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The Impact of COVID-19 on Students from a Large Online Class

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Abstract: The Coronavirus disease (COVID-19) pandemic has affected people in multiple dimensions. In addition to the social, physical health, financial, and mental health impacts of the pandemic, many United States (U.S.) college students experienced an abrupt transition to online learning in Spring 2020, resulting in a significant disruption to their learning and life. In this study, we examined COVID-19 impacts as reported by college students enrolled in an online class in Spring 2020 via an extra-credit survey. Participants reported predominantly negative impacts, but positive impacts were also reported. A total of 61 aspects of impact were identified reflecting six major themes: academic, housing and travel related, physical health-related, financial and work-related, social life, and mental health related impacts. We found that females reported significantly more overall negative impacts and significantly more academic and housing/travel related impacts than males. Black students reported significantly fewer positive impacts compared to non-Black students in the sample. Asian students reported significantly more academic impacts than White students. In addition, participants in the fully online degree program had significantly fewer overall impacts and significantly fewer academic impacts than those in the residential degree program. Implications of the findings were discussed.

Keywords: *COVID-19 impact, educational program disparity, ethnic disparity, gender disparity, higher education.*

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Introduction

In March 2020, the World Health Organization announced the outbreak of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), now commonly known as COVID-19, as a global pandemic (Karasmanaki & Tsantopoulos, 2021). Many countries utilized lockdown, social distancing, mask mandates, and other measures to contain its spread. This pandemic has affected people's lives in ways such as the health impact on COVID-19 patients with or without comorbidity (e.g., Dietz & Santos-Burgoa, 2020; Woods et al., 2020), social and economic consequences (Bonaccorsi et al., 2020), mental health impact (Ivbijaro et al., 2020; Torales et al., 2020), and relationship and lifestyle changes both professionally and academically (Mazumder et al., 2021).

Research shows that closing educational institutions is an effective method to contain the spread of the virus among students (Jackson et al., 2014). As of April 2020, more than 100 countries shut down educational facilities nationwide affecting nearly 900 million students (Nicola et al., 2020). This created an educational crisis as many campuses mobilized students to go home and abruptly switch from in-person to online course delivery within days. Students' learning was severely disrupted in dealing with the highly contagious virus spread as well as coping with a new learning format.

On the other hand, students who were already enrolled in an online educational degree program with all courses delivered online might, presumably, have not been directly impacted by the abrupt transition to online learning as much as those in residential education degree programs with partial or all courses originally delivered in a brick-and-mortar format. For example, students in an online education degree program might have already had learning facilities such as high-speed internet and a guaranteed learning space at home as well as personal familiarity and preference for online learning. Students without prior experience in online schooling reported a greater decrease in likelihood to enroll in online classes after their virtual schooling experience during the pandemic compared to peers who had taken online courses in the past (Aucejo et al., 2020). As such, it is important to examine to what extent the impact of COVID-19 is

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experienced differently for college students of online programs vs. residential programs, which is a gap in the current literature.

Researchers from other countries have identified different ways COVID-19 impacts college students, ranging from physical to mental health and academic to personal lives. For example, in Greece, Karasmanaki and Tsantopoulos (2021) reported that undergraduate forestry students were highly affected and experienced negative emotions due to the campus closure and transition to remote learning. In Bangladesh, college students experienced increased psychological distress and fear of losing an academic year (Hasan & Bao, 2020). For undergraduate students in Namibia, being in their home environment made learning more challenging (Kaisara & Bwalya, 2021). In a study conducted in China, one fourth of participating college students reported anxiety of different levels (Cao et al., 2020). In India, Chaturvedi et al. (2021) surveyed 1182 individuals of varied educational institutes and identified varied aspects of COVID-19 impact such as sleeping habits, learning hours and medium, social life, mental health, etc.

Economically, according to Riggert et al. (2006), around 80% of college students hold either a full-time or part-time job during their undergraduate education to help offset student debt and living costs, and aid in the transition into the labor market post-graduation. However, 42% of college students in New York City had a change in their employment due to COVID-19 (López-Castro et al., 2021). At Arizona State University (ASU), 29% of students lost their jobs, 13% had job/internship offers taken away, and 61% experienced a family member losing their job or losing some of their income. Students also expected this economic downturn to affect their future chances of finding a job and anticipated lower income in their future careers (Aucejo et al., 2020). Further, financial uncertainty was found to be a significant predictor for high scores on the DASS anxiety, depression, and stress subscales among quarantined Bangladeshi students. (Khan et al., 2020).

