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Original Research

Psychological Effects of Coronavirus Disease 2019 on Students

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ABSTRACT

Background
This qualitative study investigated the psychological effects on 21 U.S. high school students during the coronavirus disease 2019 (COVID-19) pandemic.

Aim
The study aimed to identify and assess the pandemic's effect on the mental health of these students.

Method
To determine the stress and anxiety students faced during the pandemic, an online survey used five open-ended questions that focused on awareness of the pandemic surrounding the major themes of insight, stress, anxiety, social support, and adapted coping strategies. NVivo software analyzed the raw data. Colaizzi's descriptive phenomenological analysis method converted the quantitative results into a visual/verbal form. Based on the analysis, the researcher identified the pandemic's effects on students' mental health and well-being.

Results
All 21 participants responded to each of the five questions. Of the participants, 72% demonstrated a negative outlook on their future. Seventy percent (70%) of the participants felt that COVID-19 hurt their social life because of safety precautions, such as social distancing. Even though schools and their faculty tried to keep students engaged and active, 64% of the participants found it challenging to be physically distanced from friends and teachers while learning from home. Of the students, 62% worried about missing out on sports and activities canceled due to the pandemic. 63.14% of the students felt the pandemic stressed them to the point that fear and anxiety overwhelmed them with many questions about the future.

Conclusion
This study's results may help create programs that better meet students' mental and social needs.

Keywords
COVID-19; Pandemic; High school; College students; Mental health; Stress; Anxiety; Coping strategies; Depression.

INTRODUCTION

According to the World Health Organization (WHO), viral diseases and infections threaten the world daily. There have been many viral pathogens identified in the last two decades, like severe acute respiratory syndrome (SARS-CoV) in 2003, H1N1 influenza in 2009, and Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012.[1] On February 11, 2020, Dr. Tedros Adhanom Ghebreyesus, the Director-General of WHO, announced that the current virus would be called "COVID-19,"or coronavirus disease 2019.[2] The initial designation was 2019-nCoV, but the International Committee on Taxonomy of Viruses (ICTV) termed it the SARS-Cov-2 virus since the current virus was very similar to the SARS-CoV virus.

SARS-CoV-2 is an emerging viral pathogen that causes an upper respiratory infection, which results in symptoms that range from mild to severe illness such as high fever and difficulty in breathing.[3] In the last eight to ten months of its birth, it rapidly spread across the globe. The first cases in Wuhan, China, were reported to the WHO Country Office on December 31, 2019. During this time, scientists were unable to determine the cause of the

cases. The first 29 cases were classified as "*pneumonia of unknown etiology*".[4] The Chinese Center for Disease Control and Prevention (CDC) and local CDCs later confirmed that the virus was a member of the coronavirus (CoV) family.

The new virus is very contagious, which is evident from its rapid global spread. During a meeting on January 30, 2020, according to the International Health Regulations (IHR), the outbreak was declared by WHO as a Public Health Emergency of International Concern (PHEIC).[5] By this time, the virus had spread to about 20 countries. The first reported case in the United States was on February 26, 2020. After SARS-CoV-2 was declared a pandemic, a series of nationwide travel restrictions and screenings of suspected cases were put into place in March 2020. The regulations were to avoid the pandemic's spread. There were additional travel restrictions in the U.S. from places like China (on February 2, 2020), Iran (on March 2, 2020), and the U.K. (on March 16, 2020).[6] The coronavirus 2019 (COVID-19) disease continues to spread worldwide, with more than 24.6 million cases and more than 835 thousand deaths as of August 28, 2020.[7]

The COVID-19 pandemic has brought into focus the mental stress and anxiety of various affected populations. My study asked questions to learn the impact of the pandemic, COVID-19, on current high school and college students in the U.S. During the past and present academic year in the U.S., students' lives changed drastically because of the enforced quarantine. Most schools went from in-person teaching to virtual learning and had to adapt to different learning environments quickly. Schools closed due to the quarantine and many students remained at home to stay safe during the pandemic. During the stressful time that quarantine was, students reacted differently. In some cases, COVID-19 has increased loneliness, anxiety, stress, and depression among students. The study's responses identified the students' scenarios, well-being, and how they spent their time during the quarantine.

