

Learning Modalities and Mental Health during the COVID-19 Pandemic:

A Literature Review

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Abstract

Purpose: The study's purpose was to explore how students were learning during the COVID-19 pandemic and the potential mental health outcome(s) that different classroom learning modalities may have on kindergarten through 12th grade school (i.e., K-12) students given that some of them were learning remotely or in-person, while others were doing some form of hybrid.

Methods: This study performed an extensive review of the literature, including health and educational sources from two government agencies and three school districts in southwest Virginia. The target population for the literature review was K-12 students in the United States, with a focus on the Commonwealth of Virginia.

Findings: The literature reviewed suggests a possible link between some learning modalities and K-12 students' mental health during the COVID-19 pandemic. These include anxiety, depression, sense of helplessness, isolation, and others.

Conclusion: While virtual instruction was more likely to lead to negative mental or emotional health, the literature implies a possible link between in-person learning and positive mental health for students, which may be attributed to social interaction and receiving mental health services at school. Hybrid learning was the least studied and may be a critical component in addressing the gaps described with virtual and in-person instruction.

Recommendations: More research is needed in Virginia and across the U.S. to foster our understanding of the potential impact of different learning modalities on students' mental health to help gauge best practices with a focus on addressing students' mental health.

Keywords: *mental health, COVID-19, K-12 school, learning modality, hybrid, virtual, in-person*

Background

The COVID-19 pandemic created unprecedented challenges, especially for students attending kindergarten-12th grade schools (i.e., K-12). Since early 2020, reports of rising anxiety, depression, suicide ideations, eating disorders, sense of helplessness, isolation, and feeling burnt out among children and adolescents have been published (Children's Hospital Colorado, 2021; National Association of School Psychologists, NASP, 2021; Panchal et al., 2021). For most students, this was the first time they were exposed to new learning modalities other than the traditional in-person mode of instruction. Students had to learn new technology, coupled with social and emotional skills. These added stressors increase the risk of developing mental health challenges among K-12 students.

The 2019-2020 and 2020-2021 academic years were full of uncertainties and ever-changing instructional modalities. An NPR/Ipsos poll found that 43% of parents have switched between learning modalities since the beginning of the 2020-2021 school year (Kamenetz & Uzunlar, 2021). Lack of instructional consistency can lead to more chronic stress in children and adolescents. Chronic stress alters the brain's chemical and physical structure, leading to cognitive impairment in the prefrontal cortex. It affects attention, concentration, memory, and creativity (Terada, 2020).

While the available literature reveals the worsening of mental health among youth during the pandemic, there were nearly no studies on the effects of learning modalities on youth mental health, especially during a public health emergency. As such, the purpose of our study was to explore the potential impact of learning modalities during the COVID-19 pandemic on K-12 students' mental health, given that some of them were learning remotely or in-person, while others were doing some form of hybrid, with a specific focus on the Commonwealth of Virginia.

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The study attempted to answer these questions: (1) What were the common classroom learning modalities being used by K-12 students during the COVID-19 pandemic?; (2) what was the historical trend of such learning modalities during the pandemic?; and (3) what mental health issues, if any, are linked to students learning during the pandemic as reflected in learning modalities (i.e., virtual/online, hybrid, and in-person/face-to-face)?

Mental health refers to an individual's emotional, psychological, and social well-being (Centers for Disease Control and Prevention, CDC, 2018). A student with good mental health should be able to focus during lessons, have positive self-esteem, have resilience to overcome obstacles, and be socially adaptable. Poor mental health can lead to mental illness or disorders that affect a person's feelings, behavior, and way of thinking (CDC, 2018; Panchal et al., 2021).

In order to understand the common classroom learning modalities used and their historical trend, we constructed a national and Virginia timeline for the period of March 2020 to May 2021. The common learning modalities were in-person, virtual/online (or remote), and hybrid. Table 1 and Table 2 present the timelines and trends of the modalities used in K-12 schools across the United States (U.S.) and Virginia in particular.

