

THE IMPACT OF THE COVID-19 PANDEMIC ON COLLEGE STUDENT'S HEALTH & 1
WELL-BEING

The Impact of the COVID-19 Pandemic on College Student's Health & Well-being

A Senior Honors Thesis

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Introduction

The coronavirus disease and pandemic abruptly emerged in December of 2019 in Wuhan, China and has continued to leave long-lasting mental and physical impacts (Centers for Disease Control, 2023). The first confirmed cases in the United States emerged in Washington State by January 20, 2020, with the first death reported on February 29th, 2020 (Copeland et al., 2021). The disease was caused by SARS-CoV-2, which is a type of coronavirus that was identified in 2019 and caused a pandemic of respiratory illnesses called COVID-19 (Copeland et al., 2021). COVID-19 can spread from person to person through droplets in the air caused by an infected person (The Johns Hopkins University, 2022). While the disease can show mild-to-no symptoms in some individuals, some may experience severe cases that leave long-lasting muscle and lung damage, nervous system problems, kidney and lung failure, and death (The Johns Hopkins University, 2022). The symptoms of COVID-19 include coughing, shortness of breath, fever, body aches, loss of taste and smell, fatigue, nausea, congestion, headache, and sore throat (The Johns Hopkins University, 2022). The duration of these symptoms varies; however, many individuals experience improvements within ten days. Other people with more severe cases may experience symptoms lasting months or years (The Johns Hopkins University, 2022). Many people experience mild illness from COVID-19 and can recover at home using over the counter medications such as acetaminophen and ibuprofen. Other individuals with severe cases of COVID-19 may need to visit the hospital and can be treated with antiviral medications (The Johns Hopkins University, 2022). The Center of Disease Control recommends individuals receive a vaccination, such as Pfizer and Moderna, which are fully approved by the FDA, as well

as receive boosters when eligible, to prevent lasting effects of COVID-19, hospitalization, and death (The Johns Hopkins University, 2022).

COVID-19 impacted the lives of people in the United States, as well as globally. In March of 2020, the world began global health crisis lockdown procedures due to COVID-19 spreading, causing country borders to seal and many schools and facilities to close, while employees and students continued life virtually (Katella, 2021). Lockdown procedures required all residents to stay at home except for going to an essential job or to get essential supplies and groceries. Additionally, people began wearing masks and practicing social distancing when needing to leave the house (Katella, 2021). The FDA authorized vaccines in December of 2020, and by 2021, borders, facilities, and schools began to reopen with a mask mandate and social distancing requirements (Katella, 2021). As we enter 2023, mask mandates and social distancing have been lifted in most areas.

The COVID-19 pandemic impacted college students, as the abrupt shift to mandates and isolation created barriers for college students in adopting a physically and healthy lifestyle. As a result of the pandemic, college students experienced increased anxiety and stress (Abboud et al., 2022; Calle et al., 2021; Son et al., 2020; Wang et al., 2020), depression (Huang et al., 2021; Lin et al., 2020; World Health Organization, 2022b), and suicidal ideation (Kohls et al., 2021; Son et al., 2020). Additionally, studies also reported students had increased feelings of mental exhaustion, feelings of isolation, feelings of sadness (Abboud et al., 2022), a decreased sense of happiness (Calle et al., 2021), increased eating disorder symptoms and alcohol use (Kim et al., 2021; Kohls et al., 2021), while rates of posttraumatic stress disorder were lower (Kim et al., 2021). Furthermore, multiple studies reported college student's physical activity levels declined

while sedentary behavior increased because of the COVID-19 pandemic (Bertand et al., 2021; Calle et al., 2021; Coughenour et al., 2020; DaSilva et al., 2022; Sidebottom et al., 2021).

It is evident there is a significant impact the pandemic mandates had on the mental and physical health of college students, which can be particularly difficult for young adults who are also more vulnerable to managing stress of newly becoming an adult. As primarily young adults, a significant amount of lifestyle choices is formed during this time. It is known how most students are experiencing college as a first time in managing themselves as beings with responsibilities and independence. Lifestyle choices made through early adulthood will physically impact future health and wellbeing into adulthood, which amplifies the importance of this literature review and future research on this topic.

While we have somewhat returned to 'normalcy,' the lasting effects of isolation during the pandemic stay with us. One of which is the impact the COVID-19 pandemic had on college student's mental and physical health, while being particularly limited to home. This literature review will explore how the COVID-19 pandemic affected, and continues to effect, the mental and physical health of college students. The COVID-19 pandemic required mandates and precautions that, although were necessary at the time in preventing the spread of the serious disease, played a significant role in unhealthy habits formed and raised the percentage of college students suffering from mental illness and lack of physical activity. Therefore, the research question that was addressed in this review is: How has the COVID-19 pandemic impacted college student's physical and mental health? The purpose of this review is to highlight the significant impact the COVID-19 pandemic had on college students and provide research-based

suggestions on how students can get back on track in adopting a physically and mentally healthy lifestyle.

Background

Prevalence of COVID-19 Statistics

The COVID-19 pandemic has caused and continues to create long-lasting impacts around the globe, including widespread confirmed cases and deaths due to COVID-19. The World Health Organization reported in 2020, the daily new number of confirmed COVID-19 cases peaked in April, with a total of 2,271.14 in the United States (Mathieu et al., 2020). In 2021, the daily number of confirmed COVID-19 cases peaked in January, with a total of 3,377.71 new cases (Mathieu et al., 2020). In 2022, the daily number of confirmed COVID-19 peaked in February, with a total of 2,716.57 new cases in the United States (Mathieu et al., 2020). It is important to note how the number of confirmed cases may not be exact and are likely to be much higher than that reported, due to delays in reporting and limited testing (Mathieu et al., 2020).

The Center of Disease Control conducted a provisional count for COVID-19 deaths, which was based on mortality data in the National Vital Statistics System and includes the 50 states and the District of Columbia (Centers for Disease Control, 2023). The data reported may be incomplete, as death records may be delayed when submitted to the National center of Health Statistics and processed (Centers for Disease Control, 2023). The Center for Disease Control reported a total of 385,666 deaths in the United States in 2020 due to COVID-19, including 209,481 men and 176,185 women (Centers for Disease Control, 2023). In 2021, 463,199 deaths occurred in the United States due to COVID-19, including 260,166 men and 203,033 women. In

2022, 245,244 deaths occurred due to COVID-19 in the United States, including 132,913 men and 112,331 women.

As this literature review focuses on the college student population, statistics are included for the age group of 18-29 years, which is the typical age range of college students. In 2020, 1,489 COVID-19 related deaths between the ages of 18-29 years were reported, including 937 men and 552 women. In 2021, 3,933 deaths between the ages of 18-29 years occurred, including 2,372 men and 1,561 women. In 2022, 1,393 deaths due to COVID-19 between the ages of 18-29 years occurred, including 860 men and 533 women (Centers for Disease Control, 2023). It is evident the coronavirus disease has significantly affected and continues to affect the United States population.

Mental Health Prevalence

As a result of COVID-19 mortalities and morbidities, many people have faced mental health challenges. The Center for Disease Control reported that, "During June 24-30, 2020, U.S. adults reported considerably elevated adverse mental health conditions associated with COVID-19. Younger adults, racial/ethnic minorities, essential workers, and unpaid adult caregivers reported having experienced disproportionately worse mental health outcomes, increased substance use, and elevated suicidal ideation" (Centers for Disease Control, 2020, para. 2). According to The World Health Organization, "A mental disorder is characterized by a clinically significant disturbance in an individual's cognition, emotional regulation, or behaviour. It is usually associated with distress or impairment in important areas of functioning. There are many different types of mental disorders. Mental disorders may also be referred to as mental health conditions. The latter is a broader term covering mental disorders, psychosocial disabilities and

(other) mental states associated with significant distress, impairment in functioning, or risk of self-harm” (World Health Organization, 2022a). During the COVID-19 pandemic, “more than 60% of college students met the criteria for at least one mental health problem...[and] almost three quarters of students reported moderate or severe psychological distress” (Abrams, 2022, para. 1). In particular, the rates of anxiety and depression among college students has increased significantly since the start of the COVID-19 pandemic, and now affects 1 in 3 college students (Druckenmiller, 2022). Although there are many different types of mental disorders, this literature review will highlight and discuss disorders that were shown to substantially rise in the number of diagnosed college students, those experiencing symptoms of the disorders discussed, and those who's already diagnosed disorders increased in severity due to the circumstances COVID-19 pandemic, including anxiety disorder, depressive disorder, eating disorder, and post-traumatic stress disorder.