METHODS

Study Design

The study conducted an online survey to produce raw data. Subsequent data analysis used Colaizzi's descriptive phenomenological analysis to uncover high school and undergraduate students' psychological emotions and feelings. Colaizzi's proposed method, widely used in the health sciences, consists of seven specific steps. The steps are (a) familiarization, (b) identifying significant statements, (c) formulating meanings, (d) clustering themes, (e) developing a detailed description, (f) producing a fundamental structure, and (g) seeking verification of the entire structure.[8] These seven steps provided a rigorous analysis asset, with each step staying close to the participants' data. The result was a concise yet all-encompassing description of the phenomenon being studied, validated by the participants who contributed their thoughts to the situation. Since the method depends on first-person experiences, these personal accounts were gathered as responses using a standard Google Forms survey.

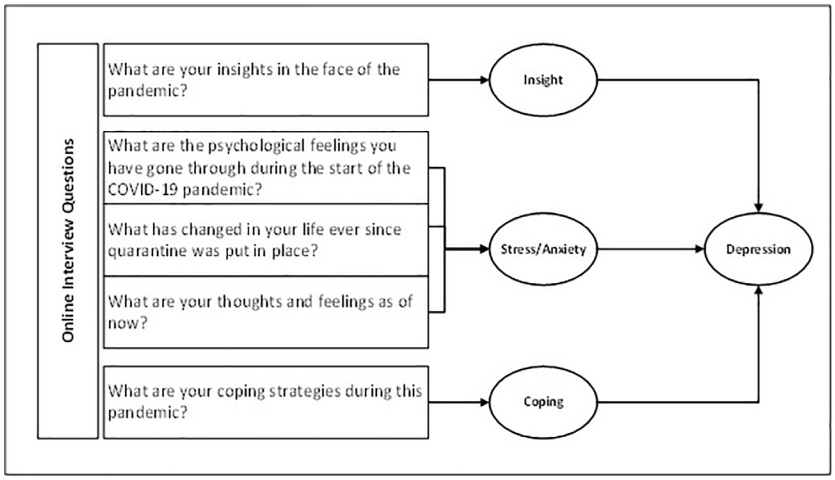
The qualitative method analyzed the participants' answers by finding themes in the responses rather than focusing solely on one individual's response. This approach allowed the study to be more accurate and conclusive of high school's general population to undergraduate students in the United States of America.

Study Subjects

The study focused on recruiting participants who lived within the geographic boundaries of the United States of America. A convenience sampling strategy was used to recruit the students who were attending high school or undergraduate program. Participants were recruited by sending emails to students who were already known by the researcher. An email template was developed to send and request the participants to participate in the survey. In the email, the study objectives and a link to the Google Forms survey was included. During the online survey process, 21 high school and college students participated from different states within the United States. The requirements to participate in this study were: 1) participants had to be attending either high school or college (as an undergraduate student) and 2) participants need to sign a digital agreement before entering the survey.

Survey questions: The survey outline and questions were deter-

Figure 1. *Online Survey Google Form and Interview Questions*



mined by consulting related academic literature (see References) and producing relevant questions answered by students, and then they filled out the form. The questions asked in the survey were (see also Figure 1):

1. What are your insights in the face of the pandemic?
2. What are the psychological feelings you have gone through during the start of the COVID-19 pandemic?
3. What has changed in your life ever since quarantine was put in place?
4. What are your thoughts and feelings as of now?
5. What are your coping strategies during this pandemic?

Data Collection

The questions shown in Figure 1 were put in place to understand the emotional perspective of the effects of the pandemic on the students. The responses were not shared between the participants, which eliminated any possible bias or error. The first part of the survey was a participant's permission form that all participants agreed to, which outlines:

1. I agree to participate in the research study. I understand the purpose and nature of this study, and I am participating voluntarily. I understand that I can withdraw from the study at any time, without any penalty or consequences.
2. I grant permission for the data generated from this interview to be used in the researcher's publications on this topic.
3. I grant permission for the online survey responses to be recorded and saved for review by the researcher.
4. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.
5. Choose one of the following options: A - I grant permission for the researcher to use direct, attributed quotations from my interview. Or B - I grant permission for the researcher to use my responses in aggregate or anonymous statements, but I prefer to maintain confidentiality and request that any comments are presented without attribution to me.