Nonetheless, studies also reported some positive impacts of the pandemic. Amongst all the challenges, some adolescents in the U.S. reported increased time with family and more time for themselves as positive changes due to the pandemic (Rogers et al., 2021). A study on positive change conducted in Scotland identified an average positive change score of 47.2% after 23 days during the pandemic. In India, young adults had more time to explore their own interests and more time to spend with loved ones (Mazumder et al., 2021). Some of the most common reported positive changes were increased sense of gratitude and more time for things one enjoys (Williams et al., 2021). To what extent such impacts might be replicated among students who were enrolled in a large online class is yet to be assessed.

There have also been studies demonstrating that the impact of COVID-19 varied by gender. Some US data illustrates that the severity of COVID-19 is twice as great for men than women (Klein et al., 2020). Male students at Arizona State University struggled with online courses more than females and were less likely to enroll in an online course after their experience during the pandemic (Aucejo et al., 2020). However, other studies have found that females have experienced more psychological stress, anxiety, and fear related to COVID-19 (Hoyt et al., 2021; Karasmanaki & Tsantopoulos, 2021; Yan et al., 2021), reported more stress with online exams (Elsalem et al., 2020) and more negative impacts to 'home life' and 'social activities' (López-Castro et al., 2021) compared to males. Nonetheless, female students had also reported significantly more positive impacts of COVID-19 compared to their male counterparts (López-Castro et al., 2021; Williams et al., 2021).

Regarding the ethnic differences in COVID-19 impact, for every White death due to COVID-19, The COVID Tracking Project reported 1.44 Black/African American deaths, 1.39 American Indian/Alaska Native deaths, and 1.16 Hispanic/Latinx deaths (The Atlantic Monthly Group, 2021). Black and Latinx minority individuals had more difficulty accessing life and medical resources compared to White participants, although Black individuals had also reported significantly less feelings of isolation compared to White and Latinx respondents (Ruprecht et al., 2021). Amongst Academics, Black women experienced the largest decline in productivity due to COVID-19 (Staniscuaski et al., 2021). In the UK, racial minority migrants were 3.1 times more likely to lose their job and significantly less likely to be furloughed compared to White UK-natives. Minority migrants were more likely to endure a loss of income within their household and reported higher perceived economic hardship (Hu, 2020). López-Castro et al. (2021) found that Asian students had experienced more financial and physical health impacts in comparison to White individuals, while Hoyt et al. (2021) discovered that Asian students had less anxiety than their White peers. Additionally, Hispanic/Latinx students had reported more positive impacts compared to White students (López-Castro et al., 2021).

Still, little work has examined both the self-reported negative and positive impacts of COVID-19 on U.S. college students of different gender, ethnicity, and programs in areas such as educational experience, social life, and psychological wellbeing (see exceptions in Cao et al., 2020; Chaturvedi et al., 2021). Limited studies (e.g., Hoyt et al., 2021; López-Castro et al., 2021) have examined if college students of different ethnicities and genders in the U.S. perceived and experienced the impact of COVID-19 differently. Further, there is limited research examining if the pandemic-related transition to online learning had different impacts for students in fully online programs compared to residential programs. We aim to fill this gap in research.

In this study, we address three major research questions: First, what are the major impacts of the pandemic as reported by college students enrolled in an online class? Second, of the impacts reported, how many are positive vs. negative, and

what are the most common positive and negative impacts? Third, what are the differences in COVID-19 perceived impacts between students by gender, ethnicity, program (fully online program vs. residential online program)?

Methodology

Sample and Data Collection

This study uses a convenience sample of college students enrolled in a large online course in Spring 2020 as approved by the Institutional Review Board (IRB) of the University of Florida (UF). This large online class included two sections. One section included students who were enrolled in traditional residential programs with the option of taking some online courses. Another section of the class was made up of students enrolled in the online degree programs (UF Online) who took solely online courses toward their undergraduate degree pursuit.

An extra-credit CANVAS survey was administered in April 2020 that included seven open-ended questions related to COVID-19 and one true/false question on encountering technical issues in taking one course unit exam. Completion of the survey was rewarded via extra credit points to compensate for the disadvantages experienced by students due to COVID-19 and related technical issues in an online Honorlock proctored exam. A separate brief CANVAS survey was also administered for students to indicate their opt-out of research participation in terms of allowing their survey responses to be used toward research after the completion of the semester even though they had responded to the COVID-19 impact survey. There was no penalty for students who opted out the participation in this research.