Anxiety Disorder

Anxiety disorders can be defined as an “excessive fear and worry and related behavioural disturbances” (World Health Organization, 2022a, para. 3). The excessive fear associated with anxiety disorders can prevent college students from developing healthy lifestyle habits due to the severe distress and significant impairment in the functioning of one's life if proper treatment and coping mechanisms are not adopted (World Health Organization, 2022a). During the pandemic, the prevalence of anxiety increased in college students “from 18.1% before the pandemic to 25.3% within four months after the pandemic began” (Fruehwirth et. al., 2021, p. 3). Anxiety disorders consist of different kinds, including generalized anxiety disorder, which is characterized as excessive worrying; panic disorder, which is characterized by experiencing

panic attacks; social anxiety disorder, which is characterized by an excessive fear and worrying in social situations; and separation anxiety, which is characterized by an excessive fear or worrying about being separated from others, specifically those who share an emotional bond with the individual (World Health Organization, 2022a). Treatment for these individuals may consist of psychological treatment or medication (World Health Organization, 2022a).

Depressive Disorder

Depressive disorder, also known as depression, is not the same as short emotional responses and mood changes due to a challenge one may face in life. Instead, an individual diagnosed with depression experiences depressive episodes, which can be characterized as experiencing a “depressed mood (feeling sad, irritable, empty) or a loss of pleasure or interest in activities, for most of the day, nearly every day, for at least two weeks” (World Health Organization, 2022a, para. 4). Depression can be debilitating on a college student's life and prevent them from adopting healthy lifestyle habits due to several associated symptoms of the disorder, including “poor concentration, feelings of excessive guilt or low self-worth, hopelessness about the future, thoughts about dying or suicide, disrupted sleep, changes in appetite or weight, and feeling especially tired or low in energy” (World Health Organization, 2022a, para. 4). The prevalence of depression in college students increased during the COVID-19 pandemic from 21.5% before the pandemic to 31.7% after the pandemic began (Fruehwirth et. al., 2021, p. 3). Although treatment exists for depression, including psychological treatment and medication, it is important to understand these individuals are at an increased risk of suicide (World Health Organization, 2022a).

Eating Disorder

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Eating disorders, which include anorexia nervosa and bulimia nervosa, are defined as “abnormal eating and preoccupation with food as well as prominent body weight and shape concerns” (World Health Organization, 2022a, para. 8). Eating disorders can impair a college student's health and prevent them from adopting healthy lifestyle habits, particularly associated with their relationship with food, as the “symptoms or behaviours result in significant risk or damage to health, significant distress, or significant impairment of functioning” (World Health Organization, 2022a, para. 8). The prevalence of eating disorders in college students increased after the start of the pandemic, affecting one in two female and one in three male students, whereas before the pandemic studies showed only one in three women and one in seven men had an eating disorder (Tavolacci et. al., 2021). Although treatments exist for eating disorders, including cognitive based therapy and family-based treatment options, it is important to understand the risks associated amongst the specific types of eating disorders. Anorexia nervosa typically occurs during adolescence or young adulthood and can put individuals at an increased risk for suicide or medical complications that can lead to death (World Health Organization, 2022a). Bulimia nervosa can put individuals at an increased risk for health complications, substance use, and suicide (World Health Organization, 2022a).

Post-Traumatic Stress Disorder

Post-traumatic stress disorder, commonly referred to as PTSD, can develop because of a horrific life-threatening or terrifying event or series of events (World Health Organization, 2022a). PTSD is characterized by a variety of symptoms that persist for a minimum of several weeks, which include, “ re-experiencing the traumatic event or events in the present (intrusive memories, flashbacks, or nightmares); 2) avoidance of thoughts and memories of the event(s), or

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avoidance of activities, situations, or people reminiscent of the event(s); and 3) persistent perceptions of heightened current threat” (World Health Organization, 2022a, para. 6).

Individuals who are diagnosed with PTSD can undergo effective psychological treatment (World Health Organization, 2022a). While the prevalence of other mental disorders was heightened due to the COVID-19 pandemic, the rates of post-traumatic stress disorder were lower in college students during the pandemic. This may have been due to the elimination of certain environmental triggers due to being able to avoid them through stay-at-home mandates (Kim et al., 2021).

Mental Health & COVID-19

Furthermore, mental health was significantly affected due to the COVID-19 pandemic. The Center of Disease Control conducted a survey in June 2020 on individuals greater than or equal to 18 years old to assess mental health, suicidal ideation, and substance use during the pandemic (Centers for Disease Control, 2020). The survey concluded, “40.9% of respondents reported at least one adverse mental or behavioral health condition, including symptoms of anxiety disorder or depressive disorder (30.9%), symptoms of a trauma- and stressor-related disorder (TSRD) related to the pandemic (26.3%), and having started or increased substance use to cope with stress or emotions related to COVID-19 (13.3%). The percentage of respondents who reported having seriously considered suicide in the 30 days before completing the survey (10.7%) was significantly higher among respondents aged 18–24 years (25.5%), minority racial/ethnic groups (Hispanic respondents [18.6%], non-Hispanic black [black] respondents [15.1%]), self-reported unpaid caregivers for adults (30.7%), and essential workers (21.7%)” (Centers for Disease Control, 2020). Moreover, the survey results suggest elevated levels of

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mental health conditions, substance use, and suicidal ideation in 2020. The Center of Disease Control noted that, “The prevalence of symptoms of anxiety disorder was approximately three times those reported in the second quarter of 2019 (25.5% versus 8.1%), and prevalence of depressive disorder was approximately four times that reported in the second quarter of 2019 (24.3% versus 6.5%)” (Centers for Disease Control, 2020). It is also important to point out how one quarter of the surveyed individuals had symptoms of trauma-and-stressor-related disorder, as well as about 1 in 10 respondents reporting increase substance usage, and nearly twice as many people reporting considerations of suicide in 2020 than respondents in 2018, in response to the pandemic (Centers for Disease Control, 2020).

In addition, the survey conducted by the Center of Disease Control also highlights how mental health conditions disproportionately affected certain populations, including young adults, Hispanic persons, Black persons, essential workers, unpaid caregivers for adults, and those receiving treatment for preexisting mental and psychiatric conditions (Centers for Disease Control, 2020). It is evident that alongside the direct impact of COVID-19 through the high number of cases, hospitalizations, and deaths caused by the disease, the pandemic also impacted people indirectly. Due to long-periods of isolation through mandated stay-at-home orders, virtual learning, and facilities closing, mental health declined with socially induced isolation (with respect to health crisis conscientiousness).

Recommendations for Physical Activity

Physical activity is all bodily movement requiring energy expenditure, including during leisure time (World Health Organization, 2022b). Regular moderate and vigorous intensity physical activity is linked to many health benefits, including helping “prevent and manage

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noncommunicable diseases such as heart disease, stroke, diabetes and several cancers. It also helps prevent hypertension, maintain healthy body weight and can improve mental health, quality of life and well-being.” (World Health Organization, 2022b, para. 3). The Center for Disease Control stated, “Physical activity is one of the best ways people can improve their health now and in the future. People who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits” (Centers for Disease Control, 2022, para. 2).

The Center for Disease Control highlights how physical activity is important for a variety of reasons, including the benefits seen in improving mental health and cognitive function. Physical activity has shown to enhance mood, reduce feelings of anxiety and depression, and can reduce risks of dementia, including Alzheimer's disease (Centers for Disease Control, 2022; World Health Organization, 2022b). Physical activity has also been shown to reduce the risk of chronic health conditions, including type 2 diabetes, cardiovascular disease, and certain types of cancer (Centers for Disease Control, 2022; World Health Organization, 2022b). Physical activity can also improve sleep quality and improve immune function (Centers for Disease Control, 2022). It has also been shown to enhance thinking, learning, and judgment skills, as well as promote healthy growth and development in youth, teenagers, and young adults (World Health Organization, 2022b).

