010097

Forte A, Orri M, Brandizzi M, Iannaco C, Venturini P, Liberato D, Battaglia C, Nöthen-Garunja I, Vulcan M, Brusìc A, Quadrana L, Cox O, Fabbri S, Monducci E. "My Life during the Lockdown": Emotional Experiences of European Adolescents during the COVID-19 Crisis. In *Int J Environ Res Public Health*. 2021 Jul 18;18(14):7638. https://pmc.ncbi.nlm.nih.gov/articles/PMC8303213/

Gallè, F., Sabella, E. A., Ferracuti, S., De Giglio, O., Caggiano, G., Protano, C., Valeriani, F., Parisi, E. A., Valerio, G., Liguori, G., Montagna, M. T., Romano Spica, V., Da Molin, G., Orsi, G. B., & Napoli, C. (2020). Sedentary Behaviors and Physical Activity of Italian Undergraduate Students during Lockdown at the Time of CoViD-19 Pandemic. In *Int. J of environmental research and public health*, 17(17), 6171. https://doi.org/10.3390/ijerph17176171

Gore, J., Fray, L., Miller, A., Harris, J. & Taggart, W. (2021). The impact of Covid-19 on student learning in New South Wales primary schools: An empirical study.

In *Aust. Educ. Res*., 48, 605–637 https://doi.org/10.1007/s13384-021-00436-w

Han, J., Ryu, C. E. & Nadarajan, G. (2024). Exploring Factors Affecting Student Learning Satisfaction during Covid-19 in South Korea. *Frontiers of Educational Technologies (ICFET 2024)*. ACM, 8 pages. https://doi.org/10.1145/3678392.3678406

Kishira, H. & Sasaki, G. (2024). Information and communication technology use by students with disabilities in higher education during the COVID-19 pandemic. In Journal UAIS n. 23, 1723–1737 https://link.springer.com/article/10.1007/s10209-023-00997-w

Leporini, B., Buzzi, M., & Hersh, M. (2023). Video conferencing tools: Comparative study of the experiences of screen reader users and the development of more inclusive design guidelines. *ACM Transactions on Accessible Computing*, 16(1), 1-36. https://doi.org/10.1145/3573012

Magklara, K., & Kyriakopoulos, M. (2023). The impact of the COVID-19 pandemic on children and young people. *Psychiatrike = Psychiatriki*, 34(4), 265–268. https://doi.org/10.22365/jpsych.2023.024

Magson, N.R., Freeman, J.Y.A., Rapee, R.M., Richardson, C.E., Oar, E.L. & Fardouly, J. (2020). Risk and Protective Factors for Prospective Changes in Adolescent Mental Health during the Covid-19 Pandemic. *J. Youth Adolesc*. 2020, 50, 44–57. https://pubmed.ncbi.nlm.nih.gov/33108542/

Matczak, A., Akdogan, H. & Ashmore, D. (2023). The paradox of technology in online education during the Covid-19 pandemic: the experiences of safety and security students in a Dutch university. *High Educ* 86, 1269-1292 https://doi.org/10.1007/s10734-022-00971-0

Migliorini, L., De Piccoli, N., Cardinali, P., Rollero, C., Marzana, D., Arcidiacono, C., ... & Di Napoli, I. (2021). Contextual influences on Italian university students during the Covid-19 lockdown: Emotional responses, coping strategies and resilience. Community *Psychology in Global Perspective*, 7(1), 71-87. https://psycnet.apa.org/record/2021-77663-004

Millán-Jiménez, A., Herrera-Limones, R., López-Escamilla, Á., López-Rubio, E., & Torres-García, M. (2021). Confinement, comfort and health: Analysis of the real influence of lockdown on university students during the Covid-19 pandemic. *Int. J of environmental research and public health*, 18(11), 5572. https://doi.org/10.3390/ijerph18115572