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Table 1

*U.S. Timeline of School Closures and Trends of Learning Modalities in 2020**

Key Date	Description of Event	Learning Modality
February 11, 2020	American Federation of Teachers started requesting guidance from the federal government on how to handle the COVID-19 outbreak.	
Mid-February, 2020	Individual schools and districts in Washington and New York began brief closures, of a few days, to clean their facilities.	
February 25, 2020	CDC announced schools to start preparing for the coronavirus and should have plans ready for possibility of conducting classes remotely.	
February 27, 2020	First school closure due to possible exposure at Bothell High School, Washington state.	
February 29, 2020	First reported death from COVID-19 in the U.S.	
March 5, 2020	Northshore school district in Washington state became first district to shift to online learning for up to 14 days.	Virtual/online
March 11, 2020	<ul style="list-style-type: none"> • World Health Organization (WHO) declared COVID-19 a global pandemic. • More than 1 million students impacted by school closures in the U.S. • 10+ days later, all 50 states closed K-12 school buildings, as did nearly all colleges and universities. 	Virtual/online Hybrid
Fall 2020	Schools provided a variety of learning modalities	In-person Virtual/online Hybrid

*Data sources: CDC, (2020); WHO (2021); Keith & Gharib (2020); Decker et al., 2021; Donohue & Miller (2020).

Table 2

*Virginia Timeline of School Closures and Trends of Learning Modalities for Academic Years 2019-2020 and 2020-2021**

Key Date	Description of Event	Learning Modality
March 12, 2020	Governor Ralph Northam declared state of emergency for Virginia, ordering all K-12 schools to close for a minimum of two weeks, effective the next day.	
Starting March 16, 2020	Schools assigned academic work through distancing learning.	Virtual/online
March 23, 2020	Governor Northam signed Executive Order 53, ordering all K-12 schools (public and private) to close for the remainder of the academic year.	Prepackaged course work (i.e., paper copies of packets)
June 9 – end of summer 2020	Governor Northam announced a phased process plan to slowly resume in-person classes for the summer and 2020-2021 academic year.	Hybrid In-person
Fall 2020	Learning modalities varied across school divisions/districts in Virginia.	Virtual/online Hybrid In-person
February 5, 2021	Governor Northam called on all K-12 school divisions to provide in-person learning options.	

*Data sources: Virginia Office of the Governor (2020a; 2020b; 2020c; 2021).

2020-2021 Virginia’s Instructional Status

During the 2020-2021 academic year, while all of Virginia’s 132 school divisions offered students a fully remote option of learning, other learning modalities were also used. Table 3 presents the different learning modalities utilized in Virginia during the 2020-2021 school year. As of September 8, 2020, the instructional options were *in-person* (all students have 4+ days of face-to-face instruction); *partial in-person* (while some students were meeting 4+ days a week for in-person instruction, others were doing hybrid or remote learning); *all hybrid* (all students were doing some in-person and some remote learning with none hitting the 4 days a week threshold); *partial hybrid* (some students were hybrid, not meeting the 4 days a week threshold);

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and *fully remote* (majority of students were learning remotely, while some students may have attended in-person).

Table 3

*Virginia's Instructional Status by School Division for the 2020-2021 Academic Year**

Date	In-person	Partial in-person	All Hybrid	Partial Hybrid	Fully Remote
September 8	10	26	25	4	67
September 22	10	26	24	5	67
November 12	15	42	30	11	34
December 14	9	35	26	10	52
January 26	15	41	25	9	42
February 16	19	48	29	11	3
February 22	20	50	30	11	2
March 1	26	48	33	10	
March 8	31	48	33	9	
March 15	37	51	31	9	
March 22	38	50	34	7	
April 5	42	48	35	4	
April 19	53	43	29	5	
April 26	55	42	29	5	
May 3	58	42	27	4	

*Data Source: Virginia Department of Education (n.d.).

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The disruption of schooling for K-12 students, which led to the introduction of new learning modalities, may affect students' social and emotional health, thereby warranting the need to understand the potential impact of these learning modalities on their mental health to inform best practices to protect and/or minimize the mental health effects on children during a national health emergency, including the post-pandemic era. This was the aim of the present study.

Methods

This paper stems from a 2021 faculty-student summer research fellowship at Hollins University that explored the potential impact of learning modalities during the COVID-19 pandemic on K-12 students' mental health, with a focus on the Commonwealth of Virginia. The target population for this literature review was K-12 students. The authors performed a review of the literature, including health and educational sources from the official websites of the Virginia Department of Health (VDH), Virginia Department of Education (VDOE), Roanoke City Public Schools, Roanoke County School District, and Salem City School District (hereinafter *other health and educational sources*) for reports on learning modalities and students' mental health.