The recommended daily amount of physical activity varies depending on age and specific populations. The World Health Organization suggests adults ages eighteen to sixty-four “should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week [and] should also do muscle-

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strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits” (World Health Organization, 2022b, para. 9). The World Health Organization also suggests adults “may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits” (World Health Organization, 2022b, para. 9). Time spent being sedentary, including screen time, should be limited and replaced with any intensity of physical activity (World Health Organization, 2022b). It is important for individuals to meet the recommended guidelines for physical activity, as sedentary behavior is tied to many negative health outcomes. In adults, sedentary behavior can cause mortality, cardiovascular disease, cancer, and type 2 diabetes (World Health Organization, 2022b). According to the World Health Organization, currently 1 in 4 adults globally do not meet the recommended levels of physical activity (World Health Organization, 2022b).

Physical Activity Prevalence

In addition to mental health levels declining, the COVID-19 pandemic mandates created a barrier for college students that have induced them into developing physically unhealthy lifestyle habits which continue to affect them to this day, including decreased physical activity levels and increased sedentary behavior. The World Health Organization notes that global levels of physical activity have continued to decline, with no improvement, since 2001 (World Health Organization, 2022b). Prior to the pandemic, sedentary behavior was increasing in college students, with 41% of college students worldwide not meeting the recommended amount of physical activity levels (López-Valenciano et. al., 2021). During the pandemic, physical activity

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levels significantly declined in college students, as “five studies showed a reduction of light/mild physical activity (walking) between 32.5 and 365.5%, while seven studies revealed a reduction of high/vigorous physical activity between 2.9 and 52.8%. Walking, moderate, vigorous, and total physical activity levels have been reduced during the COVID-19 pandemic confinements in university students of different countries” (López-Valenciano et al., 2021, p. 1).

Increased sedentary behaviors during leisure time activities and at work, as well as convenient motorized transportation vehicles and screen technology at work and educational systems are part of the reason levels of physical inactivity have increased over the years (World Health Organization, 2022b). Furthermore, in the recent years due to the COVID-19 pandemic social distancing policies and lockdown mandates, studies have shown physical activity levels have declined and a rise in sedentary behavior due to the nature of the pandemic, which is evidently an at-large issue given the importance and vast amount of health benefits associated with regular physical activity (Centers for Disease Control, 2022; World Health Organization, 2022b).

Methods

A literature review was performed to identify the impact of the COVID-19 pandemic on the mental and physical health of college students. Databases utilized for this literature review were Medline, PubMed, ScienceDirect, Gale Academic OneFile, JMIR publications, CINAHL, and Google Scholar. Peer reviewed articles were obtained from the databases and were published from the year of 2020 – 2022. To obtain the most relevant articles to construct this literature review, keywords were utilized while searching through databases. The keywords included,

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coronavirus, COVID-19, pandemic, physical activity, exercise, mental health, college students, depression, anxiety, eating disorder, and post-traumatic stress disorder.

The inclusion criteria for the twenty articles that were utilized and discussed in this literature review are as follows:

- a. Articles must be peer-reviewed.
- b. Articles that are research studies must be IRB approved.
- c. Articles must be either research studies or literature reviews.
- d. Articles must be focused on or related to the impact of the COVID-19 pandemic on college student's mental and physical health.
- e. Articles in which provide information on the impact of the COVID-19 pandemic on the general population must also include college students in their study.
- f. Articles aim to provide information on the impact of the pandemic on college student's mental and physical health or discuss specific ways to combat the negative effects of the COVID-19 pandemic on physical and or mental health of college students or discuss links between college student's physical activity levels and mental health levels during the pandemic.

Exclusion criteria are as follows:

- a. Articles focusing on the impacts of COVID-19 that do not involve mental or physical health of college students.
- b. Articles focusing on a population other than college students (children, non-college student adults, etc.).

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- c. Articles discussing the mental and physical health of college students only prior to COVID-19 or in a way that is not related to the COVID-19 pandemic.

The articles retrieved from the databases were reviewed and determined to be relevant and applicable for usage in this literature review. The articles that met the inclusionary criteria and added relevant information were reviewed and discussed in this literature review. The final search retrieval resulted in twenty reviewed articles discussed in this literature review.

Fourteen of the reviewed sources were used solely to construct the introduction, background, and discussion chapters of this review. Furthermore, the remaining twenty sources are research studies that will be analyzed further in the table summary and results section of this literature review to answer the following research question proposed: How has the COVID-19 pandemic impacted college student's physical and mental health? As there are no exclusionary criteria for articles based solely in the United States, the twenty articles ranged in various areas, including the United States, China, Germany, Canada, and Poland. All the articles discussed were peer-reviewed research studies and retrieved from credible journal sources, including BMC Psychiatry journals, Oxford Academic journals, SAGE journals, Canadian. Science Publishing, and Frontiers in Psychology.

Results

The search retrieval resulted in twenty articles, with similar outcomes and themes regarding college student's physical and mental health due to COVID-19. The twenty articles were research studies. Of these studies, eight described and outlined the impact of COVID-19 on college student's mental health. Four studies described the impact of COVID-19 on college student's physical health. The remaining eight studies provided information on both college

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student's mental and physical health due to the COVID-19 pandemic. All twenty articles utilized surveys to obtain research data. Of the twenty surveys, thirteen were conducted in the United States, four were conducted in China, one was conducted in Poland, one was conducted in Canada, and one was conducted in Germany. The publication dates for all twenty articles ranged from 2020 to 2022.

Table 1. *Summary of Findings: The Impact of the COVID-19 Pandemic on College Student's Health & Well-being*

Article name	Date Published	Purpose	Type of study (review or research study)/sample size	Methods	Main outcomes
"Assessing College Student Knowledge and Health Related Behaviors During the COVID-19 Pandemic" (DaSilva et al., 2022).	June 14, 2022	To assess students' knowledge and awareness of COVID-19 risk factors for severe illness and to identify if students were changing their eating and physical activity behaviors.	Research study involving 368 undergraduate college students, 68.8% females, 31.2% males from one small private school, one large public university, and one large community college in the United States.	43-question retrospective survey to assess health habits before and during the pandemic. Demographic and knowledge variables were analyzed using frequencies, and change in nutrition and physical activity habits were assessed using Wilcoxon Signed Rank tests	Findings demonstrate students are aware poor nutrition and lack of physical activity will increase their risk of developing a more severe case of COVID-19. Students report making no changes even with this awareness. Sedentary behavior increased, and time spent engaged in physical activity decreased during the pandemic.
"Psychological Health and Behaviors in College Students During the COVID-19 Pandemic" (Abboud et al., 2022).	June 14, 2022	To assess changes in quality of eating, physical activity habits and changes in mental health in students during the COVID-19 pandemic and to explore relationships between health habits and anxiety and depression.	Research study involving 368 undergraduate college students, 68.8% females, 31.2% males one small private school, one large public university, and one large community college in the United States.	43-question retrospective online survey from June - December 2021. Demographics, eating and activity habits, perceived levels of stress, symptoms of anxiety and depression, isolation, and difficulty sleeping was analyzed using frequencies.	Findings show increases in mental exhaustion, feelings of isolation, difficulty sleeping, anxiety and depression symptoms. Changes in lifestyle habits were associated with feelings of anxiety and depression. The pandemic has negatively impacted the mental health and lifestyle habits of students.

