

MENTAL HEALTH DURING THE COVID-19 PANDEMIC: A LITERATURE
REVIEW ON ONLINE EDUCATION'S EFFECT ON U.S. COLLEGE STUDENTS

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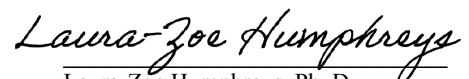
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Ben Haight. Mental Health during the COVID-19 Pandemic: A Literature Review on Online Education's Effect on U.S. College Students

(Professor Katherine Andrinopoulos, Public Health)

This thesis explores the impact that the sudden shift to a non-traditional, online learning model had on the mental health of college students in the United States. The work reviews 27 published sources between the Spring of 2020 and March of 2020 that produced findings on the mental health of college students during the pandemic, perceptions and lessons learned regarding the academic models utilized during the pandemic, or on both subtopics in conjunction. This thesis was inspired by the recognition of the immense cultural and pedagogical shift that suddenly occurred due to the COVID-19 pandemic. The study was also inspired by a desire to learn how the target demographic experienced these shifts. This research also set out to understand the role online education and its features might play in the context of post-pandemic higher education in the U.S. The thesis is divided into three sections. Section One outlines the background context of the work and explains the methods used to compile the sources of the literature review. Section Two includes the key findings of the literature review and a discussion of the findings. Finally, Section Three concludes the literature review and provides a foundation and suggestions for future research. This includes a detailed proposed research project at Tulane University to further understand the relationship between academic models and student mental health. The thesis found that mental health rates among students declined because of the changes to student's lives the pandemic brought about, and students had mixed but primarily negative perceptions of online education in the first months. However, the thesis also found that having adequate time to prepare for an online or hybrid course led to higher levels of satisfaction among both students and faculty, which implies aspects of an online education model may be retained.

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Introduction

Background Context

In the spring of 2020, the COVID-19 pandemic drastically altered modern society in both the United States and the world. Major sports leagues were shut down, businesses were forced to close, mandatory stay-at-home orders were issued, and students of all ages were sent home from schools. Following a summer season where numbers of COVID-19 cases decreased and then spiked to new heights, the 2020-21 academic year was unlike any other school year in recent history. Most Institutions of Higher Education (IHEs) were offering some or all classes online, and schools varied in their decisions to allow students to return to campus.

This literature review has been designed to discern the impact the academic months following the transition to online learning had on students and faculty at Institutions of Higher Education (IHEs) across the U.S.

Research Rationale

This research was designed in a way that could most effectively determine the relationship between the educational model that IHEs utilize and the mental health of college students. College students are at a higher risk for mental health symptoms due to a variety of factors such as their age, cognitive maturity, and stress and workload in a college setting. Mental health diagnoses on college campuses increased 14% from 2007 to 2017 (Ketchen Lipson et al., 2018). College students have also utilized mental health services on college campuses at an increased rate in the past decade (Oswalt et al., 2018). A literature review was seen as the primary solution for understanding the scope of

published research and compile a wide array of source types to best analyze the effects of the online education model and the future role it could play at U.S. IHEs.

Initially this thesis was designed to conduct semi-structured qualitative interviews at Tulane University. This study design would directly address the possible link between mental health and online learning. However, the study protocol was not approved by the local Institutional Review Board in time to effectively carry out this study within the allotted time frame. Aspects of this original study design are included in the Future Research section.

Research Objectives

The primary objective for this research was to review existing literature and publications relating to the topic to be able to succinctly report existing findings on online learning's impact on college student's mental health. Three primary research questions guided the work and determined the search criteria. They were:

- What was COVID-19's impact on the mental health of college and university students?
- What role did a non-traditional learning model have on said impact on students, if any?
- What elements of hybrid learning should be carried forward in future teaching and what were the lessons learned?

Methods

To answer the research questions posed, a systematic literature review was conducted. The search utilized databases to compile sources and records. Databases that were used were ERIC (Education Resources Information Center), PubMed, and JSTOR. These three databases were chosen because of recommendations from advisors to this study. Within each database, search terms were combined to locate potentially relevant sources. Search terms were organized into three categories: keywords associated with the COVID-19 pandemic, keywords associated with mental health and keywords associated with college students and education models. Search strategies such as utilizing quotation marks around search terms and placing AND or OR in between search terms were employed for best results. Box 1 details possible combinations for search terms.

Box 1: Search Term used in Database Search

"COVID-19" OR "SARS-COV2" OR "coronavirus" OR
"COVID" OR "pandemic"

AND

"mental health" OR "stress"
OR "well-being" OR "anxiety"

AND

"college students" OR "university students"
OR "Zoom" OR "hybrid learning"

Inclusion and exclusion criteria were outlined to determine if a source initially yielded by the search terms could be useful to the study. To be included, studies and sources had to:

1. Be published in English and focused on U.S. IHEs

2. Be published between March 2020 and March of 2022
3. Be specifically about U.S. undergraduate or graduate level college students
4. Have a full text accessible to the researcher

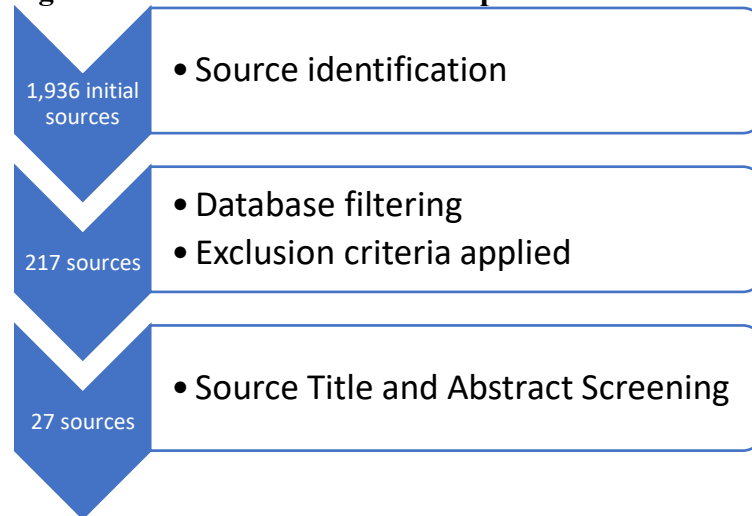
Studies were excluded if they did not meet these criteria. Sources were not limited to one variation of work – commentaries, literature review articles, studies and thought pieces were all considered during this search process. Citation lists in studies that met inclusion criteria were searched to find other relevant studies. Sources and studies on IHEs outside of the U.S. were excluded to limit the number of found publications that would need to be screened. Excluding non-U.S. study publications was also an attempt to standardize the background context of each study by keeping all involved IHEs in one country and under one federal government.

Over the course of the search process, 1,936 sources were initially found across the three databases before any exclusion criteria was applied. However, many of these sources were not applicable to this study. Filters within the databases that make a search more specific were applied, which reduced the initial source count to 217 sources. These filters included publication date, focus or target age (set at 18-24) and English articles only. This target age range was used because the focus on mental health was specifically for young adult mental health. Therefore, graduate students or professional students older than this range were not included.

Along with applying the inclusion and exclusion criteria, a screening of source titles led to further discarding of sources. The majority of research studies that were yielded after the search were conducted internationally, particularly in China. Other sources that explored the mental health of college students were published prior to March

of 2020. Topics addressed in the title and abstract of a source that were ultimately excluded were the impact of physical activity, healthy nutrition and diets, and social media use on mental health, among others. Studies focusing on medical school students, other professional-level students and student experiences during the pandemic from middle and high schools were also discarded. Graduate students for this review were defined as students within the target age range pursuing a Masters degree. There were even some neurological clinical trial studies on the mental health of mice that were yielded but not selected. After applying the inclusion and exclusion criteria, the database filters, and screening the study titles for relevancy, 27 sources were ultimately included in this literature review.

Figure 1. Flow chart of the review process for source inclusion



The 27 selected sources were all read by the primary investigator. Tables with summary information on each source were created to aid in notetaking and source organization and

are included in the Appendix. The key findings of the sources were categorized based on the specific research question they addressed.

Results

Of the 27 sources identified, 18% were strictly quantitative studies, 33% were mixed method studies combining quantitative questioning and qualitative interviews or open-ended questions, and 15% were strictly qualitative studies. Mixed method studies are defined in this review as studies that included multiple methods of data collection. This often took the form of a quantitative online survey that included open-ended questions. The remaining third of the sources were a combination of literature reviews, review papers, and one report on personal experience teaching during the pandemic. 85% of studies were conducted and published in 2020, with 55.5% of those studies completed specifically in the spring and early summer of 2020.

The findings from the 27 sources pertaining to the topic and research questions are compiled and summarized below. They have been organized into three primary categories: sources discussing the pandemic's impact on the mental health of college students, sources discussing the pandemic's impact on the changes in education models at U.S. IHEs, and sources discussing both topics. 41% of the sources were classified as dealing with mental health specifically, 48% were labeled as educational model specific, and only 11% tackled both topics together.

COVID-19 and Mental Health

Research Studies Across the 2019-2020 Academic Year

Three sources that dealt specifically with mental health (Fruehwirth et al., 2021; Kim et al., 2021; Zimmermann et al., 2021) offer the unique perspective of having collected data in the 2019 fall semester through the summer of 2020. This allows for direct comparison of mental health levels before and during the COVID-19 pandemic.