We used a keyword search to find relevant research articles and other resources from credible sources (see Table 4 for a list of data collection sources used in this study). The keywords used in our search were: COVID-19 pandemic and learning modalities for K-12 students; COVID-19 pandemic and mental health among K-12 students; COVID-19 pandemic and learning modalities and mental health and K-12 students/education; and classroom dynamics. The inclusion criteria for the search included research articles published between May 2020-May 2021, and excluded articles not relevant to the study's focus.

Table 4

Data Sources/Databases

Data Sources/Databases	Websites
Google Scholar	https://scholar.google.com
Hollins University Library, One Search Engine	https://library.hollins.edu/
Virginia Department of Health (VDH)	https://www.vdh.virginia.gov/
Virginia Department of Education (VDOE)	https://doe.virginia.gov/
VDOE School Health Services	https://www.doe.virginia.gov/support/health_medical/index.shtml
VDOE State Snapshot: Virginia School Operational Status	http://www.doetest.virginia.gov/support/health_medical/office/reopen-status.shtml
Roanoke City Public Schools	https://www.rcps.info/
Roanoke County School District	https://www.rcps.us/
Salem City School District	https://www.salem.k12.va.us/
National Association of School Psychologists	https://www.nasponline.org/resources-and-publications/resources-and-podcasts/covid-19-resource-center
VDOE COVID-19 Resources for Virginia School Nurses	https://padlet.com/tracy_white/np3rseb1exi73hoe
VDOE: BACK TO SCHOOL!	https://padlet.com/tracy_white/hwgb0zk4ump1sn3a

In total, we reviewed 39 data sources—23 research articles; 6 videos; and 10 official websites as listed on Table 4. Out of the 23 full-text research articles reviewed, nine were included in this study. Further, out of the six videos reviewed, one was included. From the 10 official websites analyzed, four of their contents were included in this study.

Findings

The literature reviewed and other health and educational sources suggest possible connection between some of the learning modalities and K-12 students’ mental health before and during the COVID-19 pandemic (pre-pandemic and intra-pandemic, respectively). Together, they help answer the study research questions: (1) what were the common classroom learning modalities being used by K-12 students during the COVID-19 pandemic?; (2) what is the

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historical trend of such learning modalities during the COVID-19 pandemic (i.e., late March 2020 – May 2021); and (3) what mental health issues are linked to student learning during the pandemic as reflected in classroom dynamics (i.e., virtual/online, hybrid, and in-person)?

Pre-pandemic Mental Health

Prior to the pandemic, millions of children and adolescents struggled with mental health disorders. They included, but were not limited to, anxiety, depression, attention deficit disorder or attention deficit-hyperactivity disorder, obsessive-compulsive disorder, post-traumatic stress disorder, and eating disorders (Panchal et al., 2021).

Intra-pandemic Mental Health

Previous studies found an increase in anxiety, depression, serious suicidal ideations, poor cognitive health, combative behavior, the sense of helplessness, isolation, and feeling burnt out (NASP, 2021; Children’s Hospital Colorado, 2021; Panchal et al., 2021; Golberstein et al., 2020). For example, on May 25, 2021, the Children’s Hospital Colorado declared a state of emergency for the mental health of young people (The Associated Press, 2021). Hospitals were seeing a shift from low levels of anxiety and depression to attempting suicide. This shift has been exacerbated by isolation and pandemic stress (Children’s Hospital Colorado, 2021; Magson et al., 2020; Adjemian et al., 2021).

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For most students, the 2020-2021 school year was the first time they were exposed to learning through modalities other than in-person instruction. In addition to pandemic stress, students had to learn new technologies, as well as social and emotional skills. The potential consequences of these additional stressors include increased risk of developing mental illnesses, family conflict, poor academic performance, and lack of access to essential services.

Virtual/Online Learning

According to the CDC, children between the ages of 5 and 7 who received virtual instruction during the early phase of the pandemic had worsening mental or emotional health, spent less time outdoors, engaged in less physical activities, and decreased face-to-face interaction with friends compared to those who received hybrid or in-person instruction (Verlenden et al., 2021). It is important to note the decline in engagement of these activities are all known to increase the risk of developing depression and anxiety (Magson et al., 2020; Panchal et al., 2021; Verlenden et al., 2021).