<p>“Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study” (Wang et al., 2020).</p>	<p>November 9, 2020</p>	<p>To assess and survey the mental health status and severity of depression and anxiety of college students during the COVID-19 pandemic.</p>	<p>Research study involving 2,031 undergraduate and graduate college students in the United States.</p>	<p>An online survey consisting of multiple choice and open-ended questions, and two standardized scales - the Patient Health Questionnaire-9 and the General Anxiety Disorder-7—for depression and anxiety.</p>	<p>Findings show many respondents reported academic, health, and lifestyle-related concerns caused by the pandemic. Participants indicated increased stress/anxiety levels during the pandemic. And that many were not able to cope adequately with the stress related to the current situation. A large proportion of respondents reported depression, anxiety, and/or suicidal thoughts.</p>
<p>“COVID on Campus: Assessing the Impact of the Pandemic on Undocumented College Students” (Enriquez et al., 2021).</p>	<p>July 20, 2021</p>	<p>To examine the impact of the COVID-19 pandemic on undocumented college students.</p>	<p>Research study involving 1,067 undocumented college students attending California, United States 4-year universities.</p>	<p>A two-component survey consisting of a quantitative rating of the extent to which the pandemic negatively affected academic performance, attention to academics, family and self-financial stability, mental health, and physical health; and a qualitative rating of two open-ended questions regarding how the pandemic affected them and their family, and how their immigrant origin</p>	<p>Qualitative findings showed immigration status significantly increased the negative economic effects of the pandemic, leading to severe financial strains that proposed negative effects on students’ academics and health. Quantitative findings confirmed a strong association between students’ preexisting economic insecurities and negative effects of the pandemic.</p>

				affected these experiences.	
<p>“The impact of the coronavirus disease 2019 (COVID-19) pandemic on university students’ dietary intake, physical activity, and sedentary behaviour” (Bertand et al., 2021).</p>	January 15, 2021	To examine the impact of COVID-19 on college students’ dietary intake, physical activity, and sedentary behavior.	Research study involving 125 college students from the Universities of Saskatchewan and Regina in Canada.	An online questionnaire was administered retrospectively for pre-pandemic analysis and prospectively for analysis during the pandemic to examine students’ dietary intake, physical activity, and sedentary behavior.	Findings showed nutrient and caloric intakes were significantly reduced, while alcohol consumption increased during the pandemic. Physical activity declined during the pandemic and sedentary behavior increased.
<p>“Effects of COVID-19 on College Students’ Mental Health in the United States: Interview Survey Study” (Son et al., 2020).</p>	November 9, 2020	To assess the effects of the COVID-19 pandemic on the mental health of college students.	Research study involving 195 college students in Texas in United States.	Interview surveys were conducted to understand the effects of the pandemic on mental health and well-being of college students. The data was analyzed quantitatively and qualitatively.	Findings show students experienced increased levels of stress, anxiety, and depressive thoughts. This included fear and worry about their own health and of their loved ones, difficulty in concentrating, disruptions to sleeping patterns, decreased social interactions due to social distancing, and increased concerns on academic performance. Students adopted either negative or positive coping mechanisms.

<p>“Mental Health, Social and Emotional Well-Being, and Perceived Burdens of University Students During COVID-19 Pandemic Lockdown in Germany” (Kohls et al., 2021).</p>	<p>April 6 2021</p>	<p>To examine the mental health, social and emotional well-being, and perceived burdens of college students during COVID-19 pandemic lockdown in Germany.</p>	<p>Research study involving 3,382 college students in Germany.</p>	<p>A cross-sectional and anonymous online survey assessed mental health status (depressive symptoms, alcohol, and drug consumption, and eating disorder symptoms), attitudes toward the COVID-19 pandemic and perceived burdens, and social and emotional aspects of the pandemic (social support, perceived stress, loneliness, and self-efficacy).</p>	<p>Findings revealed that not being a parent, having no indirect social contact one or two times a week, higher perceived stress, higher experienced loneliness, lower social support, and lower self-efficacy significantly predicted higher levels of depressive symptoms, and higher alcohol use and eating disorder symptoms. Social and cultural activities, dating, and hobbies were negatively affected during the pandemic. Nearly half of the students reported anxiety over the COVID-19 pandemic, and many (37%) reported elevated depressive symptoms. Suicidal thoughts were seen in 14.5% of students.</p>
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<p>“Change in college student health and well-being profiles as a function of the COVID-19 pandemic” (Lanza et al., 2022).</p>	<p>May 2, 2022</p>	<p>To examine changes in college student's health and well-being from before and during the pandemic along with links between covariates and profiles during the pandemic.</p>	<p>Research study involving 1,004 college students a large, multi-campus public university in the Northeastern region of the United States.</p>	<p>A longitudinal survey study and latent class analysis which identified health and well-being profiles at both waves was conducted; covariates were included in relation to class membership.</p>	<p>Findings showed COVID-19 had significant impacts on students. Results showed mental health problems increased. A decrease in substance use, sexual behavior, physical inactivity, and food insecurity was shown. The examination of covariates associated with health and well-being profiles during the pandemic revealed that high risk students for poor academic, social, and health outcomes were female, a racial/ethnic minority student, a sexual or gender minority student, and experienced low feelings of belonging at the college.</p>
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<p>“The Effects of Social Distancing During the COVID-19 Pandemic on Stress, Eating, Weight, Sleep, and Physical Activity in College Students” (Calle et al., 2021).</p>	<p>June 7, 2021</p>	<p>To evaluate how COVID-19 social distancing affected stress, sleep, dietary habits and physical activity patterns in female versus male college students, and to assess perceived factors associated with self-reported weight changes occurring initially during social distancing mandates.</p>	<p>Research study involving 575 college students, 80% women, 14% men, 1.3% transgender and 2% non-binary in the United States.</p>	<p>A cross-sectional and online anonymous survey study. The questionnaire survey was framed retrospectively to recall initial phases of social distancing mandates.</p>	<p>Findings showed students reported high levels of stress and decreased happiness, with women affected at higher levels. 36% of students reported overeating and 34% reported increase in weight. Inactivity was reported in 31% of students and 40% reported decreased sleep patterns during the initial months of social distancing. 37% reported having high levels of anxiety, and 61% reported a decreased sense of happiness. 64% reported stress due to schoolwork.</p>
<p>“The impacts of coping style and perceived social support on the mental health of undergraduate students during the early phases of the COVID-19 pandemic in China: a multicenter survey” (Huang et al., 2021).</p>	<p>October 27, 2021</p>	<p>To assess the effects of coping style and perceived social support on the psychological well-being of college students and relevant associated risk factors.</p>	<p>Research study involving 3,113 college students in China.</p>	<p>A cross-sectional, multicenter survey study performed in February and March of 2020. Online questionnaires were distributed and included sociodemographic information utilizing the 21-item Depression, Anxiety and Stress Scale (DASS-21), the Perceived Social Support Scale (PSSS), and the Simplified</p>	<p>Findings show the pandemic caused increased psychiatric problems in students, resulting in some students to adopt passive and negative coping mechanisms such as smoking and drinking which aggravated their mental illnesses. However, those who adopted positive and active coping styles and</p>

				Coping Style Questionnaire (SCSQ).	receiving suitable family support strengthened their ability to regulate bad emotions, relieve various pressures and cope with psychological disorders.
“Relationship of Physical Activity With Anxiety and Depression Symptoms in Chinese College Students During the COVID-19 Outbreak” (Xiang et al., 2020).	November 20, 2020	To evaluate levels of inadequate physical activity, anxiety, and depression and to assess the relationship of physical activity with anxiety and depression symptoms college students during quarantine.	Research study involving 1,396 Chinese college students.	Web-based cross-sectional surveys were utilized for data collection from February 25 to March 5, 2020. Anxiety and depression were assessed with the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS), and physical activity was assessed using the International Physical Activity Questionnaire (IPAQ-SF).	Findings showed the prevalence rates of anxiety and depression in college students was 41.8%, which was higher than the rates found in prior surveys. Anxiety regarding the epidemic was associated with whether they were an only child. Depression during the epidemic was associated with gender, age, education, and if they were an only child. 52.3% of students engaged in inadequate physical activity during the pandemic, which was more than twice the level of inadequate physical activity prior to the pandemic.
“Depression is Associated with Moderate-Intensity Physical Activity	December 2, 2020	To investigate the association between depressive symptoms and physical activity	Research study involving 628 college students from 19	Cross-sectional study Depression symptoms, physical activity levels, and gender role were	Findings showed 34.72% of students had clinically relevant depression, and 58.6%