Fruehwirth et al. (2021) examined several COVID-19 stressors on first-year college students at a large university. This study involved a survey and took place between October 2019 and February 2020. A follow-up survey was offered in June and July of 2020. The data from the 419 students that completed both the initial and follow-up surveys make up the study. The Personal Health Questionnaire Depression Scale (PHQ-8) and General Anxiety Disorder (GAD-7) scale were used to measure students' depression and anxiety levels, respectively. Statistical analysis then identified associations between COVID-19 stressors and anxiety and depression symptoms using a longitudinal model.

Findings from the study are that isolation and online learning were risk factors for decreased mental health, specifically increased depression or anxiety symptoms. Interestingly, COVID-19 itself was not as impactful of a stressor than college-related stressors according to the quantitative survey questions asked about anxiety and depression symptoms among the students. Social isolation was a significant influence on the anxiety and depression of participants, while COVID-19 diagnoses or hospitalizations of loved ones did not correlate at all with significant negative mental health effects.

Students who struggled with the online learning style were more likely to have moderate to severe anxiety and depression based on the statistical analysis of the surveys.

In all, rates of response on anxiety and depression increased 39.8 and 47.9 percent respectively between the beginning of the school year in 2019 and the end of the school year in June of 2020. The study clarifies that these increases in mental health symptoms were not the result of a traditional first year college student's experience, but rather specific to the pandemic. Further, the existing stress college students underwent prior to the pandemic is noted, as the study team identifies college students as an "already stressed" demographic.

Kim et al. (2021) utilized logistic regression and surveys to analyze mental health symptoms after the COVID-19 pandemic onset. The study found that multiple risk factors for mental health symptoms were found to be higher during the pandemic. First and second year students at 4 IHEs, a total of over 8,613 students, completed the survey to provide the data to be statistically analyzed. Quantitative scales such as the Patient Health Questionnaire-9 were employed to analyze the mental health symptoms. This study began before the pandemic in the fall of 2019, and continued into the "early months," the middle of the 2020 spring semester. The loss of an outlet for physical activity and social engagement via student organizations is hypothesized by the authors to be a reason why the mental health rates decreased between prior to and the middle of this study. Racial discrepancies and levels of socioeconomic status also appear to be defining risks for worse mental health during the COVID-19 pandemic. As coinciding with cognitive-behavioral theory, losses in positive reinforcement directly contributes to an increased risk for depression. Restrictions in exercise and the stockpiling of groceries (as

grocery stores experienced shortages, this led to increases in bulimia and binge eating) were two specific risk factors for a decrease in mental health rates.

The research team of Zimmermann et al. (2021) began a study at the University of Nevada, Reno in August of 2019 to study the effects of an intervention to prevent depression and anxiety. The study was planned to have 3 dates of data collection, in August, December, and February. By the February collection date, COVID-19 cases were being reported in the U.S. An additional follow up was scheduled for April, and 278 of the initial 371 participants completed the final survey. Various scales, including PHQ-9 and GAD-7, were utilized to quantify the data. Data was analyzed using a repeated measures ANOVA, a statistical test that compares the means of data from the factors in the questionnaire across time points.

Not surprisingly, distress levels were higher in the April data collection than at any other point in the study. The mean scores of the PHQ-9 and GAD-7 tests increased between February and April. Pre-existing mental health struggles were identified as a risk factor for above-average distress levels after the onset of the pandemic. Specific to certain demographics, women were more likely to have higher anxiety and stress levels, and Latinx students were more likely to have more severe depression symptoms. Online social contact and consuming news and other media about the pandemic were identified as factors that increased distress levels. Students who tend to avoid stressful or difficult situations (Cognitive and Behavioral Avoidance) were also found to be at a higher risk for distress symptoms. Poor sleep and an unhealthy diet were physical risk factors, along with low social engagement and low physical exercise levels.

That this study was completed over the course of six months allows for an informative comparison of college students' stress levels before and after the pandemic. This study found that distress and symptoms of anxiety and depression increased markedly after the onset of the pandemic. Further, specific demographics and behaviors were found to be associated for an even higher risk of mental health symptoms.

Research at Texas A&M in May of 2020

In the late spring of 2020, research by two teams at Texas A&M University (Son et al., 2020; Wang et al., 2020) was completed to analyze the effects of the pandemic on the mental health of students. These two studies are compiled here, with the first being primarily a quantitative survey and the second a more qualitative interview study.

Wang et al. (2020) conducted research at the conclusion of the 2020 spring semester to establish mental health levels of all enrolled students. The study was inspired by several similar studies taking place in China at the time. The study team felt that there was not enough information on U.S. college students during this time period and aimed to collect some population data on depression and anxiety levels, as well as factors leading to stress, coping behaviors, and issues students were experiencing while attempting to cope.

The study design primarily utilized multiple choice questions in an online format. While there were no specific qualitative questions, there were open-ended survey questions for this purpose. The PHQ-9 and GAD-7 questionnaires were utilized for this study, as they lead to effective data analysis of mental health levels. 2301 participants completed the survey. Of these, 80.7% reported having at least some level of depression

over the last two weeks. Worryingly, 18% of respondents reported having self-harm or suicidal thoughts in the past two weeks. The report includes that research prior to the pandemic had found that 3-7% of college students had suicidal thoughts, implying the pandemic has had a profound impact on suicidal thought rates amongst college students. Just under 39% of respondents said they were experiencing moderate to severe anxiety in the past two weeks.

Popular coping mechanisms included speaking with friends and family, exercise, and self-care activities. Almost 16% of respondents said they had been unable to cope with the pandemic in any capacity. The study team posits that the vast number of changes in multiple aspects of the students' lives is the primary culprit for the decline in mental health of the participants. News and media outlets and general uncertainty or misinformation about the pandemic were also found to increase stress and anxiety.

Son et al. (2020) performed a mixed methods interview survey in April of 2020 to analyze students' mental health as a result of the pandemic. The majority of the information was collected via online qualitative interviews between research assistants and the participants. General stress levels were also observed with the Perceived Stress Scale-10, or PSS-10. This is a common stress-measuring instrument that gauges stress levels over the last month.

71% of respondents reported that their stress and anxiety levels increased as a result of the pandemic. The study team also found that 97% of the student participants believed other students were experiencing the same levels of stress. Stress stemmed from worrying about their loved ones being impacted by the virus, the various changes in learning models and educational spaces that made school more challenging, and a lack of

social interaction. Results found that being unable to concentrate on school could began a negative feedback loop of declining mental health because the students knew they should be paying more attention and wanted to but simply could not in these circumstances. Other found risk factors included class workload, financial difficulties, eating patterns, changes in one's living environment and sleeping habits.

The study also sought out how participants were choosing to cope with the events of the semester. Both negative and positive coping methods were reported. 23% of participants performed negative coping methods such as sleeping in late, ignoring the news or their assignments, and drinking or smoking. It is interesting to note that ignoring the news here was found to be a problem, while other studies in this review found that *consuming* news on the pandemic was a trigger for mental health symptoms. 70% of participants reported performing relaxing hobbies to cope, like playing with pets, exercising, journaling, and watching TV. Further, 34% of participants reported speaking to family members and friends was a good way to self-distract.

44% of respondents experienced an increase in depressive thoughts in the target time. The study also found that almost half of the participants believed their academic course load to be lighter or more manageable. This study suggests that the education model of an online semester was a challenge but not the primary reason mental health worsened among the population. The study team mentions how collegiate students were already a vulnerable group for mental health prior to the pandemic, and that the events of the 2020 spring semester showcased the lack of support available for these students.

Multi-University Studies

Two sources (Oh et al., 2021; Soria & Horgos, 2021) were found that involved quantitative and mixed-methods surveys sent to multiple U.S. IHEs. The large sample sizes allowed for broader trends of mental health among college students during the pandemic to be explored.

Oh et al. (2021) completed a large cross-sectional study across 28 universities in the U.S. during the Fall 2020 semester to explore depression and anxiety levels among college students as a result of the COVID-19 pandemic. Survey questions were formulated using the commonly used Patient Health Questionnaire-9 (PHQ-9) to elicit information on participant's experiences with depression or depression symptoms over the past two weeks. The respondents' answers are tallied up on a scale from 0 to 27, with scores of 15 or higher indicating the individual was moderately or severely depressed over the target time period. To measure anxiety, the GAD-7 scale was again used, with a scale from 0 to 12 to rank feelings of anxiety, nervousness, and irritability.

The large size of this sample allows for insight into broad mental health trends of the college student demographic in the fall of 2020. Over 3200 students (19.7% of participants) were found to have moderate to severe depression over the past two weeks, and over 5400 students (32.7%) were found to have moderate to severe anxiety in that same time span. Further, COVID-19 was found to have a significant impact on these numbers, particularly in regards to financial concern and infection concern. The study team was able to specify the relationship that concern of COVID-19 had with various factors of the participants. Concerns about COVID-19 was found to impact sleep, physical activity levels, social interactions among peers and others and general social

stress. These factors have all previously been associated with mental health outcomes. The study team mentions how the developmental phase of the young adult participants might be a further risk factor, as adolescents and young adults are more susceptible to hormonal imbalances and stressors. Another but lesser factor associated with increases in depression and stress was the social aspects of knowing a loved one who was infected with or died from the virus.