The next section of the survey asked for the demographic details of the student to make sure the participant is either a high school or undergraduate student:

1. Student attending for the 2020-2021 school year: A-High School or B-Undergraduate.
2. Student grade level for the 2020-21 school years: A-Freshman, B-Sophomore, C-Junior, or D-Senior.
3. Student Gender: A-Female or B-Male.
4. Student age group: A-≤13, B-14 and ≤18, C-19 and ≤ 23, or D - ≥23.
5. Student household size (those living at home with family): A-1 and ≤4, B-5 and ≤8, C-9 and ≤12, or D-≥13.
6. State where the student lives.
7. Country where the student lives (provided only one option): A) the USA.

The final section of the survey was the five open-ended questions, as shown in Figure 1. These open-ended questions allowed the participants to answer with full honesty and specificity regarding their situations. The study subjects came from various locations around the U.S. to better understand how the pandemic impacts students across the country rather than in one fixed state or city. Table 1 shows the demographics. Table 2 shows the participants were both, male and female, and the survey didn't provide any difference in the representation of how these two groups experience differed during the pandemic.

Data Analysis

According to the grounded theory standpoint, Urquhart and Whilst defined saturation point as the point in coding when no

Table 1. *Participants' Demographic Characteristics by Age in the United States (21 participants)*

	Freshman	Sophomore	Junior	Senior	Grand Total
Highschool	5		1	4	10
<=13	1				1
Male	1				1
14 and <=18	4		1	4	9
Female	3		1	3	7
Male	1			1	2
Undergraduate	4	3	2	2	11
14 and <=18	4				4
Female	2				2
Male	2				2
19 and <= 23		3	2	2	7
Female		3	1		4
Male			1	2	3
Grand Total	9	3	3	6	21

Table 2. *Participants' Demographic Characteristics by State in the United States (21 participants)*

States in the United States	Female	Male	Grand Total
California	1	0	1
Florida	1	0	1
Massachusetts	2	0	2
Oklahoma	2	0	2
Texas	4	3	7
Virginia	1	3	4
Pennsylvania	2	0	2
Massachusetts	0	1	1
North Carolina	0	1	1
Grand Total	13	8	21

new codes or emergent themes occur in the data.[9,10] After 15 participants, the responses were repetitive, and it became empirically confident that a certain saturation point was reached. The survey continued until 21 participants, which ultimately presented results that confirmed this prediction. Then, the responses were analyzed using Colaizzi's phenomenological analysis methodology. All answers were viewed through a non-biased lens that allowed the study to produce more apparent themes regarding high school and undergraduate students' psychological feelings during the pandemic. Next, an inductive data analysis was used to condense the extensive raw text gathered during the survey process into a summarized format. During the data analysis, coding of the interviewed detailed text was performed to look for common patterns, themes, and categories related to the study questions in Figure 1.[11]

In the study, the Computer-Assisted Qualitative Data Analysis Software (CAQDAS), NVivo Release 1.3, was used to autogenerate themes and group data to develop a rich report. The NVivo software used for this research study allowed using autogenerated thematic coding to classify the data, including a large volume of text grouped, coded, and categorized. Subsequently, the results were represented in visual formats through comparison tables and figures when deemed appropriate. The NVivo software supported the entry of all details collected through the survey responses. The collected information and raw text were in an electronic format that was compatible with the application software. NVivo helped organize the answers, find thematic trends, search narrated text, form categories, and display data in various graphical representations.

ETHICAL REVIEW

At the beginning of the survey, all participants said yes to questions concerning being a part of this research and having their responses used anonymously for research purposes. For the study's duration, extra security measures ensured that academic misconduct such as plagiarism and repeated publication did not occur. This is an independent thesis research. The approval of the Ethics Committee and the Institutional Review Committee (IRB) to carry out this study was not mentioned.

RESULTS

Question 1: Students' Understanding of the COVID-19 Pandemic

All 21 participants (P1-P21) answered the question, "*What are your insights in the face of the pandemic?*" The NVivo software coded the answers received for this question to display common themes and terms. The five most repeated and relevant words were "pandemic," "time," "people," "face," and "masks," with counts of 15, 16, 24, 9, and 9 respectively. The words "people," "face," and "masks" among the topmost repeated words indicate their importance and the adoption of the new culture of wearing the masks. The results signify that students are undergoing a significant transition that has a considerable impact on their lifestyle. To support their argument, participants used phrases such as:

"The pandemic has shed light on America's inequities, and it's heartbreaking to see how hard it's hit certain communities (Participant, P19). I believe that all safety precautions are reasonable and that everyone should respect them during these trying times. COVID is a bit scarier to people since there is no stable vaccine yet (P1). We were not prepared for a pandemic like this (P2). The people's freedom and safety are two different things that should be addressed accordingly (P3). Wearing masks and using hand sanitizer has suddenly become a political belief rather than pure reasoning (P5). Even during the times where the number of cases was surging, there was still an influx of customers with a complete disregard for face mask usage. The number of people who have their noses outside the mask or not wearing a mask contributes to the virus's lingering (P6). It's frustrating to know that people still refuse to wear masks and even go to parties (P11). We need to find a new way of life and adjust our daily lives to prevent feeling caged (P16)".