Morganti, A., Brambilla, A., Aguglia, A., Amerio, A., Miletto, N., Parodi, N., ... & Capolongo, S. (2022). Effect of housing quality on the mental health of university students during the Covid-19 lockdown. *Int. J of Environmental Research and Public Health*, 19(5), 2918. https://pubmed.ncbi.nlm.nih.gov/35270609/

Moulin, L. & Soncin, M., (2025). Persistent impacts of the COVID-19 pandemic on student outcomes in Italy. *Research in Economics*, Vol. 79, Issue 2, 2025, https://doi.org/10.1016/j.rie.2025.101031

Neethipudi, O.K., & Fann, C.M.S. (2024). Impact of technology during Covid-19 pandemic on adolescents' identity development. *Int. J. of Research* Granthaalayah, 12(1), 131–140 https://doi.org/10.29121/granthaalayah.v12.i1.2024.5484

Nguyen, M. H., Gruber, J., Fuchs, J., Marler, W., Hunsaker, A., & Hargittai, E. (2020). Changes in Digital Communication During the Covid-19 Global Pandemic: Implications for Digital Inequality and Future Research. *Soc Media Soc. 2020* Sep 9;6(3):2056305120948255. https://pubmed.ncbi.nlm.nih.gov/34192039/

Okuyama J., Seto S., Fukuda Y., Funakoshi S., Amae S., Onobe J., Izumi S., Ito K. & Imamura F. (2021). Mental Health and Physical Activity among Children and Adolescents during the COVID-19 Pandemic. *The Tohoku Journal Exp Med*. 2021 Mar; 253(3):203-215. https://doi.org/10.1620/tjem.253.203

Parker, J., Kaur, S., Medalla, J. M., Imbert-Sanchez, A., & Bautista, J. (2023). Dietary trends among young adults during the Covid-19 lockdown: socioeconomic and gender disparities. *BMC nutrition*, 9(1), 107. https://bmcnutr.biomedcentral.com/articles/10.1186/s40795-023-00759-0

Pfefferbaum, B., & North, C. S. (2020). Mental health and the Covid-19 pandemic. New England Journal of Medicine, 383(6), 510-512. https://www.nejm.org/doi/full/10.1056/NEJMp2008017

Riboldi, I., Capogrosso, C. A., Piacenti, S., Calabrese, A., Lucini Paioni, S., Bartoli, F., ... & Taylor, C. (2023). Mental Health and Covid-19 in University students: findings from a qualitative, comparative study in Italy and the UK. *Int. J of environmental research and public health*, 20(5), 4071. https://www.mdpi.com/1660-4601/20/5/4071

Sitarz, R., Forma, A., Karakuła, K., Juchnowicz, D., Baj, J., Bogucki, J., & Karakuła-Juchnowicz, H. (2021). How do polish students manage emotional distress during the Covid-19 lockdown? A web-Based cross-sectional study. *Journal of clinical medicine*, 10(21), 4964. https://pubmed.ncbi.nlm.nih.gov/34768484/

Sun, L., & Fredrick, S. (2024). Youth emotional experiences during Covid-19: Relations with internalizing problems and social support. *Child Indicators Research,* 17(3), 1355-1377. https://doi.org/10.1007/s12187-024-10123-8

Takács J, Katona ZB & Ihász F. (2023) A large sample cross-sectional study on mental health challenges among adolescents and young adults during the Covid-19 pandemic at-risk group for loneliness and hopelessness during the Covid-19 pandemic. *J. of Affective Disorders*, Vol. 325, 770-777, https://doi.org/10.1016/j.jad.2023.01.067

Thi, A., Pham, V. & Pham, C.M. (2023). Students' Perceptions towards Hybrid Learning during the Covid-19 Pandemic. ACM ICDTE '22. 25–30 https://dl.acm.org/doi/10.1145/3568739.3568744

Zhen, F. (2025). The impact of COVID-19 on the achievement of public school students in British Columbia: A multilevel analysis on the results from the province-wide standardized assessment. *Heliyon*, Vol. 11, Issue 4, 2025, https://doi.org/10.1016/j.heliyon.2025.e42851