Soria and Horgos (2021) oversaw the dispersal of a large quantitative survey to eight universities around the United States. With a final sample count of over 27,000 students, the data from this survey sought to identify various factors associated with the mental health of college students at the conclusion of the 2020 Spring semester. The study used a COVID-19-specific survey, the Student Experience in the Research University or SERU COVID-19 survey. The study team also utilized the Patient Health Questionnaire-2 (PHQ-2) and Generalized Anxiety Disorder-2 (GAD-2) scales for the collection of data on major depressive disorder (MDD) and generalized anxiety disorder (GAD).

The study found that 35% of all respondents clinically qualified as having MDD and 39% qualified or met criteria for GAD. These numbers also depended on demographic factors, as students that identified as LGBTQ+, non-white, or of a lower socioeconomic status had greater odds of having MDD. Further findings include that students who reported that their institution “supported them through the pandemic” or had higher senses of belonging at their institution were at a lower risk of GAD. Unexpected financial costs (especially in regards to new technology), loss of a job or source of revenue (primarily due to on-campus job cancellation) and a loss of family

income due to the pandemic were factors found to increase risk for both anxiety and depression.

The study team concludes that individual demographic factors and personal identity had a major effect on the levels of depression and anxiety experienced by students in the 2020 Spring semester. Because of this, support services and lessons learned should take into consideration that there is no one solution that can adequately assist every collegiate student suffering from mental health issues, the study team argues. Even with specific variability based on demographics of students, the overall trends of the study confirm that depression and anxiety increased among college students as a result of the pandemic.

Additional Studies

Kecojevic et al. (2020) completed a cross-sectional survey study involving 162 undergraduate students. The inclusion criteria were students taking an introductory Public Health course in the spring of 2020. The Brief Symptom Inventory (BSI-18) was utilized to quantify the mental health of the student participants, along with the Perceived Stress Scale (PSS).

Results concluded that participating students identified academic struggles began at the start of the pandemic, and not before. Specifically, non-freshman students that were identified experienced increased levels of anxiety and stress compared to pre-pandemic non-freshman.

The results from this study coincide with studies from previous years that conclude that “public health emergencies” like Hurricane Harvey have negative impacts

on the mental health status of public health students. The study also identified where collegiate students accumulated their COVID-19 news, with findings stating that students felt social media was the least trustworthy source of news on the state of the pandemic. An inability to focus on academic work due to external reasons was found to be a primary factor in students' academic struggles. This study concludes depression, stress, and anxiety are dependent on the academic situation that students are experiencing. The more routine, structure, and purpose students feel they receive from instructors and the academic institution, the more academic success they will experience.

Lee et al. (2021) employed a multiple-choice questionnaire from a third-party survey research platform exploring the mental health of U.S. college students after the 2020 spring semester. 200 student participants recorded responses. The study included all four years of undergraduate students.

A majority of respondents (over 80%) reported feeling an increase in at least one of anxiety, depression, or feelings of loneliness. In this study participants were found to be worried about the health of their loved ones (in previous study reviewed, health of loved ones was not found to be a concern of students, at least not as significant as academic and social concerns). Other concerns identified by the study include a lack of productivity, financial issues, and future job offers (for the graduating students). 61% of students reported that finishing the 2020 spring semester away from campus was more difficult.

Social relationship statuses were also explored. 34.1% of participants said COVID-19 strained their relationships with their family and these students were also more likely to report that the semester was harder to complete at home than it was on-

campus. Similarly, 45.7% of participants reported experiencing strained relationships with friends. These declines in social relationships are emphasized by the study team as a crucial risk factor for declining mental health. Students were asked how they were managing stress and coping with the events of the pandemic. Just under half of all respondents were engaging in physical activity, and mindfulness activities and professional mental health care approaches were also reported. However, 30.3% of participants reported taking no specific actions to improve their mental health.

The uncertainty of the 2020 spring semester clearly had an impact on the anxiety and stress levels of participants. Having to continue to perform academically amidst the struggles associated with the pandemic furthered feelings of stress. The study team posits that increased mental health services on U.S. university campuses is a step to reduce some of these worries for students.

Literature Reviews and Research Reports

These final two mental health-specific sources (Lederer et al., 2021; Stowe et al., 2021) review existing literature to discuss strategies for changing perceptions on the mental health of college students. They assert that the pandemic provides an opportunity to reassess how mental health is currently dealt with and suggest ways that this could be improved on in the future.

Lederer et al. (2021) published a commentary discussing how COVID-19 made existing challenges college students faced even more difficult to handle. These included academic workloads and dealing with mental health issues. According to the study, "health and academic success depends" on colleges being able to successfully balance

COVID-19 guidelines and a college experience. Seeing as over 20 million United States citizens are enrolled in higher education, these individuals tend to be overlooked. College students are consistently found to be suffering from depression and anxiety, factors that are exacerbated by the COVID-19 pandemic. Cancellations of events and experiences were found to leave students feeling unfulfilled with personal/professional milestones. Further, the need to return home could put students in "volatile" environments, and cause financial burden, and housing insecurity.

The highlights from the research report identify four ways colleges should deal with a spontaneous transition to online learning in the midst of COVID-19. These strategies include:

- Using data to inform decision making,
- Communicating clearly and prioritizing student support services,
- Employing equitable systems (such as lenient grading policies),
- Highlighting services

The study team discussed several reasons why these increases in mental health impacts could occur. These include being a student of color and having to take on additional caregiving roles with family members. Giving additional aid to student support services and ensuring equitable systems are in effect were listed by the study team as recommendations for moving forward. In all, the study team found that COVID-19 would likely greatly impacted higher education institution operations but finds that strategies exist to support an efficient online semester.

In the research of Stowe et al. (2021), the authors aimed to classify the events of the pandemic in relation to Maslow's Hierarchy of Needs and the Phases of Disaster

model created by the Substance Abuse and Mental Health Services Administration.

Rather than complete a study with participants, they review the Hierarchy of Needs and Phases of Disaster model and extrapolate these models onto how college students in the U.S. are experiencing and dealing with COVID-19.

At the time of publication in the summer of 2021, the authors (and the rest of the world) were still experiencing the fluctuations of the COVID-19 pandemic. Cases and deaths would rise and fall, mask mandates would be issued and then removed and then reissued. Stowe et al. point to the Phases of Disaster model and identify that these circumstances did not allow for a Recovery and Rebuilding phase. There was yet to be an “after the disaster,” but rather the disaster seemed to be perpetually ongoing. The research team thus suggests implementing a “sandbar” phase of disaster recovery, drawing on the analogy of a sandbar in the water allowing for swimmers to rest and stand even amidst areas of an ocean or body of water that are too deep to stand up in. The authors describe the COVID-19 sandbar as an opportunity to rest, recharge mentally, and recognize that many aspects of the pandemic are out of the individual’s control. Behaviors on the sandbar can include developing a new daily routine that is different from one’s routine prior to the pandemic but fits the needs of the individual during it, establishing strong self-care habits, and even learning a new hobby. Even though the pandemic is surrounding the individual like the water does to a person on a sandbar, being able to take time and reset is beneficial for one’s mental state.

In relation to Maslow’s Hierarchy of Needs, the authors note that in the context of college students, things like academic achievement might not be prioritized as highly by students as they once were. Basic needs like medical and basic health behaviors must be

met first (according to Maslow's model) and this may be more difficult during the pandemic. Individuals who lost sources of income as a result of the pandemic will look to satisfy financial needs first, which can result in putting aside or deprioritizing homework and other academic responsibilities. In short, the authors argue that the context of the pandemic may force college students to be less mentally available for school. Because of this, being able to find the 'sandbar' amidst the turmoil and mentally reset is key for balancing stress and anxiety.

Summary of Mental Health Publications

In all, 11 publications reviewed here were organized as specifically discussing COVID-19's impact on the mental health of college students in the U.S. Most studies and publications were cross-sectional, resulting in detailed insight into a particular time period, but lacking in information on causality and broader trends. Anxiety and depression were the two most common mental health symptoms to increase after students were sent home in March of 2020, but other symptoms such as stress and eating disorders were also found to increase. Finding ways to cope with the events of the pandemic and filling up newfound free time with constructive activities like being physically active were ways to combat mental health symptoms. Some studies made mention of factors like sexual orientation, race, and socioeconomic status. These factors are important to study when aiming to get the most wholistic understanding of the impact the pandemic had on the mental health of college students. This literature review acknowledges these factors and asserts that further study and analysis of these factors is needed, but does not analyze them further, in accordance with the aim of this report.

COVID-19 and Changes in Education Models

Journal Articles on Faculty and Student Perceptions

Thomas Grose of the American Society for Engineering Education wrote two articles (Grose, 2020; Grose, 2021) that illustrated faculty perceptions and lessons learned from the Spring of 2020 to the start of the 2021-22 academic year regarding online and hybrid instruction.

Further analysis of the 2020 spring semester's use of online learning is provided by a Grose (2020) journal article in which he highlights how difficult online learning was for engineering students who rely on team interaction and hands-on learning instruction for much of their coursework. Grose's work found that faculty members struggled as well, especially in the absence of an "in-person connection."

Much like the findings of other sources Grose references, faculty members Grose interviewed reported that having the time during the summer of 2020 to prepare for the fall semester was a huge help. This time allowed for assignments, expectations, and core content to be planned out more thoroughly and better designed for an online learning model. Strategies were already planned out for the fall 2020 semester and reported to the author, including combining online lectures with consistent group work and creating smaller groups within large classes to allow for more instructor-student interaction.