Out of 338 students in the class, 329 students responded to the extra credit survey and 16 of the 329 students opted out of this research. 14 of the students who opted out were from residential programs. This resulted in 313 initial participants (277 residential online students and 36 fully online students). Four of the 313 students who participated in the study did not provide responses to the survey item for this study and were therefore excluded from the analysis, resulting in a final 309 participants. Of those four students, three were female and one was male; two were white, one was Asian, and one was Hispanic/Latino; these four students were in the residential program with majors in the college of Liberal Arts and Sciences. One of the four students was a freshman, one a sophomore, one a junior, and one a senior.

Out of the 309 participating students, 87.4% of the sample were female (n = 270) and 12.6% of the sample were male (n = 39). This female/male ratio is much higher than that in UF undergraduate population in the 2019-2020 academic year (i.e., 57% vs. 43%). 50% (n = 154) of the sample were White, 11% were Asian (n = 34), 21% were Hispanic/ Latino (n = 65), 8.4% were Black/ African American (n = 26), and 10% were Other (n = 30) which includes American Indian/ Alaskan Native, two or more races, race/ ethnicity unknown, and non-resident alien. 273 (88%) of students were residential students and 36 (12%) of students were online students enrolled in the UF online programs. These percentages by racial groups and educational programs are consistent with those in the UF undergraduate population during the same academic year (i.e., 52.07% White, 5.85% African American, 22.32% Hispanic, 9.24% Asian, 10.28% Other, 14% UF online students, 86% residential students). Thus, our study sample has larger female-to-male ratio compared to the UF population.

In terms of college, 5.8% (n = 18) of the sample were in the College of Agriculture and Life Sciences, 1.6% (n = 5) in the Warrington College of Business, 0.65% (n = 2) in Education, 6.8% (n = 21) in Health and Human Performance, 2.3% (n = 7) in Journalism and Communications, 59.5% (n = 184) in Liberal Arts and Sciences, 0.32% (n = 1) in Medicine, 3.6% in Nursing (n = 11), 18.4% (n = 57) in Public Health and Health Professions, and 0.98% (n = 3) in The Arts. 2.9%, 13.7%, 33.9%, 48.6%, 0.6%, and 0.3% of students were freshman, sophomore, junior, senior, and post-bachelor or unspecified, respectively.

Instruments and Data Coding

Student backgrounds: Student background information (e.g., gender, race, years of college, education program) was obtained from the records available at the University Registrar as approved by UF IRB.

Coding perceived COVID-19 impact: Verbatim data was obtained from students' response to one item on the COVID-19 impact extra credit survey. This item asks: "*In what ways do you think you have been impacted by the Coronavirus pandemic? (List at least three ways, but include as many as you want.)*". Code development and training started with discussing a small set of student verbatim responses to the survey item to identify unique codes of specific aspects of impact reported by students. The set of individual codes were revised in the coding process to exhaust the aspects of impacts reported by students and listed in a coding manual developed by the first and second authors (Wang & Shabash, 2020). The 2nd author was trained to be the master coder after reaching 90% coding agreement with the coding trainer, the 1st author. A small set of student responses (24.3%) were double coded between the 1st and 2nd author to maintain coding reliability across coding rounds with an average inter-coder agreement of .83. Coding disagreement and ambiguous responses were resolved via coding conferences.

Analyzing of Data

This study used mixed methods, with both qualitative content analysis and quantitative secondary data analysis of the coded verbatim responses. Participants' open-ended responses were processed using a grounded theory approach with inductive analysis instead of a pre-existing theory (Rogers et al., 2021). Individual codes were analyzed based on content and were categorized into themes by the nature of impact as being positive, negative, or neutral. The responses coded as neutral impacts were minimal and therefore not included in data analysis. Descriptive analysis was conducted for percentages of occurrence of the individual impact code reported by participants, together with the mean, standardization, percentage of minimal one occurrence of the specific theme in participants' responses as well as that of positive vs negative impacts reported by participants.

To understand the differences in perceived COVID-19 impact across gender, race, and educational programs, a series of independent t-tests were conducted for group comparisons. All outcome variables have values of skewness and kurtosis that fall within the acceptable ranges of -3 and 3 for skewness and -10 and 10 for kurtosis, thus indicating normal distributions (Kline, 2011). In situations when the homogeneity of variance assumption was not met with significant Levine's statistic, Welch's t test results were reported as recommended in such situations (Welch, 1938).