Most of the other top frequently used words also aligned well with the purpose of this question. These words described the need to adopt a new lifestyle and introduce the mask culture. Upon developing an awareness of the pandemic, participants mentioned that the significant challenges were adapting to the ongoing pandemic culture. Initial changes have given way to drastic changes in one's everyday life's mental, emotional, and social aspects. These changes have led many students to feel that more states within the U.S. should promote face masks to control the spread of COVID-19. Many people not wearing their face masks and engaging in constant social interactions increase the number of cases, which allows the pandemic to go on for a more extended period. These actions result in students not attending school in ways they used to before the pandemic, which lead to negative and cooped-up emotions.

Question 2: Students' Psychological Feelings during the Start of the COVID-19 Pandemic

All 21 participants (P1-P21) answered the question, "*What are the psychological feelings you have gone through during the start of the COVID-19 pandemic?*" The NVivo software coded the answers received for this question to display common themes and terms about which students experienced stress and/or anxiety. The five most repeated and relevant words were "pandemic," "felt," "school," "anxiety," and "stress" with 12, 15, 12, 7, and 8 counts, respectively. Having these words among the top five indicates that the answers received aligned with the student's feelings during the pandemic. To support the argument, participants used phrases such as:

"At the beginning of the pandemic, I felt too cramped and caged in, upset, stress, tired, bored, anxious, and stressed (P5, P15, P17, P21).I const " antly felt on edge and have found myself becoming anxious when I am in the aisle of a store, and more than five people are in the same area. My temper seems to have gotten worse as well, whether I am driving, in a store, or even just being at home (P1). The fear of contracting the disease has never left and continues to haunt me and my close friends and family (P4 and P14).I was also disappointed as I couldn't finish high school properly (P3), and all clubs/sports stopped with it (P13). I felt fearful that my family or I would contract the virus (P4). Currently, my psychological feel-

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ing is more anxious about the upcoming school year (P6). The pandemic had caused many ups and downs psychologically early on (P8). Throughout the pandemic, I have felt a surge in anxiety as someone who already dealt with anxiety, the feelings of impending doom and loneliness made things much worse (P11). Lastly, my research internships, volunteering events, and clinical positions have either been canceled or postponed due to the pandemic, which has caused me great stress and anxiety (P12)".

There were different feelings among the students, such as anxiety, cramps, and tiredness. The pandemic made the students feel caged within their homes and stop them from socializing, which contributed to creating fear about the school year. The ongoing pandemic created high levels of stress among students to the point where they felt disconnected in a realm that some described as a "black hole".

Question 3: Changes among the Students' Lifestyles when the Quarantine was put in Place

All 21 participants (P1-P21) answered the question, "*What has changed in your life ever since quarantine was put in place?*" The NVivo software coded the answers for this question to display common themes and terms. The five most repeated and relevant words were "pandemic," "changed," "school," "friends," and "masks" with 8, 12, 12, 10, and 7 counts, respectively. The presence of these words among the top-five most repeated and relevant words indicates their importance concerning the question. The results signify that students are undergoing a significant transition that significantly impacts their lifestyle. To support this argument, participants used phrases such as:

"School ended for me back in March, and I have not seen my friends as much as I'd like (Participant, P1). We haven't gone to school, and I have not left home in a while. We can only go out for necessary stuff, and we do online school (P21). Additionally, I must stay at home more, causing me stress because of an emotionally abusive father (P2). A lot has changed. I moved states. I was previously living in Kansas and going to school there. I quit and obtained a new job, and I've already transferred to a college nearer to home (P5). Masks and hand sanitizer must be brought with you everywhere. Social distancing has become very prevalent (P3). Along with (hopefully) everyone else, I have started to wear a mask everywhere I go. Even after the COVID pandemic goes away, I think masks will be an essential part of my life (P11). Wearing a mask has become a part of everyday clothing (P16). Whether it's a computer, phone, or tablet, I feel like I am using technology a lot more than I used to. Another change would be sleep; I sleep a lot later and wake up later (P13). I felt like a lot of my independence was stripped away from me (P19). Felt bored staying home all day and not going out for any activities. Had to find ways to keep me busy and occupied (P20)".