In this engineering context, certain faculty members admitted a lot of work done by engineering students is already completed online, on computers or drawn out on paper away from the classroom. Understanding what is required of students in their coursework can influence the way an online course is run – certain courses may be better suited for

online learning. A major challenge reported in this article is the differing time zones students and faculty members had to contend with. This issue is especially prevalent at universities where students can be coming from all over the nation or world. Especially with group projects or other synchronized meetings, having students in different time zones can put extra pressure or stress on students to meet at irregular school hours.

Grose again wrote an article the following year with more insight on how the online learning process was impacting students and faculty. This report is a journal article, again with the American Society for Engineering Education, where Grose spoke with faculty at U.S. universities and collected qualitative findings on their perceptions of both the online and hybrid learning models. Here, both students and faculty are interviewed.

There were a variety of aspects of the completely online learning model that were found to be liked enough to be kept during a transition to a hybrid style of learning. One of these was breakout rooms, which one professor stated added variety to their courses. Videos were also reported to be well-received by students and faculty members alike. Videos allow for an inverted or “flipped” classroom, a concept where lecture materials are assigned outside of the classroom, allowing for more practice and experimentation with the material inside the classroom. Inverted classrooms were used in certain educational settings before the pandemic, but online learning provides a prime opportunity to utilize this instructional method. The article also touches on the ability hybrid or online classes have of extending educational opportunities to individuals unable to be on a university campus. Digital classes and online learning drastically increase flexibility of learning, where attending a classroom is no longer required to learn the

material and pass a course. Finally, the ability to invite guest speakers to a classroom became markedly easier with the transition to online learning. Being able to video call into a class can connect students and instructors with experts in the subject or field, and online calls can facilitate seminars and discussions easily.

However, there were aspects of online learning not looked upon as favorably according to Grose's research. Cheating worries increased over the pandemic, as being away from a classroom and teachers meant students were often less supervised when taking tests than before. At-home distractions, internet access and other technological issues, and communication with their instructors were all additional issues listed by students.

Results of Mixed-Methods Studies

Five mixed-method studies on student perception of the online learning model (Murphy et al., 2020; Schnieders & Moore, 2021; Serhan, 2020; Gonzalez-Frey et al., 2021; Hariharan & Merkel, 2021) are compiled below. Overall findings suggest that while online learning did present some benefits to students, students were more willing to discuss negative aspects of a non-traditional education model.

The research team of Murphy et al. (2020) conducted a mixed methods online survey at a small, private, 4-year university in Maine to better understand how the transition to an online learning model impacted students' academic experience. The study found that on the topic of transitioning to an online learning model, 59.5% of participants expressed uncertainty, 50.7% expressed anxiety, and 41.2% expressed nervousness. Some students responded that professors decreased workload after the transition to

online, while others stated workload increased. Over 81% of respondents felt their professors utilized the learning management system (LMS) effectively to provide clear instructions on assignments and course direction. Common themes from the open-ended questions posed to students included constant communication, continual use and updating of the LMS, and “leveraging technology” to improve academic experience (including using 3rd party tools like Zoom and Google Hangouts). Instructors that were able to be flexible and supportive of their students were mentioned repeatedly in response to ‘what should professors keep doing?’ The study concludes that while the sudden transition led to increased feelings of anxiety and uncertainty, communication between students and faculty led to better academic experiences overall. No real mention of the greater context of the pandemic is mentioned.

Schnieders and Moore (2021) summarized a large mixed-method survey of first-year college students at the end of the 2019-2020 school year. The research study initially planned to explore the students’ educational plans by surveying them at the start and end of their first year. However, the pandemic forced the study team to change their questioning for the summer surveys to reflect the sudden and drastic changes in their educational experience because of COVID-19.

The shift to an online learning model was difficult for many student participants, the study found. 66% of respondents reported their coursework was somewhat to very challenging. In open-ended questions, students cited lack of motivation, struggles to conceptualize information when presented in an online and not hands-on format (this was especially prevalent for students in studio art or laboratory-based majors), and concern

for the long-term effects of online learning. In fact, 55% of respondents reported a “great deal” of academic concern in the long-term.

Access to technology and the internet was a crucial factor in determining the satisfaction of students regarding online learning. Open-ended questions yielded results such as students having to go and buy a new laptop to complete the semester or struggling with maintaining a reliable Wi-Fi connection in important academic times such as presentations or tests. The study also defined “learning gaps” as a situation where a student needed a learning device but did not receive it. Learning devices ranged from timely feedback on an assignment from a professor to the number of assignments. For example, a learning gap would occur if a student needed a quiet space to work but was unable to have one. 60% of respondents had at least 2 different learning gaps while finishing the semester online, and 29% of respondents had 5 or more learning gaps (the study defined 10 possible learning gaps).

An interesting note from this study was that prior online learning experience was found to have a positive correlation with student satisfaction with online learning. In this study, 62% of respondents had never taken an online course before, which can explain the struggles this study’s research found. Applying this trend forward, however, it could be assumed that further experience with online learning in the 2020-21 academic school year may have left students less overwhelmed due to their prior experience.

The study team found that, despite all the criticisms and struggles with the online learning model, 83% of respondents planned to enroll in the same institution for the following year. The study concludes with guidelines for how HEI administration and even policy makers can improve a future online learning model. Suggestions include

eliminating learning gaps, addressing socioeconomic inequality among students, better preparing students and faculty for online learning via workshops and training, and investing in student outreach and support.

Toward the end of the 2020 spring semester, Professor Serhan of Arizona State University administered a mixed-methods online survey for 31 students in order to explore participants' attitudes and perceptions of Zoom, especially compared to traditional in-person teaching (2020). There were two open-ended questions in this survey asking the students the advantages and disadvantages of using Zoom, respectively. The study used a Likert-type survey for the quantitative questions, having participants rank their perceptions of the issue on a 5-point scale with strongly disagree being a 1 and strongly agree being a 5.

61.3% of students disagreed that Zoom improved their learning, and 22.6% of students in the study agreed that they liked the use of Zoom. 61.3% of students also said that Zoom resulted in less interaction with their instructor and did not help them participate in class. 80% of students reported they would have been more comfortable learning in a traditional classroom setting than over Zoom.

For the open-ended questions of this study, advantages of being on Zoom for their education were grouped into four primary categories: flexibility, including being able to stay at home and a less rigid schedule; easier interaction, including feeling it was easier to ask questions; written communication; and the use of multimedia. It should be noted that roughly 79% of all responses fell into the flexibility category. Disadvantages of using Zoom were also grouped into four categories, although there were more even numbers of responses per category for the disadvantages. They were: distractions, specifically with

learning outside of the classroom; quality of interaction and feedback, labeled as worse due to the lack of in-person connection available; poor education quality, including sentiments of overpaying in tuition; and technical difficulties. 42% of participants' responses fell under the distractions category, with 37% going under the quality of interaction and feedback and 16% for poor education quality.

Although advantages of transitioning to Zoom were mentioned, it seemed the disadvantages inspired more detailed responses and seemed to be the core findings of the study. The results of this study make little to no mention of the context of why the transition to Zoom was made, and instead focuses mainly on the individual academic experience of the participating students.

Gonzalez-Frey et al. (2021) studied initial thoughts and perceptions of an online learning model from students at SUNY Buffalo State at the conclusion of the 2020 spring semester. This study utilized qualitative questioning in a survey format, combining a Likert scale to rate remote instruction with open-ended questions. To organize collected data the study team sorted responses into four categories: Communication, Flexibility, Virtual Interaction, and Empathy. From these categories, key quotes were selected to represent the categories findings.

The study team selected students from all four academic years, with seniors being the largest subgroup. 26 graduate students also participated. 62% of students reported their online learning experience was at least somewhat worse than traditional instruction, while only 14% of respondents said online learning was at least somewhat better. The open-ended question aspect of this survey questioned students on aspects of online learning that "helped" students. Communication was the most common response –

instructors that were proactive, sent consistent emails, and utilized video conferencing or virtual platforms was found to be beneficial. Communication was also a common theme when students were asked what could have been done better, as well as educators being flexible with deadlines and showing empathy.

Gonzalez-Frey et al. summarized their lessons learned into two major categories: strong and frequent communication between students and instructors and a clear, structured layout of the schedule and expectations for each week. Flexibility from both instructors and students is also important for accommodating all students and overcoming the many obstacles associated with online learning. With proper planning and a comfortability with the tools needed to learn remotely, this study team concludes a course or semester held online can allow for an informative, successful online learning experience. Of course, the 2020 spring semester allowed for no real planning period and demanded a near spontaneous switch from traditional to online instruction.

Hariharan and Merkel (2021) utilized a survey at Cornell University during the 2020 fall semester to explore the differences between student experiences in a hybrid learning model. Of the 26 student participants in this study, 18 took a Public Health course completely online, while 8 students elected to take a hybrid version of the course. The group of participants was made up of second-, third-, and fourth-year students. The survey combined quantitative and qualitative data collection by asking the students both open-ended and Likert-type survey questions. The study lasted the duration of the semester.