Interestingly, parents of children receiving virtual instruction reported higher prevalence of their own emotional distress, difficulty sleeping, job loss, job security concerns, childcare challenges, and conflict between working and providing childcare (Magson et al., 2020; Verlenden et al., 2021). These stressors contribute to chronic stress in a family unit and reduce the well-being of parents, which can have a negative impact on the mental health of children and adolescents.

In-Person Learning

Little research has been conducted on the contribution of face-to-face learning to students' mental health. However, inferences can be made that in-person learning provides face-to-face interaction opportunities that virtual students seem to lack. These opportunities give students a sense of connectedness, decrease feelings of social isolation, and reduce the risk of developing anxiety and depressive disorders (Magson et al., 2020).

Also, schools play an important role in providing essential mental health services for children and adolescents. According to Golberstein et al. (2020), between 2012 and 2015, 57% of adolescents received some school-based mental health services.

Hybrid Learning

Hybrid learning has been the least studied of all learning modalities. Because little is known about the advantages and disadvantages of hybrid learning, one can only hypothesize about the impact it may have on students' mental health. In an article published in the CDC's Morbidity and Mortality Weekly Report, Verlenden et al. (2021) noted parents of children who received hybrid education reported their kids' mental or emotional health deteriorated during the pandemic. They reported similar results for parents of fully virtual students in terms of reduced times outdoors, physical interaction with friends, and physical activity (Verlenden et al., 2021). A decrease in the activities increases the risk that these children may develop depression and anxiety. However, this survey was conducted between October 8-November 13, 2020, which means students had only experienced hybrid instruction for a maximum of two months. As such, this information does not fully contribute to our understanding of the long-term impact this learning modality has had on students, and thus warrants further investigation.

Gaps in the Literature

The majority of studies on youth that have been published since the beginning of the COVID-19 pandemic focused on the effects of the pandemic on the mental health of children and adolescents. Little research has been conducted on the effects of the new learning modalities on mental health outcome(s) of K-12 students. Specifically, to our knowledge, no study has been conducted in Virginia that examines the connection between learning modalities and K-12 students' mental health outcome(s).

Conclusions

The literature reviewed for this study suggests the potential effects of some of the learning modalities on students' mental health. First, students who received virtual instruction were more likely to report worsening mental or emotional health due to a decline in face-to-face interactions, physical activities, self-esteem, and access to mental health care, as well as an increase of chronic stress within the family unit (Magson et al., 2020; Verlenden et al., 2021).

Also, the literature implies a possible connection between in-person learning and positive mental health outcomes for students, which may largely be attributed to the social connection/interaction with peers/friends and receiving mental health related services at school, such as counseling. However, this finding is not conclusive. Still, a related hypothesis is that students utilizing in-person instruction may have better access to the essential services schools provide, including mental and behavioral health services.

Hybrid learning has been the least studied of all the learning modalities and may very well be a critical component in addressing the gaps described with virtual and in-person instruction. Nonetheless, the limited research on hybrid suggest negative mental health or emotional outcomes for students who experienced it.

Our study's findings should be interpreted with caution because they are not based on a correlational research design, and thus cannot establish a relationship between any particular learning modality and mental health outcomes. Yet, the study fosters our understanding on the potential impact of learning modalities on students' mental health, and has implication for further research.

Recommendations

An important outcome of our literature review yields a number of recommendations for further research. While there is conclusive evidence that, since the beginning of the pandemic, the mental health of children and adolescents have deteriorated (Adjemian et al., 2021; Children’s Hospital Colorado, 2021; Golberstein et al., 2020; NASP, 2021; NASP, 2020; Panchal et al., 2021), there are very limited studies on the impact of learning modalities on K-12 students’ mental health.

The extensive review of the literature, including the official websites from VDOE and VDH, as well the three school districts in southwest Virginia, exposed a lack of data at the state and school district levels on the effects of the different learning modalities on students’ mental health. Hence, more research is needed in Virginia and across the country to foster our understanding of the potential impact of different learning modalities on students’ mental health in order to help come up with recommendations on best practices with a focus on addressing students’ mental health.

Finally, evidence has shown that when students have “structures that allow for continuity in relationships, consistency in practices, and predictability in routines (Darling-Hammond et al., 2019, p.100),” their anxiety is reduced, and they support engaged learning. Therefore, classroom structures, whether online or in-person, should promote strong and positive student-teacher relationships that will act as continued support for students’ mental health.

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