Among College “Students During the COVID-19 Pandemic: Differs by Activity Level, Gender and Gender Role” (Lin et al., 2020).		among college students with different genders and gender roles (masculinity and femininity traits) during the pandemic.	different locations in China.	measured using The Center for Epidemiological Studies Depression Scales (CES-D), the International Physical Activity Questionnaire - Short Form (IPAQ-SF), and the 50-item Chinese Sex-Role Inventory (CSRI-50).	participants were classified as having a “low” physical activity level. Students with higher masculinity traits were less likely to have depression among all participants, while students with fewer masculinity traits (regardless of their gender) were highly vulnerable to depression during the pandemic.
“The mediating role of resilience in the effects of physical exercise on college students’ negative emotions during the COVID-19 epidemic” (Li et al., 2021).	December 31, 2021	To assess the relationship between physical exercise and negative emotions in college students during the COVID-19 pandemic and discover the mediating role of resilience and the role of physical exercise in improving negative emotions.	Research study involving 1,214 college students from three universities in the provinces of Shandong, Liaoning and Jilin in China isolating at home during the pandemic	An online questionnaire survey using the Physical Exercise Questionnaire, Negative Emotion Scale and Resilience Scale.	Findings showed exercise had a direct effect on the negative emotions of college students. Resilience had a partial mediating effect between exercise and the negative emotions of the college students. Physical activity directly affected the negative emotions of college students and improved resilience by slowing down their negative emotions and promoting their mental health.
“Influences of the COVID-19 Pandemic on Intuitive Exercise and Physical Activity	March 9, 2022	To discover whether of college student’s self-reported physical activity and	Research study involving 216 college students (187 female, 27 male, and 2	An online, anonymous survey was administered during the Fall 2020 to Spring	Findings reported changes in student’s exercise mindset and amount since the

among College Students” (Yon et al., 2022).	psychological mindsets and relationships around exercise changed during the pandemic.	classified as other) at a university in the Southeastern region of the United States.	2021 academic school year using an Intuitive Exercise Scale (IEXS) and open-ended questions for assessing exercise attitudes and behaviors during the COVID-19 pandemic.	beginning of the pandemic changed in a positive way, as many revealed developing a better relationship with exercise and movement during the pandemic as represented by practicing more intuitive exercise. This included how students found to embrace their physical body and feelings to guide which types and the amount of exercise to engage in due to extra free time from quarantine.	
“Effects of COVID-19 pandemic and quarantine period on physical activity and dietary habits of college-aged students” (Sidebottom et al., 2021).	December 1, 2021	To investigate the effects of quarantine periods and campus closures on physical activity, dietary habits, and food insecurity among college students.	Research study involving 291 college students (age 18-24 years old) in the United States.	A cross-sectional, self-reported online questionnaire which evaluated physical activity, sedentary behavior, and dietary behaviors before and during COVID-19 campus closures occurring in March–May 2020. The Wilcoxon signed-rank test was used to assess changes in physical activity, sedentary behavior, and dietary habits. The McNemur’s test was used to compare food insecurity changes.	Findings reported students in quarantine significantly decreased physical activity levels and increased sedentary behavior. Dietary habit changes were observed, which included increased meals at home, alcohol consumption, and decreased fruit consumption. Food insecurity doubled among students during quarantine.

<p>“Changes in Depression and Physical Activity Among College Students on a Diverse Campus After a COVID-19 Stay-at-Home Order” (Coughenour et al., 2020).</p>	<p>November 9, 2020</p>	<p>To discover whether there was a change in physical activity participation levels and depression levels after COVID-19 stay-at-home orders.</p>	<p>Research study involving 194 undergraduate and graduate college students (73% female) over the age of 17 located in a racially diverse university in the United States in Southern Nevada.</p>	<p>A cross-sectional study consisting of an online 10-minute anonymous survey sent out to students between May 7th and May 28, 2020, requesting information about demographic and academic data, cardiorespiratory fitness, and depression symptoms through a Patient Health Questionnaire (PHQ-9).</p>	<p>Findings showed greater depression symptoms and reduced physical activity after the stay-at-home order. Senior and Hispanic students were less likely to report worsening depression scores than freshmen and white students. Asian students were significantly more likely than white students to report decreased physical activity levels.</p>
<p>“Impact of COVID-19 on the mental health of US college students” (Lee et al., 2021).</p>	<p>June 8, 2021</p>	<p>To investigate the impacts of the COVID-19 pandemic on United States college students</p>	<p>Research study involving 200 college students in the United States, ages 18 to 24 years old attending a 4-year university. 50.6% were female, 58% of students were first-generation students, and 36% considered themselves to be LGBTQIA+.</p>	<p>A survey was conducted through Pollfish[R]'s survey platform regarding the physical, emotional, and social impacts of the COVID-19 pandemic. Other factors were also recorded (participant's year in college, whether or not they were first-generation students or if they identify with the LGBTQIA+ community).</p>	<p>Findings showed students closer to graduating (60.8%) faced increases in anxiety, feeling of loneliness (54.1%), and depression (59.8%). 20.0% reported worries for the health of loved ones, which impacted their mental health status. Almost half of students (46.7%) began exercising to help their mental health. 60.9% found it harder to complete the semester at home.</p>

<p>“Coping with Stress During the Second Wave of the COVID-19 Pandemic by Polish University Students: Strategies, Structure, and Relation to Psychological Well-Being” (Guszkowska and Dąbrowska-Zimakowska 2022).</p>	<p>February 28, 2022</p>	<p>To develop a hierarchy of strategies for coping with the stress brought about by the pandemic on students and identify the relationship between coping strategies and psychological well-being.</p>	<p>Research study involving 1,330 university students, ages 18 to 30 years old attending the University of Physical Education in Warsaw, Poland.</p>	<p>A cross-sectional, exploratory anonymous online survey study was utilized. The Brief COPE Scale, being the Polish adaptation by Juczynski and Oginska-Bulik, and a short version of the Psychological General Well-Being Index were used to assess strategies for coping with stress and psychological well-being.</p>	<p>Findings showed the most common coping strategies were acceptance, doing another activity for distraction, active coping, and physical activity, whereas substance use, denial, and behavioral disengagement were lowest in the hierarchy of coping strategies. Self-blaming, behavioral disengagement, venting, substance use, and distraction coping strategies were negatively correlated with psychological well-being. Positive reframing, physical activity, acceptance, humor, and active coping strategies were positively correlated with psychological well-being.</p>
<p>“Impact of COVID-19 Pandemic on College Student Mental Health and Wellness” (Copeland et al., 2021).</p>	<p>January 1, 2021</p>	<p>To explore the impact of the pandemic on the emotions, behavior, and wellness behaviors of first-year college students</p>	<p>Research study involving 675 first-year undergraduate students at the University of Vermont in the United States, ages 18 to 25 years old completed a behavioral</p>	<p>3 self-report survey batteries through the RedCap platform at the beginning of the fall and spring semester, and at the end of the spring semester. This 18-item survey utilized the Brief</p>	<p>Mitigation strategies enforced due to the pandemic had a small yet continuous impact on student's mood and wellness behaviors throughout the semester. After the</p>

			and emotional functioning assessment at the beginning of the spring semester in 2020 (76 completed the same assessment at the end of the spring semester, 600 completed 1 or more items from a related survey after the onset of COVID pandemic, and 485 completed nightly surveys assessing daily mood and wellness behaviors before and after the start of the pandemic).	Problem Monitor. Students used an app to complete daily surveys across the school year to report on 21 health- and wellness-related behaviors from that day (such as minutes of exercise, minutes of screen time, nutritional quality of meals, hours of sleep, and amount of water consumed, mood, stress).A survey was given at the end of the spring semester to evaluate students’ response to the COVID pandemic.	onset of the pandemic, externalizing problems, and attention problems in student’s increased, as well as negative effects on daily mood and wellness behaviors, but not stress levels. Students enrolled in a campus wellness program were less affected in terms of COVID’s effect to their personal life in comparison to those not in the program.
“College Mental Health Before and During the COVID-19 Pandemic: Results From a Nationwide Survey” (Kim et al., 2021).	June 19, 2021	To examine screening rates for psychological disorders before and during the COVID-19 pandemic.	Research study involving 8,613 total first or second year undergraduate students (3,643 pre-pandemic period of October 7, 2019 through December 1, 2019, and 4,970 during the pandemic period of March 2, 2020 through May 9, 2020) Students were recruited from different schools in geographically diverse areas of the United States across the pre-pandemic period (West, 1,358;	Online surveys were sent to students to assess mental health using a randomized control trial.. Generalized anxiety disorder, social anxiety disorder, and panic disorder were assessed using the Generalized Anxiety Disorder Questionnaire, Social Phobia Diagnostic Questionnaire, and Panic Disorder Self-Report. Posttraumatic stress disorder was assessed using the Primary Care PTSD	Findings showed that during the pandemic, depression, alcohol use disorder, bulimia nervosa, and comorbidity were higher, whereas posttraumatic stress disorder was lower. There were no differences in rates of panic disorder, social generalized anxiety disorder, insomnia, anorexia nervosa, or suicidal ideation during the pandemic compared to pre-pandemic.