Both the online and hybrid groups had statistically similar mean grades for the course, with the in-person group scoring 1.3% higher. The study team asserts that the

differences between the two groups was seen in class behavior and participation rather than final grades. Based on the findings of the survey, the study created four primary directives for a successful online learning experience:

Small-group activities and breakout rooms should be held consistently to increase class engagement and contributions among students. Students enjoyed being able to speak with other students during these times, and students who reported being more active in small-group work had a higher mean grade than those who contributed less. The second directive builds off of this one, which is to encourage students to keep their cameras on, especially in breakout rooms. The study found this contributed to feeling more connected with others in small-group work or in the overall learning experience because it better mimicked in-person learning. Due to inconsistent Internet connection and reports of feeling self-conscious with cameras on, the study team emphasizes this should only be an encouraged suggestion and not a mandate.

The third directive was for faculty to assign learning activities that are specifically suited to an online learning experience. Rather than attempt to transfer in-person strategies to an online setting, offering more project-based, small-group assignments in class can help students digest the material better in an online setting. Finally, ensuring that lecture recordings, transcripts, and any other materials from a class session are available for all students was found to be beneficial. Students in both the online and in-person groups reported enjoying being able to access class lectures even after the class was over, specifically when reviewing for tests.

Summaries of Literature Reviews and Reports

Kelly and Columbus (2020) identified the stressors higher education organizations were experiencing entering the fall 2020 semester and looked to identify factors that influenced the response to the pandemic higher education may be experiencing. This work did not involve a questionnaire or research process, but rather acts as a literature review of the state of higher education institutions in the United States for the near future. The study identified five near-term challenges to online learning:

The primary challenge involved student retention and motivation during online learning. After a spring semester where the transition was mandatory, experiencing online learning during the fall may seem like the pandemic will never end, and this is the future of higher education. Online education reports have shown that numbers of students have become unidentifiable or unable to access, emphasizing how hard it is to maintain motivation amongst students in an online format.

Other challenges to online learning included recruiting students in the future and in-person enrollment, maintaining auxiliary activities, and financial issues associated with reopening schools during the height of the pandemic. A final challenge mentioned by the study team was how difficult it was to plan for a recurrence or an additional outbreak-type disruptions of educational learning. In a look towards the long term, the study determined that student preferences in academic instruction and experience will be markedly different. However, online education's failure to provide the social and experiential opportunities that in-person collegiate living offers makes it seem, according to this study, that online learning will only have an auxiliary role in future higher

education experiences. Additional videos and breakout rooms aren't enough to provide the general vibe that an on-campus experience provides to first-year students.

This work looks to the future by analyzing what kinds of impacts the pandemic will have on universities. The authors mention how campuses may be more wary to invest in new infrastructure after seeing how plausible instruction is in a virtual setting. Rather, the authors identify investments in things such as broadband internet may be more common for universities. The demographics of college students may also be permanently affected. With universities developing online courses and strategies for remote instruction, opportunities for students to enroll at a university without moving on campus increase, increasing overall enrollment as well. To support this, universities will need to continue to invest in and support online or hybrid models of instruction.

Newfield and Douglass (2020) discuss how the COVID-19 pandemic has spotlighted the need to increase online opportunities at Higher Education Institutions or IHEs. According to the authors, specific industries and the work force in general are adapting and universities must adapt alongside them to best prepare students for post-graduate life. The researchers stated that expanding online opportunities and services at IHEs can “help mitigate growing socioeconomic inequality” while also allowing students to “enhance personal growth.”

Online courses and degree programs can help students stick to their academic goals and increases “educational attainment rates.” The COVID-19 pandemic forced students in a more ‘traditional’ on-campus collegiate environment to experience pursuing a degree from home, online, or in other non-traditional methods. The authors assert that this is a prime time for popular 4-year universities to adapt and reshape the courses and

opportunities they offer. Suggestions include reworking curriculum to be a more hybrid-based style, emphasizing the “quality and nature” of learning experiences rather than simply being in a classroom with a faculty member, and even providing short-term certificates or “badges” during the pursuit of a traditional bachelor’s degree in order to break up the process into potentially more manageable segments. Finally, the authors stipulate that these reforms to a more inclusive, hybrid education model should be extrapolated to community colleges and other smaller colleges, and not withheld for the biggest and most well-known research institutions and prominent IHEs.

Zeng and Wang (2021) created a literature review that summarizes published studies on student satisfaction of non-traditional education models since the onset of the pandemic. The review finds that student satisfaction with the learning model is predictive of student academic success. The literature review also points out that recent studies on student satisfaction have produced inconsistent results, with some studies saying there is no difference between satisfaction of online or in-person instruction and other studies finding student satisfaction decreases with online instruction.

A factor highlighted by the literature review is the timeframe universities had to work with when designing these online courses. Due to the rapid onset of COVID-19 and the sudden transition to a socially distanced world, many faculty members and HEI officials needed to work quickly with little planning period to develop online courses. This may affect the quality of product produced and offered to students.

The authors broke their source information into two groups: the synchronous and asynchronous aspect of online learning. They found that the synchronous aspect allowed for real-time conversations and feedback, which was met with high approval from

various study participants. Synchronous meetings also best simulate in-person learning and interactions, which was found to be beneficial for students' focus and motivation. The asynchronous aspect provides easier access to materials and can be done on a personal schedule, which college students also were satisfied with. Asynchronous learning material can also be watched or read by students at their own pace, rather than the professor's pace. This means students can stay on certain PowerPoint slides longer if they need to or click on links embedded in the learning materials. For both synchronous and asynchronous online learning, the quality of the video or internet connection is important for keeping satisfaction high.

The authors conclude that asynchronous and synchronous aspects must be present in order to have an online class that is satisfactory for college students. Having asynchronous learning material support the material covered in a synchronous Zoom class or assigning asynchronous discussions about synchronous interactions are ways that faculty can connect these two components of online learning.

Reports on Personal Faculty Experience

Three sources (Mercer & Behrens, 2020; Travis et al., 2021; Zhou, 2020) are written by faculty and administrators of three universities and detail how they dealt with transitioning to different education models during the pandemic.

Mercer and Behrens (2020), professors at a small, private university, created a report of their experiences and observations after moving to an online teaching model during the spring semester of 2020. This source did not follow a research study protocol but rather was a compilation of findings based on the authors' experiences.

The authors listed six areas of reflection based on the time spent in an online education model. The first was lessons learned about their university's primary academic website. Similar to a Blackboard or Canvas, this website is where faculty members post assignments, resources, syllabi, and grades for students, and where students submit assignments. Websites like these are referred to as learning management systems, or LMS. While this existed prior to the pandemic's onset, detailed knowledge of all of its features and supreme comfortability navigating the website suddenly became a necessity in 2020 spring. The authors found that course folders should be reorganized if the course will be held online, and that student and faculty experiences can differ due to different capabilities of each party on the website.

The next three reflection areas included assignment due dates, grading, and tests and quizzes. The authors found that communication was key with students, and that flexibility and understanding was absolutely necessary. Deadlines were moved from "end of class" to "end of day" (11:59 PM), traditional test and quiz formats were often altered to ensure there was no cheating, and rubrics and realistic expectations were helpful for students to not become overly stressed about their grades.

The final two reflection areas involved Zoom and distractions in the classroom. Noted changes to a traditional in-person learning model was the absence of a "teacher in front" environment (speaker's screen can be one of several visible) and the fact that students could now see all other students' faces (compared to primarily back of heads in a classroom with rows of desks). With these changes, the authors stated they had to find new ways to encourage and assess participation. It was difficult to monitor student's attention levels when distractions could be occurring on screen or in breakout rooms, let

alone away from the screen. Having cameras on and emphasizing being present in the class were some strategies employed.

Travis et al. (2021) compiled a summary of the work that the administrators of Hope College in Michigan did to operate during the 2020 Fall semester. Hope College announced it would attempt to be “as in-person as possible” during the 2020 Fall semester, which included in-person classes and students living on campus. This was all done “in the best interest of the students,” particularly after faculty feedback from the online 2020 Spring semester.

For that fall semester, Hope College began classes two weeks earlier than it typically would in order to complete the semester by the Thanksgiving holiday. Breaks were also reduced to streamline the semester schedule. Faculty and administration members formed collaborative teams as early as July of 2020 to help plan for the semester. Over the course of the semester, Hope College performed over 10,500 COVID-19 tests for students and staff at no cost. 1% of the student population was selected at random to be tested daily as part of the college’s surveillance screening strategy. Students could also get a test if they were experiencing symptoms. Positive cases were isolated in reserved quarantine rooms on campus. Positive cases peaked in the final two weeks of the semester: the highest number of students in isolation or quarantine was 369 and occurred on November 11.

Masks were required of all persons in all public spaces. Classrooms and other campus buildings were altered to accommodate social distancing practices. If classes had too many enrollees and would be unable to socially distance in a campus building, they were held online. 18% of courses held at Hope College that semester were taught

completely online, 58% were taught in-person, and the remaining courses followed a hybrid model. Long distance travel was discouraged.

This report outlined lessons learned from the administrative teams responsible for this modified semester. Communication is identified as crucial for this process to be successful, including being able to share data and plans with team members quickly, having a solid communicative relationship between the school and the students, and relationships with local health departments. Acknowledging constraints was another lesson learned. The report states employees and resources were not strained because the college did not attempt to provide outside of their range of possibility. Finally, the created teams were an efficient way to break up work and act as a think tank for ideas and strategies to tackle the issues the pandemic presented. No information is included in the report about Hope College's strategies for the 2021 spring semester.