Furthermore, students experienced the introduction of social distancing policies such as virtual learning and maintaining a distance of at least six feet. Students could not talk to their friends as they used to at school due to the barrier screen placed in front of them. Even with all the measures taken at schools engaging in in-school learning, students still faced exposure to COVID-19 in many ways. In some schools where in-school learning is an option, students could bring COVID-19 back to their teachers or classmates if they become exposed outside of school. Consequently, it is essential for students to stay home, the primary procedure for U.S. high schools and colleges. Students started following the orders of the CDC. They cultivated the habit of wearing masks in public areas to protect themselves and the people they live with from the virus. Many practices such as virtual learning, engaging in social distancing, applying sanitizer, washing hands frequently, and wearing masks were put into one routine to ensure the most safety. Each practice provides an additional layer of stress to defend against COVID-19.

Question 4: Thoughts and Feelings As-of-Now

All 21 participants (P1-P21) answered the question, "*What are your thoughts and feelings as of now?*" The NVivo software coded the answers for this question to display common themes and terms. The five most repeated and relevant words were "pandemic," "school," "feel," "go/ing," and "back" with 12, 10, 20, 17, and 15 counts, respectively. The presence of these words among the top-five most repeated and relevant words indicates their importance concerning the question. That question inquired about the student's feelings as-of-now and about wanting to go back to a social setting, such as school (if possible). To support the argument, participants used phrases such as:

"I have felt many things since the pandemic, but mostly either angry or sleepy. I have also had thoughts that make me cry for some unknown reason, and I spend most nights tearing up over something that doesnot seem to matter (Participant, P1). I don't think that we will get over this hurdle with the country's current state for the next 6-15-months (P3). I feel like the pandemic will affect life for at least the next two years as we move back to the new normal (P8). This makes it frustrating to plan future events because it cannot be predicted when things will return to normal (P6). Even though the school started back up again, so I'm feeling stressed. It's really hard to concentrate. Plus, the teachers kill time during our zoom meetings and are just assigning busy work (P15). I feel very emotional when I think about the times we're living in because I believe we are all experiencing a collective shock and grief that we won't ever fully process (P19). I wish we can go out again and go back to our normal life (P21). I'm currently in denial that I will start college in the fall. I refuse to get my hopes up for move-in day and orientation because nothing is guaranteed (P4)".

With the school year ending abruptly and no summer activities, students worried not only about how the academic year would progress but also about their educational, personal, and social futures. Students expect life to get back to normal in the future, but they are nervous about how far away that future is. This worry is beginning to impact their personalities, mental well-being, and work ethic with an added pressure of "busy work" assigned by their schools. Additionally, the survey shows that the students are worried about their mental well-being and say that anxiety keeps them from being the person they want to be.

Question 5: Coping Strategies during the Pandemic

All 21 participants (P1-P21) answered the question, "*What are your*

coping strategies during this pandemic?" The NVivo software coded the answers for this question to display common themes and terms. The five most repeated and relevant words were "a lot," "time," "watch," "games," and "friends" with 20, 14, 15, 11, and 7 counts, respectively. They indicate that the answers received are gearing toward spending more time on the screen and playing video games as a coping mechanism during the pandemic. To support this argument, participants used phrases such as:

> "*Listening to music and drawing seems to help me cope and learn that doing things inside can be just as fun and keep my brain functioning (Participant, P1). I have been catching up on a lot of sleep and watching T.V. to past [sic] the time (P2, P3, P4, P5, P15). Video games are an interesting way to continue to interact with friends daily. I'm very thankful for technology as it has allowed me to stay in touch with people I can't see in person (P13 and P21). Additionally, periodically having group calls and texts with friends helps keep track of everyone's mental health and boosts morale as people think back to what they have accomplished between sessions (P6, P9, and P11). One of the biggest strategies I live by is working out, exercise, walking, or outdoor games (P5, P14, P16, P18, and P20).*"

It has been several months since schools and non-essential workplaces have closed. Many people settled into the new normal during these changing times, i.e., social distancing and virtual learning. Instead of face-to-face contact with teachers and friends, students have developed new ways to stay busy while adhering to public health guidelines. Students became addicted to video games, watched Television (T.V.) regularly, and attended virtual meetings on Zoom and other platforms. The virtual world has provided students with a unique opportunity to hang out with their friends. However, with the increase in screen time, few students used their free time as an opportunity to stay fit. Having the screen as their only source of learning and entertainment, students became sedentary. They did not get their usual daily exercise, which is something they could have gotten while staying on a school campus.