<p>Midwest, 1,151; South, 879; East, 255; four total schools) and the pandemic period (West, 213; Midwest, 1,051; South, 979; East, 2,727; four total schools). Students only participated once (not in both periods).</p>	<p>Screen. Major depressive disorder was assessed using the Patient Health Questionnaire-9. Anorexia nervosa and bulimia were assessed using the Stanford-Washington University Eating Disorder Screen. Insomnia was assessed using the Insomnia Severity Index. Alcohol use disorder was assessed using the Alcohol Use Disorders Identification Test Consumption.</p>	<p>Women and Black students had higher rates of alcohol use disorder and depression during the pandemic.</p>
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Findings

COVID-19's Impact on Mental Health

Several of the articles discussed how students predominantly showed signs and symptoms of anxiety or severe stress and depression because of the COVID-19 pandemic. Other articles reported varying findings, such as disruptions to sleep quality or financial burdens which negatively impacted mental health, eating disorders, alcohol use disorder, and suicide ideation. Son et al. conducted a study on college students residing in the United States and concluded 71% indicated increased levels of anxiety and stress, 20% indicated remained the same, and 9% stated that their stress and anxiety had decreased due to the COVID-19 pandemic. Among those who reported increased stress and anxiety, only 5% used mental health counseling services (Son et al., 2020).

Increased levels of anxiety and stress were associated with increased fear and worry about their own health and of their loved ones (91% reported), difficulty in concentrating (89% reported), disruptions to sleeping patterns (86% reported), decreased social interactions due to physical distancing (86% reported), and increased concerns on academic performance (82% reported) (Son et al., 2020). Of these students, 43% indicated they were worried about their families and relatives who were more vulnerable to contracting a severe case of the virus, such as older adults, those with existing health problems, and those who are pregnant or recently gave birth to a child. Other students (15%) were worried about their family members whose occupation increased their risk of exposure to COVID-19, such as essential and health care workers. The remaining (11%) were worried about contracting the virus themselves (Son et al., 2020).

Furthermore, over one-third (38%) of students reporting disruptions to sleep patterns (86%) reported severe disruptions, half (50%) reported they stayed up later or woke up later than they did prior to the pandemic, and 17% reported irregular sleep patterns such as inconsistent timing going to bed and waking up each day. Others (7%) reported increased total hours of sleeping, while some (6%) reported less sleeping time (Son et al., 2020).

Similar studies conducted on college students in the United States found increased stress and anxiety levels due to the pandemic (Abboud et. al., 2022; Calle et al., 2021; Wang et al., 2020). A total of 76.7% of students experienced anxiety symptoms and 56.1% had trouble sleeping in one study (Abboud et. al., 2022), while other studies reported 37% of students had high anxiety levels, 64% indicated the increased stress was due to schoolwork, and 40% reporting decreased sleep patterns (Calle et al., 2021; Wang et al., 2020). Many students in both the U.S (Son et al., 2020; Wang et al., 2020) and Germany (Kohls et al., 2021) reported increased levels of depression and suicidal thoughts ((Kohls et al., 2021; Son et al., 2020), with 44% reporting loneliness, uncertainty, or insecurity (12%), hopelessness (10%), concerns with academic performance (8%), and overthinking (5%) as contributing factors in one study (Son et al., 2020). Studies also reported students had increased feelings of mental exhaustion, feelings of isolation, and feelings of sadness (Abboud et. al., 2022), a decreased sense of happiness (Calle et al., 2021), and increased eating disorder symptoms and alcohol use (Kim et al., 2021; Kohls et al., 2021).

In contrast to previously mentioned outcomes, Lanza et al. found levels of anxiety were unchanged from pre-to-post pandemic, yet elevated levels of depression symptoms increased from 44.1% to 61.2% (Lanza et al., 2022). In addition, the study found a decrease in substance

use, including nicotine, alcohol, and cannabis, as well as a decrease in sexual behavior (Lanza et al., 2022). Copeland et al. found that after the onset of the pandemic, externalizing problems, such as confidence in the government handling the pandemic in a responsible manner and attention problems in student's increased, as well as negative effects on daily mood and wellness behaviors (i.e. minutes of physical activity, sleep, and nutrition quality), but not stress levels (Copeland et al., 2021). Students enrolled in a campus wellness program, where they live by a code in which they do not possess alcohol or drugs, were less affected in terms of COVID's effect to their personal life in comparison to those not in the program (Copeland et al., 2021).

Kim et al. observed depression, alcohol use disorder, bulimia nervosa, and comorbidity were higher during the pandemic, while posttraumatic stress disorder was lower and the rates of panic disorder, social generalized anxiety disorder, insomnia, anorexia nervosa, and suicidal ideation was unaffected from pre-to-post pandemic (Kim et al., 2021). Lower rates of PTSD may have been seen due to stay-at-home mandates allowing for an environment in which eliminated certain situations that may trigger trauma related distress through avoidance, as research suggests avoidance is associated with lower PTSD distress in the short term (Kim et al., 2021).

While some individuals may have seen an increase in anxiety due to the risks and burdens brought about by the pandemic, others may have experienced an offset of their symptoms due to the elimination of school pressures in some cases through pass or fail grading systems, explaining the unaffected rates of panic disorder and social anxiety disorder (Kim et al., 2021). Similarly, the rates of anorexia nervosa may have been unaffected due to social distancing creating less social pressure to attain a thin image (Kim et al., 2021).

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While the rates of insomnia could have been adversely affected by lifestyle routine changes, in this case they may have been unaffected due to online learning allowing for students to find greater sleep time with the elimination of early commute to classes (Kim et al., 2021). Although rates of depression increased, suicidal ideation may have been unaffected due to mental health levels not undergoing drastic enough changes for suicidal ideation to increase from pre-to-post pandemic (Kim et al., 2021).

The rates of depressive disorder were more prevalent in Black students than white students during the pandemic (Kim et al., 2021). Black Americans suffered particularly high rates of COVID-19 infection and mortality, longer durations of unemployment during the pandemic, as well as being historically underserved by mental healthcare services, all of which may provide an explanation for higher rates of depression seen in Black students during the pandemic (Kim et al., 2021).

Coughenour et al. found greater depression symptoms in students after the stay-at-home mandate, with senior and Hispanic students less likely to report worsening depression scores from pre-to-during the pandemic than freshmen and white students (Coughenour et al., 2020). Hispanic students may have not shown changes in worsening depression scores after the mandate due to already having stressors negatively impacting their health prior to the mandate, such as minority-related stress and depression (Coughenour et al., 2020). Furthermore, Hispanic students historically tend to be more culturally family-oriented, which research has shown to prevent depressive symptoms, especially when stay-at-home mandates enabled some students to spend more time with families (Coughenour et al., 2020).

Additionally, college seniors were less likely to have increased depressive symptoms from pre-to-during the pandemic, which may be due to being able to better adapt and cope with stressors compared to younger classmen, as research shows the ability to regulate emotions and deploy coping mechanisms increases with age (Coughenour et al., 2020). Research has also shown students who were successful in college have higher emotional and social intelligence (Coughenour et al., 2020).