Zhou (2020), a professor at Mercy College in New York, published a report on their experiences teaching an upper-level, lab-based biology course during the transition from in-person to remote learning in the spring of 2020. The author asserts throughout the report that various online tools can make the online education model a powerful way to teach because of the options available. For example, the author noted how they were able to annotate the lecture slides they were presenting on during the presentation with a stylus on a tablet. The author felt these annotations and illustrations allowed for students to see the content presented in a more dynamic way than on a slide or in a textbook.

The nature of the course, being lab-based, proved a challenge for the author to adapt to an online setting. The authors primary solution to this was to use online lab simulators that were free for the students. Of the six lab sessions the course offered

throughout the semester, four of them took place after the switch to remote learning. However, the online labs appeared to allow for the students to comprehend the learning material successfully, even though it was on a computer. The author tested the online lab experiments before the class to be familiar with potential problems. Educational videos were also shown to the students about the content to supplement the lectures and online labs. Prelab and post-lab assignments, able to be completed from home with needing to be in the lab, were also designed by the author to further simulate a true lab experience. In fact, these pre- and post-lab assignments were not designed when the course was in-person. Rather the author created these assignments after the transition to remote learning to “make online teaching of the labs more effective.” There are no data in this report on feedback from students about the online labs or extra assignments.

While Zhou does note the potential benefits of an online education model and asserts that the online biology lab simulators were able to provide some sort of experience for the students, they also admit that there is no real substitute for experience physically using tools such as pipettes and microscopes. Zhou concludes by suggesting a well-designed hybrid course, with online lectures where information can be annotated and in-person labs where students can receive hands-on experience, is the most effective way to utilize the benefits of both education models.

Summary of Education Model Publications

In all, 13 publications reviewed here were organized as specifically discussing COVID-19’s impact on the education model utilized by IHEs in the U.S. The sudden transition to online learning in March of 2020 forced students and faculty to learn a

completely new way of learning and teaching quickly, which resulted in negative opinions on online learning. A hands-on, in-person communicative approach was no longer possible, and adjusting to this was found to be difficult for students and faculty across the country. As time progressed, specifically into the fall 2020 semester, familiarity with technologies like Zoom increased and positive takeaways became more common from study participants. Faculty became more confident with structuring courses to continue to educate and engage students. It may be too early to concretely predict which aspects of a non-traditional learning model will be kept at IHEs in the near future, as strategies like breakout rooms and asynchronous class meetings had mixed opinions. Again, factors such as students' physical access to necessary technology, the location where students were completing their non-traditional education, and their socioeconomic status were mentioned in a few studies compiled here, and future research outside of this literature review should be dedicated to uncovering more information on how these factors impact perceptions on education models.

COVID-19 and the Intersection of Mental Health and Education Model Changes

Among all the studies reviewed, only three (Copeland et al., 2021; Keyserlingk et al., 2021; Mucci-Ferris et al., 2021) had a research purpose of analyzing the relationship between learning education models and mental health levels of college students. Consequently, they are presented with no additional subgrouping. The lack of published studies suggest the need for exploring and analyzing this topic further in future research.

Copeland et al. (2021) studied the mental health of first-year college students, specifically in their behaviors. This study took place at the University of Vermont and began at the start of the 2020 spring semester, prior to the onset of COVID-19. Consequently, this study allows for a direct comparison of mental health status at the start and end of the 2020 spring semester. The study utilized questionnaires and in-depth personal assessments. Study results found that COVID-19 increased problems with attention on academics as well as externalizing problems. As hypothesized, the mood, stress levels, and overall wellness index of the students were all negatively affected halfway through the semester once COVID-19 forced students home and into a period of uncertainty. These findings were compared to data from 2018 to ensure the drop in mental health was not a normal result of a post-spring break trend towards the end of the academic the year. However, the spring of 2020 was noticeably different.

A note from the study team was that the interruption and suspension of all aspects of the college experience aside from the academic component impacted the findings. The externalizing and attention problems that were most prevalent in the behavioral and emotional functioning surveys are comparable to studies on college students who experienced natural disasters.

Finally, the study touched on how online learning might help to relieve mental stressors associated with COVID-19. The team stated, “the greater the perceived disruption by COVID-19, the greater the impact.” Steps made by administration or faculty to support students and their families through this initial phase of the pandemic has the potential to ease the mental burden of coping. Additional measures of tracking

emotional health along with physical health at a HEI were cited as a necessary area of further research.

Keyserlingk et al. (2021) attempted to explore the relationship between academic stress and general mental health. Survey questions were asked during February, April, May and June of 2020. A variety of scales were used to quantify the stress levels of student participants, including the K10 screening scale and the College Students Self-Assessment Survey.

Based on the study results, study-related stress for undergraduate university students increased from January to June 2020. However, students who were reported to have shown signs of psychological distress and mental impairment prior to COVID-19 have proven to be predictive examples of students who ultimately suffered from negative mental health impacts during the pandemic. While this study does not address the future academic situations facing these student and faculty in the coming academic years, it does illustrate the difficulties facing these students as they move into the alternative academic model of the post-COVID-19 pandemic world.

A work-life balance is cited throughout the study as something that is necessary for high mental health levels amongst college students. This is based on both prior knowledge and the findings of this study. A good balance between the social and academic facets of college is highly determinant of lower levels of stress, anxiety, and depression. The study found that COVID-19 drastically disrupted this work-life balance, and this is a primary reason why study-related stress increased during the spring semester.

The study results are consistent with pedagogy studies done in the previous 10 years. Transitions in academia, such as transitions from high school to college, have been proven to be stressful events for young adults. Specifically, individuals in this demographic have proven to look for coping mechanisms to cope with the academic stresses associated with higher education. The drastic shift in learning environments “created new demands for undergraduates.” It is then unreasonable to expect a smooth and complete transition between traditional and online learning. Procrastination specifically impacted academic stress, as the closure of the official university campus impacted study schedules and routines.

Mucci-Ferris et al. (2021) created a qualitative interview research study to identify positives, negatives, and opportunities college students identified during the COVID-19 pandemic. The study utilized interpretive phenomenological analysis, or IPA. This is a qualitative analysis method that helps researchers visualize how a phenomenon like the “college experience” was interpreted by participants in each context, with the context in this case being the end of the 2020 spring semester. 17 students at a midsized, private 4-year university responded to open-ended interview questions to detail their opinions and experiences.

The study results found several recurring answers in the ‘positive aspect’ section, including time management, technology shift, and changes in priorities and values. However, participants more readily shared information in the ‘negative aspect’ section, especially their own negative experiences (as opposed to broad positive or negatives that could be extrapolated to a larger population). Interestingly, some of the same common responses from the positives section came up again in the negative one: the technology

shift, the academic shift, and feelings and attitudes were all mentioned enough to create a subcategory, along with “loss of college experience.”

While two respondents were unable to identify opportunities that arose during the first semester of the pandemic, other participants mentioned new perspectives, new ways of connecting, and skill development. The study team found that gratitude was an overarching theme in this section, with respondents showing appreciation for custodial staff, the ability to still take classes from home, and still being able to build collegiate social networks, albeit online.

This research team concluded that the education model, and in extension, online opportunities outside of the classroom, play an important role in the mental health of college students. Online instruction that is “creative and accessible” can elevate academic motivation levels. Continuing conversations like these can help online learning software developers, university administrators, and faculty to better understand what works and what doesn’t for students to provide for a better academic and social collegiate experience online.

Summary of Publications on Education Models and Mental Health

In all, just 3 publications compiled for this review were organized as specifically discussing the relationship between COVID-19’s impact on the education model utilized by IHEs in the U.S. and how this in turn impacted college students’ mental health. The small sample size highlights the need for future research on this topic. The studies compiled do imply that the comfortability level college students have in their learning

environment can impact their rates of anxiety and stress. Further, academic stress was found to be a predictive factor of other mental health symptoms. With the sudden transition to a completely different education model at the advent of the COVID-19 pandemic, familiarity and experience with their education setting decreased rapidly for faculty and students, in turn impacting the mental health of individuals. While it is important to recognize that changes to academic models should not be labeled as the primary or sole reason why mental health symptoms increased during the pandemic, the studies collected here do indicate that education models can influence mental health among students.

Discussion

College students were already a stressed demographic prior to the pandemic. Having to move home during spring of 2020 exacerbated that. The tragic and sudden events of the pandemic helped highlight the stress and mental health issues college students were already dealing with and may inadvertently have increased access and opportunities for mental health services specifically for college students.

Universities are permanently affected by the switch to online learning. Strategies like a flipped classroom, always making lecture materials available and having guest speakers seem to be here to stay. Other strategies like breakout room sessions have a less certain future at IHEs. With adequate time to prepare for it, particularly for faculty members, students and faculty alike reported they were more confident in their ability to

navigate a course that is at least partially online. Further, each experience with online learning improves comfort levels with technological devices and various learning models.

Findings on the specific role a hybrid learning model played in mental health effects of students are slim. The hybrid learning model was applied either in the fall or spring of the 2020-21 academic year as the pandemic was becoming more familiar, so universities and students had more time to get accustomed to different learning environments. As a result, mental health symptoms seem to be reduced compared to the initial shock and upheaval during the 2020 spring semester. Additionally, there was no significant difference of reactions to the pandemic or perceptions of online and hybrid learning between the different academic classes. It seems that the mental health impacts are standard across all ages in this selected age demographic.