DISCUSSION

Many high school and undergraduate students in the United States are missing face-to-face instruction through virtual school due to COVID-19. This lack of interaction has led many students, teachers, and parents to share the common worry concerning mental health. There are also concerns that the gap between high- and low-achieving students will become larger. Given the need to address these concerns, the study decided to attain and analyze high school and undergraduate students. Twenty-one students participated in the research and provided their responses on the virtual school learning patterns and learning loss due to the pandemic. Ultimately, the questions considered what students knew about the pandemic, how they felt around the time it started and during the pandemic, and what they are currently using/doing as their coping mechanisms. All 21 participants responded to each of the five questions. The NVivo software generated a sentimental analysis for each question and provided an emotional breakdown.

Currently, students believe that the future is uncertain since they do not know how long the pandemic will last. Uncertainty is a factor that the majority of participants addressed as their primary source of concern. The students know that it is impossible to learn about all real-world dangers firsthand. So, they count on others to warn them by seeing sources such as T.V., social media platforms, and messages between groups. Despite their efforts to stay updated, it is also an inefficient process. Even though it is essential to know what is happening, the pandemic's negativity and harsh realities have impacted the students' motivation. For instance, Figure 2 shows that 72.34% of the participants demonstrated a gloomy outlook for their future. Students are exposed to images or threat signals 24/7 through T.V., social media, and other channels and get the idea there is no near-term solution to the pandemic. The analysis shows that students are experiencing severe anxiety, directly correlating with stress levels and vulnerability.[12]

As millions of U.S. students hunkered down under widespread learn-from-home and social-distancing directives, it was tricky to sustain normal social life and mental health. When the pandemic started, anticipated events and graduations were changed or canceled. Figure 3 shows that even though maintaining personal and public health and safety was the essential thing. Disappointed participants (70.07%) saw their social lives and potential memory-filled events vaporize.

With a stressful end to the previous school year and many summer programs getting canceled, digital school performance became ever so strenuous for high schoolers and undergraduate students. Students entering high school or university during this period felt nervous to go back to school, mostly if they were first-year students. It was initially hard to implement some of the changes they were not used to, such as wearing protective

Figure 2. *Sentimental Analysis on the Students' Insight in the Face of the Pandemic*

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
1 : Files\\2. What are your insights in the face of the pan...	22.54%	49.8%	18.71%	8.95%

Figure 3. *Sentimental Analysis of the Students' Feelings when the Pandemic Started*

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
1 : Files\\1. What are the psychological feelings you hav...	21.89%	48.18%	16.61%	13.31%

Figure 4. *Sentimental analysis of the Students' Lives While Going Through the Pandemic*

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
1 : Files\\3. What has changed in your life ever since qua...	14.49%	49.28%	29.17%	7.07%

Figure 5. *Sentimental analysis on the Students Preparing for the New School Year during the Pandemic*

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
1 : Files\\5. What are your thoughts and feelings as of now	23.15%	38.89%	20.65%	17.31%

Figure 6. *Sentimental analysis on the Students' Coping Strategies during the Pandemic*

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
1 : Files\\4. What are your coping strategies during this p...	14.52%	48.62%	28.34%	8.53%

clothing like masks and maintaining social distance. Figure 4 shows that even though some teachers try to encourage students to be active, 63.77% of the participants found it challenging to be physically distanced from friends and teachers while at school. Figure 4 shows that 36.23% of the participants remained somewhat positive about getting used to virtual methods. These participants have gotten close to fully adopting new lifestyles and were happy that they at least got to see their teachers and friends over calls.

After a strange end to the 2019-2020 school years with most students doing some form of distance learning, many school districts have yet to announce their plans for the upcoming school year, which has added stress and anxiety for both students and parents. The move from formal in person learning to online or hybrid learning, or even attending in person classes with masks and social distancing, weighed on students. Many feel worried about keeping up with their studies with the changing formats. There were class and curriculum cancellations because teachers cannot teach a hands-on class virtually. These cancellations led to reduced opportunities for students in areas that they wanted to explore for their future. The social aspect of back-to-school also impacted students. Figure 5 shows that 62.04% of students, during the start of the year, were worried about their social life and missing out on after-school activities, especially those canceled or adjusted, instead of the usual annual stress that would come with the back-to-school season. Although students are concerned about the future, they also feel a responsibility to make a positive change. A significant number of students, 37.96%, felt comfortable staying virtual to prevent further spreading cases.