Enriquez et al. assessed the impact of the pandemic on undocumented college students in the United States and concluded that immigration status significantly increased the negative economic outcomes the pandemic caused, which led to financial burdens and poor mental health for undocumented students (Enriquez et al., 2021). Many undocumented immigrants have restricted employment options due to the lack of access to valid social security numbers, inevitably leading them to work low-income jobs. For this reason, many undocumented students come from low-income families, and many of them did not have access to reliable internet or sufficient devices for distance learning during the pandemic (Enriquez et al., 2021). Additionally, many of these individuals were in essential jobs which increased their risk for contracting the virus (Enriquez et al., 2021). Furthermore, many undocumented immigrants are Latinx, who were statistically shown to experience greater financial instability during the pandemic. In April of 2020, an analysis discovered 61% of Latinx experienced a job or wage loss by a household member, while only 38% of whites experienced this (Enriquez et al., 2021). These factors created a greater burden and hardship for undocumented college students, which led to increased levels of stress and poor mental health during the pandemic (Enriquez et al., 2021).

Huang et al. conducted a study on college students in China and reported increased anxiety and depression (6.8%), with those reporting being in fair or poor health more likely to report symptoms of anxiety and depression (Huang et al., 2021). Also, those having to quarantine during lockdown or contracted COVID-19 themselves showed increased depression symptoms, and those whose family members contracted COVID-19 suffered higher rates of anxiety. Furthermore, increased rates of smoking and drinking occurred (25.2%), with mental health levels declining among pre-existing smokers and binge drinkers, and an increase in their tobacco and alcohol consumptions during lockdown (Huang et al., 2021). Similar studies conducted on college students in China reported increased levels of anxiety and depression (Lin et al., 2020; Xiang et al., 2020), with anxiety and depression levels higher in students with no siblings, and depression symptoms more prevalent in women and undergraduate students (Xiang et al., 2020). With this evidence, the research question, "How has the COVID-19 pandemic impacted college student's physical and mental health?" can be partly answered. Many articles obtained proved the mental health of college students significantly declined due to the COVID-19 pandemic, with particularly heightened increases in anxiety and depression disorder symptoms.

COVID-19's Impact on Physical Activity

Several studies showed college student's physical activity levels declined during the COVID-19 pandemic. Bertand et al. found only 10% of students met the recommended physical activity guidelines, while 30% classified as partaking in sedentary behavior (Bertand et al., 2021). Furthermore, minutes per week spent engaging in moderate to vigorous physical activity decreased by 20% during the pandemic, while hours spent engaging in sedentary behavior increased by three hours per day (Bertand et al., 2021). DaSilva et al. found physical activity

levels decreased and sedentary behavior increased, despite student's acknowledging the importance of physical activity, particularly in preventing a more severe case of COVID-19 developing if the virus was contracted (DaSilva et al., 2022). Similarly, other studies conducted on United States college students concluded a decrease in physical activity levels due to the COVID-19 pandemic (Calle et al., 2021; Coughenour et al., 2020; Sidebottom et al., 2021), with students in one study reporting minutes spent engaging in physical decreased from 409 minutes to 330 minutes from pre-to-post stay-at-home pandemic mandates (Coughenour et al., 2020).

Physical activity levels declining during the pandemic was likely due to gym and group exercise facilities closing, absence of sports and a coach, decreased motivation, increasing health concerns, lack of social interaction when exercising, and getting bored exercising at home (Yon et al., 2022). On the other hand, some students began exercising outdoors and partaking in at-home workouts (Yon et al., 2022). Sidebottom et al. found vigorous physical activity (i.e., activities significantly increasing heart rate, such as jogging or running) declined from two days per week to one day per week from pre-to-during the pandemic (Sidebottom et al., 2021). Moderate physical activity (i.e. activities moderately increasing heart rate and breathing, such as weight lifting, brisk walking or hiking) declined from four days per week to one day per week, and light physical activity (i.e. activities slightly elevating heart rate and breathing, such as walking, slow dancing, and general at home activities) declined from four days per week to two days per week from pre-to-during the pandemic (Sidebottom et al., 2021).

Coughenour et al. found physical activity levels decreased and mentioned how smart phone motion sensors and accelerometers tracking college student's found students to be more sedentary and decreased daily step counts from pre-to-post COVID-19 changes (Coughenour et

al., 2020). The study also reported Asian students were significantly more likely than white students to report decreased physical activity levels, which may be due to the “effects of news reports, which had made it clear that the COVID-19 originated in China, combined with xenophobic statements from politicians have heightened existing racist attitudes towards Asians” (Coughenour et al., 2020, para. 22). Coughenour et al. also points out how due to the fact “neighborhood incivilities have been shown to suppress physical activity among Asian-Americans, it is likely that aggression toward members of this ethnic group was a factor in decreasing their physical activity after the stay-at-home order” (Coughenour et al., 2020, para. 22). Furthermore, Xiang et al. concluded that 52.3% of students engaged in inadequate physical activity levels during the pandemic, which was over twice the level of inadequate physical activity levels in college students reported prior to the pandemic (Xiang et al., 2020).

In contrast, Yon et al. found positive changes in physical activity levels, as students began to develop a better mindset and relationship with exercise and movement through intuitive exercise practices (Yon et al., 2022). The practice of intuitive exercise “involves listening to physical cues (e.g., pain, soreness, fatigue) instead of forcing oneself to follow rigid exercise routines regardless of injury or sickness.” (Yon et al., 2022, para. 6). This allows the individual to become more aware of when negative exercise behaviors occur, such as over-exercise, exercise addiction, or dysfunctional exercise, as well as improve body image and reduce body dissatisfaction (Yon et al., 2022). Intuitive exercise participation, as well as more exercise variety in types of activities chosen by college students occurred during the pandemic (Yon et al., 2022).

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Another way college students were affected by the COVID-19 pandemic was food insecurity and eating habits, which correlated with decreased physical activity levels. Dietary habit changes were observed in United States college students in multiple studies (Calle et al., 2021; Lanza et al., 2022; Sidebottom et al., 2021). Food insecurity, which is defined as “a household-level economic and social condition of limited or uncertain access to adequate food” (U.S Department of Agriculture, 2022), doubled among students during quarantine in one United States study (Sidebottom et al., 2021). Lanza et al. identified a high-risk group for health concerns and challenges related to food insecurity, as well as high rates of mental health problems, substance use, and minimal physical activity (Lanza et al., 2022). Students in this group were also characterized as a racial or ethnic minority, female, a sexual or gender minority, or had low feelings of belonging at the university (Lanza et al., 2022).

In contrast, others pointed out how the pandemic led to increased meals at home as opposed to outside of the home, decreased fruit consumption (Sidebottom et al., 2021), no changes in vegetable consumption (Sidebottom et al., 2021), overeating and weight gain (Calle et al., 2021). Bertand et al. found the nutrient and caloric intakes of college students decreased during the pandemic (Bertand et al., 2021). With this evidence, the research question, “How has the COVID-19 pandemic impacted college student's physical and mental health?” can be partly answered. Many articles obtained proved that the COVID-19 pandemic caused physical activity levels to decline and an increase in sedentary behavior, which also correlated with changes in dietary habits and food insecurity in certain college students.

Mental Health & Physical Activity Relationship

Multiple studies discussed the interconnecting relationship between physical activity and its impact on mental health during the COVID-19 pandemic. Li et al. found physical activity directly affected the negative emotions of college students by improving resilience which helped slow down negative emotions and promoted mental health (Li et al., 2021). Another study conducted by Lin et al. found that students participating in low levels of physical activity experienced significantly higher levels of depression than those participating in high activity levels (Lin et al., 2020). Furthermore, individuals who regularly engaged in low-physical activity levels showed a significant reduction in depressive symptoms when engaging in moderate physical activity during the pandemic (Lin et al., 2020). The study also found students who had fewer masculine traits, regardless of gender, had greater susceptibility to depression during the COVID-19 pandemic (Lin et al., 2020).

Similarly, Xiang et al., found differences in anxiety and depression levels depending on the level of physical activity the student engaged in (Xiang et al., 2020). Students partaking in high levels of physical activity had lower levels of anxiety than those who engaged in low levels of physical activity (Xiang et al., 2020). Additionally, students who engaged in moderate or high levels of physical activity had lower levels of depression than those engaging in low levels of physical activity (Xiang et al., 2020). Those who participated in stretching or resistance training had lower levels of anxiety, while students partaking in household chores, stretching, and resistance training had lower levels of depression, with household chores being associated with the lowest levels of depression (Xiang et al., 2020). A study conducted on United States college students found students closer to graduating (60.8%) faced increases in anxiety, feelings of loneliness (54.1%), and depression (59.8%) (Lee et al., 2021). Almost half of these students

(46.7%) decided to begin exercising to help improve their mental health (Lee et al., 2021).