Many of the sources dealing with the education model aspect of the pandemic are focused specifically on the effects of the transition to online learning. While a decrease in mental health is a reported consequence of this transition, it is not the only one. A loss of a “true” college experience, decline in academic achievement and motivation, and certain benefits of having college online are all also tied to this shift. Few specifically question how the shift to online learning impacted mental health – rather it is often discussed as a by-product of the transition. Studying the relationship between “stressors” associated with online or hybrid learning and mental health symptoms like depression and anxiety is not the purpose of many of the compiled studies.

As the studies were reviewed, many dealt with findings and participant responses in the 2020 calendar year, either during the spring, summer or fall. This allowed for the freshest, earliest opinions on the mental health levels and online learning experiences.

However, it means much of the hybrid learning models utilized in late 2020 or 2021 were underreported. Further research should be carried out to understand how a balance between traditional and online learning models could be made successful, according to students and faculty.

It is interesting to note that while many of the initial problems reported on by the variety of participants and studies compiled here could theoretically be solved by continued experience with Zoom and online education, the issue of distractions due to learning outside of the classroom poses a more long-term issue. Faculty preparation and familiarity with the software being used does nothing to maintain motivation and focus for a student attending class in their own bedroom. A traditional classroom necessarily encourages focus because of the shared communal space it is held in and the lack of distractions it provides. A student on their phone in a classroom may try to hide it but is obviously more capable of being caught or singled out than a student on their phone in another room Zooming into the lecture. Further, distractions were repeatedly brought up by respondents as one of the primary reasons online learning was difficult or different – it was so much harder to maintain focus and motivation when completely alone and unsupervised. How faculty and students alike will work to combat the issue of distractions in the near future will be interesting to monitor.

Almost all of the compiled studies are cross-sectional, which is a limitation. Comparisons to past semesters are rare. However, it can be argued that the COVID-19 pandemic was life-altering enough to render comparing students' data about their mental health and academic experiences from before the pandemic to data after it a moot point.

Finally, a note on the discrepancy of focus between the mental health of students and the mental health of faculty members. The study purpose was focused on learning about how the mental health of college students was impacted by changing education models during the COVID-19 pandemic. But faculty members were also going through periods of immense change, uncertainty, and stress at this time. Results of some studies compiled in this review talk about how students came to depend more on faculty to provide clear communication, demonstrate increased empathy towards students and essentially do more emotional labor than they were prior to the pandemic to support students academically. This study is limited in that it did not specifically consider this aspect of mental health at IHEs in its literature review. Future research is needed on how this increased emotional labor asked of by faculty members impacted their mental health as well.

Proposed Future Research

This study was originally conceptualized as a year-long, qualitative research study. The research had a slightly different study aim and research questions, but essentially was designed to analyze how the specific strategies utilized by Tulane University to bring students back to campus for the 2020-21 academic year impacted the mental health and perceptions of online learning of Tulane students and faculty. This work would then serve as a foundation from which to analyze the future of online and hybrid learning at U.S. universities.

As concluded by this literature review, the specific link between a non-traditional learning model and the mental health of college students who experience the altered learning model is an area requiring further published research. This proposed research study would help fill this gap of knowledge.

Due to a lack of time available to complete the proposed study, the research aim and methods were altered and became this literature review. However, the proposed study protocol is included here in brief. This includes the methods and procedure of how a study like this could work in the future.

Proposed Study Design

The design of this study is a qualitative research study centered around semi-structured interviews. Interviews were selected as the data collection method because they would allow for a more conversational flow about experiences, which in turn would lead to more detailed and nuanced data than being restricted to a scale of opinion. With background context as universal and well-known as the COVID-19 pandemic, holding interviews allows for individual stories and experiences to be collected. Rather than simply collecting numbers and data points on a page, the goal is to create a narrative of personal experience.

25 interviews will be held, both in-person in the Caroline Richardson building on Tulane's Uptown campus, and/or on private Zoom meetings, depending on the preference of the participant. 20 undergraduate Public Health students and 5 Public Health faculty members will be interviewed. Following the interviews, a combination of literature review from outside sources and data analysis from this study's interviews will be

utilized to hypothesize the role hybrid learning will play in higher education in the short-term future.

Proposed Study Methods and Procedure

Inclusion criteria for the undergraduate subjects would include:

Subjects 18 years or older, a current full-time student, and a sophomore, junior, or senior for the Fall 2020 - Spring 2021 school year in the School of Public Health at Tulane University. For the faculty members, subjects must be 18 years or older, a current faculty member in the school of Public Health at Tulane University and have taught a hybrid learning class in the 2020-21 academic year. They also must be teaching again in the 2021-22 academic year.

The exclusion criteria are the same for both sections of participants. Subjects 17 years old or younger and do not meet the inclusion criteria will be excluded from the subject population.

There will be 20 undergraduate subjects and 5 faculty member subjects in this study. This set of subjects is being recruited because of their first-hand experiences with the hybrid learning experience at Tulane University. By selecting only subjects associated with the SPHTM at Tulane, workloads and class types will be more uniform than a selection of students with a variety of majors or faculty members teaching in different schools. No children or anyone under the age of 18 will be involved in this study and no other vulnerable subjects will be involved in this study.

Interviews will be held either in the Caroline Richardson building on Tulane's Uptown Campus or via Zoom, depending on the preference of the participant. This will

be organized during the initial contacts between participant and interviewer. The interviews will take place primarily between the hours of 9 and 5 on weekdays. This can be adjusted to best fit the schedules of the participant. This will be organized during the initial contacts between participant and interviewer

At the start of the interview, the interviewer will present the consent form to the participant and allow time for the participant to read the form and confirm their willingness to participate. Signing the consent form is required for continuing with the procedures. After the consent form is signed, audio will begin to be recorded and the interview will take place. Interviews will cover topics such as the decision-making process that led the participant to return to Tulane's campus in the fall of 2020, how they coped with academic stress in a hybrid education model, motivation levels, and general perceptions on their experiences. A copy of the interview questions and guide to be used can be found as an appendix. At the conclusion of the interview, the interviewer will thank the participant for their time. At this point, the remunerations will be paid out (an electronic gift card worth \$10). After this the participant is free to leave and has no more responsibility in this research study. All collected data from the interviews will be safely stored by the interviewer. These procedures should take about an hour's time to complete from start to finish.

Completed Interview at Tulane University

Prior to the reshaping of this study, one qualitative informative interview was conducted with a Tulane faculty member, named Sally in this study in the interest of privacy. This interview did not use the study interview guide, but rather served as an

interview to collect background context about what Tulane did to prepare for the 2020-21 academic year. Sally is a full time faculty member at Tulane but also heavily involved with CELT (Tulane's Center for Engaged Learning and Teaching). In her interview she spoke about how she was advocating for the use of Zoom prior to the onset of COVID-19 in March. She felt it could be used as an educational tool to keep teachers and students connected if they needed to travel for some reason and miss a class.

Sally also detailed the work done by Tulane administration and faculty to prepare for bringing students back to campus in the fall of 2020. In the summer of 2020, infrastructure changes were implemented to facilitate social distancing, third-party instructional design companies were contracted to aid in training the faculty on using new technology like classroom microphones and cameras, and team cohorts were created so Tulane faculty could work through the training and planning process together.

Finally, Sally addressed the potential of Zoom and online or hybrid education models being used by universities such as Tulane in the short-term future. She asserted that "we're all a lot more flexible than we ever thought we could be" and that the communication and relationship faculty and students have with each other is "the biggest component of... good education." In line with some of the findings from the literature review, Sally hypothesized that some aspects of online learning will be kept (such as the convince of meeting online rather than in a physical location, sharing teaching materials), and others will be left behind (audio-conversational difficulties on Zoom, suddenness of transition times from different education models) as the higher education industry works to find the most effective teaching methods to keep students motivated, engaged, and challenged in a post-pandemic world.

Conclusion

This literature review found that there was a direct link between the events of the COVID-19 pandemic and the decrease in the mental health of U.S. college students from March of 2020 onward. Anxiety, depression, and stress symptoms all increased across a variety of universities and study populations.

Further, this review highlighted the perceptions of the online education model from student and faculty responses and experiences. The newness and unfamiliarity of the online model, from using tools like Zoom for lectures to a new way of communicating, made for generally negative opinions on the online learning model (compared to a traditional model). However, sources compiled from months after the initial shock of the pandemic illustrate that students and faculty alike became more comfortable with the online or hybrid model. These findings, coupled with the interview from a Tulane faculty member, suggest that aspects of the online learning model will remain a part of the HEI academic experience for the foreseeable future.

Further research is needed to understand the specific effects the transition to online learning had on the mental health of college students. While the pandemic itself caused mental health symptoms to increase, compiled studies in this review rarely pointed to the academic model shift as a primary cause for these findings. Qualitative studies completed on university campuses, such as the example study presented in this research, are a potential way to explore that relationship further.