Figure 6 shows that 63.14% of the participants felt that the pandemic was stressful. It brought fear and anxiety, which led to questions such as what could happen in the future. Such thoughts were stressful for students who had to balance academics, clubs, sports, internships, and the pandemic's weight. Public health actions, such as social distancing, made people feel isolated and lonely, which further increased stress and anxiety. However, these actions are necessary to reduce the spread of COVID-19. Students adjusted to the virtual format during the pandemic period, and many relied more heavily on electronic devices. From doing schoolwork to playing videogames, students relied entirely on digital devices. In this process, students remained sedentary and did not get much physical exercise. Furthermore, by developing a heavily dependent relationship with screens, more stress was created, and community socialization fell apart. This added stress and lack of a social life makes it even more important to make digital therapeutics readily available in the academic curriculum.

CONCLUSION

The surveys of students show that their mental well-being has been devastated by the pandemic's social and economic consequences, as well as the continued uncertainty about their college education and post-college careers. Poor mental health leads to many cases of stress and anxiety, which increases the chances of students entering depression and loneliness. The study aligns with the American College Health Association report, which states that depression and anxiety are the top two impediments to high school and college students' academic education.[13] Still reeling from the emergency closures of campuses across the country during the spring semester and the sudden shifts to online instruction, students are now worried about the current academic year and whether campuses reopened for in-person instruction can remain open as COVID-19 spreads among students. This worry creates stress and anxiety among the students, which can eventually lead to severe depression.

In the short term, due to stress and anxiety, many students who have not previously sought mental health support from their school will be requesting resources to do so. These potential requests mean that counseling centers at schools need to be prepared with a proper support system. In the long run, students will develop a screen addiction due to their increased time on screens to attend classes. According to a recent survey, the average person's screen time is up at least 50%, even more so for high school and undergraduate students. Extended amounts of time in front of

technology affect the brain's frontal cortex in much the same way as cocaine. There is a release of dopamine into the brain, which can negatively impact impulse control. In other words, watching T.V., playing video games, and scrolling through social media can be seen as a digital drug for our brains.

Adopting negative behaviors as a pandemic coping strategy, such as increased screen time, will lead to new addictions within students. Avoiding these addictions will require additional proper measures. More cases of depression can occur if we are addicted to the screen, mostly depending on the content. There could be anxiety, and there's always room for other predators on the internet. Students may encounter cyber bullying and other safety issues that can cause some long-term psychological effects. Furthermore, the more time a person spends staring at a screen, they harm their health by straining their eyes, putting on unhealthy body weight, and getting headaches. The same precautions that people are taking by using the internet as a substitute for real-life will be a reason for many risk factors that can appear in students' health in the future.

To overcome the pandemic's short-term and long-term impacts, schools need to introduce classes that help students understand how to properly manage their time on technological devices and build a healthy lifestyle during these trying times. This intervention is where digital therapeutics steps in. Digital therapeutics is an emerging healthcare technology and treatment methodology that often also includes support from remote clinicians. As students spend increasing time on screens, schools need to utilize digital therapeutics and digital solutions. The objective is to change students' behavior and lifestyle, usually with laptops, smartphones, and delivery through different digital channels. Digital therapeutics can help students avoid long-term chronic diseases like type 2 diabetes, obesity, stress, anxiety, and depression.

LIMITATIONS AND FUTURE WORK

This study documented the psychological effects among high school and college students due to the COVID-19 pandemic in the U.S. via a Google Form online survey. The survey was conducted while the pandemic was in its late early-to-middle stages. Consequently, this study's results may be limited since the current findings may differ from how students feel in the future. Given the nationwide similarities in schools and universities transitioning to virtual classes during quarantine, this study is expected to have many similarities in its findings. However, the study did not analyze how student mental health problems differ by personal and social contexts such as income, religion, etc. This limited approach allowed the study to limit the possibility of confounding results by using too many independent variables. Future studies can determine the effect on students' mental health, and well-being in later phases of the pandemic or after the pandemic enters adormant state.

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