Similarly, students in Poland were beginning to exercise in a direct effort to improve mental health status, as well as accepting the situational circumstances, engaging in another activity for distraction, active coping, positive reframing, and humor (Guszkowska and Dąbrowska-Zimakowska 2022). Moreover, it is evident participation in physical activity has the potential to reduce symptoms of mental illness such as anxiety and depression.

Discussion

This literature review sought to answer the research question of, "How has the COVID-19 pandemic impacted college student's physical and mental health?" The findings of this literature review imply that college students' mental health levels significantly declined, causing increased signs and symptoms of depression, anxiety, stress, eating disorders, suicidal ideation, dietary habit changes, sleep pattern changes, increased food insecurity, and increased substance usage. Additionally, physical activity levels lowered, and sedentary behavior increased for many college students, which negatively impacted mental health levels. However, some students developed positive coping strategies as a response to the COVID-19 pandemic and its consequences, including increased physical activity levels and decreased substance usage (Guszkowska and Dąbrowska-Zimakowska 2022; Yon et al., 2022). Multiple studies demonstrated how increased levels of physical activity positively impacted mental health levels in comparison to those who were sedentary (Li et al., 2021; Lin et al., 2020; Xiang et al., 2020). Additionally, higher levels of physical activity resulted in significantly reduced anxiety and depression symptoms in comparison to those engaging in lower levels of physical activity (Lin et al., 2020; Xiang et al., 2020). Based on the findings of this study, it can be implied that

engagement in physical activity has the potential to reduce symptoms of mental illness such as anxiety and depression and can be used as a positive coping mechanism to improve mental health levels in college students.

The continued impacts of COVID-19 on college students as we begin to exit the pandemic remains largely unknown. Nevertheless, this literature review suggests the COVID-19 pandemic and mandates significantly impacted college student's physical and mental health. This study also highlights how different populations within the college student community experienced COVID-19 and its consequences differently, such as gender, family and sibling related status, race, and ethnic differences. While future research on the impacts on COVID-19 continue to be studied, it is important that in the meantime, targeted interventions promoting physical activity and mental health awareness be brought to light across college campuses.

Actions to be Taken – Mental Health

As a result of the COVID-19 pandemic, signs and symptoms for mental illnesses such as depression and anxiety substantially increased in college students, as well as eating disorders and suicidal ideation. The findings of this literature review highlight the need to prevent and treat these conditions. One way in which these issues can be addressed is the continued and expanded usage of mental health treatment services on college campuses, both in-person and virtually through telehealth, which has shown to already be beneficial throughout the pandemic thus far (Centers for Disease Control, 2020). By continuing to offer virtual services despite in-person options currently being available, students will have greater options to choose from and therefore an increased likelihood to seek treatment for COVID-19-related mental health consequences, especially with the rapidly expanding electronically advanced society we live in.

Campus intervention and prevention efforts should seek to promote connectedness by building campus community through programs and events, address student's financial strains, stress levels and emotional well-being, especially those who experienced minority and racial discrimination and inequalities during the pandemic, through clubs, events, fundraising and campus programming. Other strategies may be to enhance on campus communication by promoting campus health and counseling services.

Additionally, campus recourses, including social support groups, harm and substance abuse reduction services, and healthcare services in which provide a variety of accessible comprehensive treatment options should be available to college students. College campus health services should also periodically assess mental health and substance usage of students to evaluate the prevalence of psychological distress over time (Centers for Disease Control, 2020).

Furthermore, campus newsletters, social media sites, posters, and campus webpages may provide statistics on the decline in college student's mental health because of the COVID-19 pandemic and include suggestions on how students can adopt healthy coping mechanisms. Healthy coping mechanisms may include taking breaks from news stories, including those on social media, taking care of our bodies through a well-balanced and nutritious diet, getting adequate sleep, limiting alcohol intake, and avoiding smoking, attending regular health appointments, and engaging in daily physical activity. Additionally, engaging in relaxing and enjoyable activities, as well as connecting with peers, friends, family, and community may benefit the student's mental health.

Actions to be Taken – Physical Activity

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Most college students reported decreased physical activity levels due to the COVID-19 pandemic. The findings of this literature review highlight the need to address the significant decline in physical activity levels amongst college campuses to prevent future chronic diseases associated with physical inactivity from developing, such as type two diabetes, cardiovascular disease, and certain types of cancer (Centers for Disease Control, 2022). Additionally, people who are regularly physically active are less likely to develop severe cases of COVID-19 than those who are physically inactive (Centers for Disease Control, 2022). Therefore, stressing the importance of partaking in physical activity to college students is crucial for their future health.

College campuses can educate students on the significant decline in physical activity levels amongst college students due to the pandemic and include statistics and facts on the importance of physical activity through newsletters, social media sites, posters, and campus events. College campuses can ensure safe indoor and outdoor recreational sites and facilities, as well as team sports, clubs, and group exercise classes for students to engage in. Additionally, college campuses can host informational events on the importance of physical activity post-pandemic and inform students of the various types of activities one can partake in on campus to meet daily recommended physical activity levels.

Limitations

While this literature review provides a comprehensive overview of the impact of the COVID-19 pandemic on college student's physical and mental health and well-being, the collected research does not consider the current physical and mental state of students as we begin to enter a post-pandemic era. As the state of the COVID-19 pandemic abruptly emerged with numerous life-altering events and mandates constantly changing throughout the past few years,

new research and findings are constantly emerging. Additionally, only twenty studies were examined in this literature review, with limited sample sizes in each study, which may have not accurately represented the entire college student population worldwide. Furthermore, thirteen of the studies analyzed were conducted in the United States, four were conducted in China, one was conducted in Poland, one was conducted in Canada, and one was conducted in Germany. Therefore, this literature review is not representative of the entire world. All twenty studies analyzed in this literature review utilized surveys as a measurement tool, which is a more subjective means of obtaining research data than objective.

Furthermore, most of the twenty studies did not analyze socioeconomic and demographic status and its impact on student's mental and physical health. Only four studies represented racial, ethnic, gender, or sexual minorities in their studies. Lanza et al. reported high risk students were female, a racial/ethnic minority student, a sexual or gender minority student (Lanza et al., 2022), and Lin et al. reported students with fewer masculinity traits, regardless of their gender, were highly vulnerable to depression during the pandemic (Lin et al., 2020). Coughenour et al. reported Hispanic students were less likely to report worsening depression scores than freshmen and white students and Asian students were significantly more likely than white students to report decreased physical activity levels (Coughenour et al., 2020). Kim et al. reported women and Black students had higher rates of alcohol use disorder and depression during the pandemic (Kim et al., 2021). The remaining sixteen studies did not analyze socioeconomic or demographic minorities in their studies, which may have limited the findings of this literature review. Nonetheless, the studies obtained in this literature review provide a summary of the impact of the pandemic and its consequences on college student's health and well-being in the last few years.

Conclusion

This literature review summarized the impact of the COVID-19 pandemic on college student's physical and mental health and well-being, and answered the following research question: How has the COVID-19 pandemic impacted college student's physical and mental health? After reviewing the twenty articles, it was determined that mental health and physical activity levels significantly declined due to the COVID-19 pandemic. However, some college students increased physical activity levels as a positive coping mechanism, which positively impacted mental health levels. Higher levels of physical activity were associated with significantly reduced anxiety and depression symptoms in comparison to those engaging in lower levels of physical activity. The findings of this literature review highlight the significant negative impact the COVID-19 pandemic had on college student's mental and physical health. The findings also suggest that engaging in physical activity, especially at higher levels, has the potential to improve college student's mental health. The research suggests physical activity can be used as a positive coping mechanism in unprecedented times, such as the COVID-19 pandemic, to deter the symptoms of mental illness, particularly anxiety and depression.

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