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Appendix 1: Summary Tables of Sources

Table 1A: Breakdown of Sources into Quantified Categories (1-9)

	Study ID - Author	Phase of Pandemic	Source Type	Type of University	Academic class?	Type of Study	Focus area
1	Copeland et al.	2020 Spring	Study publication	Medium public	First-year	Mixed methods survey	Both mental health and education model
2	Fruehwirth et al.	2020 Spring	Study publication	Large public 4-year	First-year	Longitudinal quantitative study	Mental health
3	Gonzalez-Frey et al.	2020 Summer	Study publication	Midsized public 4-year	All four undergrad + grad	Mixed methods survey	Education model
4	Grose (VIRTUAL)	2020 Spring and Summer	Journal Article	Multiple US IHEs	Faculty members	Qualitative journalistic interviews	Education model
5	Grose (Keep, Watch)	2021 Fall	Journal article	Multiple U.S. IHEs	Faculty members	Qualitative journalistic interviews	Education model
6	Hariharan and Merkel	2020 Fall	Study publication	Large private (Ivy)	2 nd , 3 rd , and 4 th years	Mixed methods survey	Education model
7	Kecojevic et al.	2020 Spring	Study publication	Suburban public	Undergraduate	Cross-sectional survey	Mental health
8	Kelly et al.	2020 Fall	Journal publication	Variety of IHEs	Undergraduate	Systematic literature summary	Education model
9	Keyserlingk et al.	2020 spring semester	Study publication	Large public university	Undergraduate	Mixed methods survey	Mental health related to academics

Table 1B: Breakdown of Sources into Quantified Categories (10-19)

	Study ID - Author	Phase of Pandemic	Source Type	Type of University	Academic class?	Type of Study	Focus area
10	Kim et al.	2019 fall-2020 Spring	Study publication	Multiple U.S. IHEs	1 st and 2 nd years	Quantitative surveys	Mental health
11	Lederer et al.	2020 Fall	Journal publication	Multiple U.S. IHEs	Non-specific (all enrolled students)	Contextual Report/ Literature Summary	Mental health
12	Lee et al.	2020 Spring	Study publication	4-year university	All undergraduate years	Quantitative questionnaire	Mental health
13	Mercer and Behrens	Fall 2020	Journal article	Small private 4-year	Undergraduates and faculty	Qualitative observations, focus group interviews	Education Model
14	Mucci-Ferris et al.	2020 late spring	Study publication	Midsized, private, 4-year	Undergraduates	Qualitative, inductive content analysis	Both mental health and the education model
15	Murphy et al.	2020 Spring	Research article	Small, private, 4-year	Undergraduates	Mixed methods online survey	Education model
16	Newfield and Douglass	2020 Summer	Journal article	Large, public 4-year	All enrolled students	Literature review	Education model
17	Oh et al.	2020 Fall	Research paper	28 various U.S. IHEs	Undergraduate and graduate	Cross-sectional, web-based survey	Mental health
18	Schnieders and Moore	2020 summer	Study report	Multiple U.S. IHEs	First-years	Mixed method survey	Education model
19	Serhan	2020 spring semester	Study report article	Major U.S. university	Unspecified undergraduate	Mixed method survey	Education model

Table 1C: Breakdown of Sources into Quantified Categories (20-27)

	Study ID - Author	Phase of Pandemic	Source Type	Type of University	Academic class?	Type of Study	Focus area
20	Son et al.	2020 Spring	Study publication	Large public 4-year	All undergraduate, but primarily upper-class students	Mixed-methods interview survey	Mental health
21	Soria and Horgos	2020 Summer	Study publication summary	8 large public 4-year IHEs	Undergraduate	Quantitative survey	Mental health
22	Stowe et al.	2021 Summer	Research paper	U.S. IHEs	All enrolled students	Research paper	Mental health
23	Travis et al.	2020 Fall	Journal article	Small, private 4-year	All enrolled student	Summary of semester-long actions	Education model
24	Wang et al.	2020 Spring	Study publication	Large public 4-year	All enrolled students	Quantitative survey with option for open-ended response	Mental health
25	Zeng and Wang	2020-21	Journal article	U.S. IHEs	All enrolled students	Literature review	Education model
26	Zhou	2020 Spring	Journal article	Midsized private 4 year	Undergraduates	Report on personal experience	Education model
27	Zimmermann et al.	August 2019-April 2020	Study publication	Large, public 4-year	Underclass undergraduates	Quantitative questionnaire	Mental health

Appendix 2: Interview Guides for Proposed Research Study

Interview Guide for Student Interviews:

Interview date:

Respondent identification number:

Name of interviewer: Ben Haight

Informed consent form signed? Yes ____ No ____

For students:

Background questions:

The purpose of this interview is to get your feedback on last year's hybrid learning model. Before we get started, I would like to ask you a few background questions.

1. How old are you? _____
2. What year/class are you at Tulane? _____
3. Are you currently affiliated (enrolled or teaching in) with the School of Public Health and Tropical Medicine? _____
4. Were you affiliated (enrolled or teaching) with Tulane during the 2020-21 academic year? Yes ____ No ____

Thank you for your responses. The rest of our interview will be more like a discussion. I'm going to ask you some questions about your experiences last year.

First, a little bit of context. On March 11, 2020 Tulane decided that the remainder of the 2020 spring semester would be completed online. Zoom and online learning was introduced to Tulane students for the first time. During the summer of 2020, Tulane alerted students that plans had been made to re-open campus for the fall 2020 semester. A variety of strategies would be implemented to keep people safe, including temporary classrooms, enforcing social distancing, and mask mandates.

- With this in mind, what were your initial thoughts about returning to campus for that 2020 fall semester?
 - o What was your thought process for returning to campus? How did you eventually make your decision?
 - o Did you have any expectations?
- What was your class selection process like?
 - o What classes did you take?
 - o Do you remember how many classes you had that were completely online or a hybrid model?
- Was it hard to stay engaged during online courses? What about in-person but in a temporary classroom?
 - o Did it differ from staying engaged in class before COVID?
 - o How motivated were you to go to class and do academic activities in the context of a global pandemic?
 - o How would you say online learning accommodated different learning styles students may have?

- I want to talk a bit about recorded lectures utilized by faculty in asynchronous or online classes. Do you find these to be convenient or a shell of a real lecture? Or maybe some of both?
- Thinking about how you envisioned your school year versus how it ended up being with COVID
 - o Were there any goals you were unable to achieve during the last school year?
- Can you think of a time that you appreciated being online for your classes or being online was beneficial for your learning?
 - o Did you ever miss being in-person for classes or feel being online obstructed or hindered your learning?
- What were some ways you would take a break or relieve stress during the last school year? How would you find balance between schoolwork and relaxation during the hybrid academic year?
 - o How did you handle news relating to the pandemic while also going to school?
- How did your experience at Tulane differ from experiences you may have heard about from other universities?
- How do you feel Tulane handled the fall 2020 semester overall?
 - o What did you like about how it was handled, if anything?
 - o What do you wish was done differently, if anything?
 - o Which aspects of hybrid learning would you want to continue to have access to in the near future?

Thank you so much for your time!

Interview Guide for Faculty Interviews

Interview date:

Respondent identification number:

Name of interviewer: Ben Haight

Informed consent form signed? Yes ____ No ____

For Faculty:

Background questions:

The purpose of this interview is to get your feedback on last year's hybrid learning model. Before we get started, I would like to ask you a few background questions.

1. How old are you? _____
2. Are you currently affiliated (enrolled or teaching in) with the School of Public Health and Tropical Medicine? _____
3. Were you affiliated (enrolled or teaching) with Tulane during the 2020-21 academic year? Yes ____ No ____
4. How long have you been working at Tulane University?

Thank you for your responses. The rest of our interview will be more like a discussion. I'm going to ask you some questions about your experiences last year.

I first want to give a little bit of context to the timeline of events here. On March 11, 2020, Tulane decided that the remainder of the 2020 spring semester would be completed online. For many Tulane students and faculty, this was their first experiences with Zoom and online learning. Not long after the end of the spring semester Tulane University began making plans for how summer school courses would be dealt with, and by July of 2020, Tulane alerted students that plans had been made to re-open campus for the fall semester. A variety of strategies would be implemented to keep people safe, including temporary classrooms, enforcing social distancing, and mask mandates.

- With this in mind, can you talk about your experience with getting familiar with teaching via Zoom or to remote students?
 - o Did you teach at all during the summer?
 - o How prepared did you feel, having already had to adapt to online teaching in the spring of 2020?
- What were your initial thoughts about returning to campus for that 2020 fall semester?
 - o What was your thought process for returning to campus? How did you eventually make your decision?
 - o Did you have any expectations? What were they?
- Can you tell me a little about your class schedule for the fall semester?
 - o How many classes were you teaching?
 - o How did you structure them? Entirely online, encouraging in-person attendance, or a hybrid mix? Why?
- I want to talk a bit about recorded lectures utilized by faculty in asynchronous or online classes. Do you find these to be convenient or a shell of a real lecture? Or maybe some of both?
- How did your experience at Tulane differ from experiences you may have heard about from other universities?
- What were some ways you would take a break or relieve stress during the last school year? How would you find balance between work, home life, and relaxation during the hybrid academic year?
 - o How did you handle news relating to the pandemic while also going to work?
 - o Were your motivation levels any different than during previous academic years?
- Can you think of a time that you appreciated being online for your classes or being online was beneficial for your teaching?
 - o Did you ever miss being in-person for classes or feel being online obstructed or hindered your teaching?
 - o How do you feel online learning was able to accommodate the different learning styles of your students?
- Were there any instances where online learning affected you specifically as a Public Health faculty member?
 - o How did your knowledge of the field of public health contribute to your mindset and approach for last school year, if at all?
 - How did you discuss hybrid learning and the pandemic with colleagues or research associates or others in your Public Health network?
- How do you feel Tulane handled the fall 2020 semester overall?
 - o What did you like about how it was handled, if anything?
 - o What do you wish was done differently, if anything?
 - o Which aspects of hybrid learning would you want to continue to have access to in the near future?

Thank you so much for your time!