Findings / Results

Content Analysis Results

At the individual code level, 61 unique codes were identified suggesting that participants reported 61 unique aspects of COVID 19 related impact. The most reported impact was *change of environment*, reported by 138 (44.66%) participants suggesting many students were forced to abruptly pack and move out of student housing and had difficulties adjusting to a new environment after moving back home. 118 participants (38.19%) reported experiencing *compromised mental health,* or new or worsened stress, fear, anxiety, depression, and/or a lack of energy, mainly due to the uncertainty of the future, loneliness, and worry about the health of themselves and their loved ones. The third most reported impact, reported by 111 (35.92%) students, was *transitioning online difficulty,* encompassing difficulty shifting to an online platform, leading to reduced classroom interaction, a loss of structure, and limited access to academic resources. 105 (33.98%) students reported being impacted by a *deprivation of social gathering and interaction,* having less time to spend with family and friends, and a general lack of socialization. The fifth most reported impact was a *change of routine* (n=91, 29.45%), defined as an alteration to usual daily activities, habits, and structure.

Content analysis revealed six major themes or categories out of the 61 aspects of reported impact on students' lives. The six major themes of impact include *academics, life changes in housing and travel, physical health-related, financial and work-related, social life, and mental health.* Impacts on academics and housing/travel categories were most heavily represented among the responses, with 74.4% of participants reporting at least one academic impact and 82.7% reporting at least one disruption related to housing and/or travel.

Each individual code was further classified as *positive impact*, *negative impact*, or *neutral impact*. *Negative impact* refers to verbatim responses that convey a sense of stress, annoyance, deprivation, interruption, and/or destruction. *Positive impact* refers to verbatim responses that convey positive implications such as increased gratitude for life and appreciation of more time with family. When the responses indicated both positive and negative impact (e.g., *"I'm sleeping a lot more (this is good and bad in different ways*).") or were hard to distinguish between positive or negative impact (e.g., *"My hours unlike many in the nation have increased a lot due to the virus in the months of Jan-March."*), responses were coded as a *neutral impact*. Due to its low occurrence in data coding (i.e., only 1.3% of coded responses were coded as a neutral impact), this code was not used for further quantitative data analysis for group differences. One additional composite variable named *total impact* was the total number of impacts listed by participants by summing up all negative, positive, and/or neutral impacts reported by participants. See summaries below and Table 1 below for reported specific impact under specific themes with representative codes and descriptive statistics.

Academics: Academic impacts were reported, on average, 1.67 times per student, and reported by 74.4% of the sample. The top five academic impacts reported were all negative academic impacts including *transitioning online difficulty* (*n* = 111), *distraction at home* (*n* = 76), *lack of physical study resources* (*n* = 67), *struggling to concentrate for study* (*n* = 62), and *decreased productivity* (*n* = 49). The majority of academic impacts were related to academic issues/stresses with the transition from in-person to an all-online curriculum. Students had issues with reduced classroom interaction and difficulties accessing resources previously available via in-person avenues, including tutoring resources. Students reported experiencing technological difficulties and issues finding a stable internet connection off-campus, and many lacked an adequate area conducive to studying and/or taking proctored exams. Due to distraction from family members and a noisy home environment, many participants reported difficulty focusing on academic tasks, and as a result, difficulty maintaining the same amount and/or quality of work prior to COVID-19. Other reported impacts include *compromised professional development opportunities (-)* (*n* = 43), *decreased motivation (-)* (*n* = 41), *increased study load (-)* (*n* = 20), *loss of extracurriculars (-)* (*n* = 19), *lower grades (-)* (*n* = 10), *less time for schoolwork/ study (-)* (*n* = 10), *increased testing stress (-)* (*n* = 6), *more time for schoolwork (+)* (*n* = 3), *course dropping (-)* (*n* = 2), *higher grades (+)* (*n* =

2), and *increased productivity (+)* (*n* = 1). The negative sign indicates negative impact, whereas the positive sign indicates positive impact.

Housing/Travel: Impacts related to housing and travel were reported 1.50 times per student, on average, and reported by 82.7% of the sample. The top five housing/travel impacts reported were: *change of environment (-)* (*n* = 128), *change of routine (-)* (*n* = 84), *restricted travel/ visits (-)* (*n* = 69), *physical confinement (-)* (*n* = 68), and *moving issues (-)* (*n* = 50). 128 students were negatively impacted by a change of environment, while 84 were negatively affected by a change of routine. Students lost the structure of daily life they had become accustomed to and had to abruptly adapt. Participants felt trapped indoors and were restricted from travelling, going out to public areas, or even visiting their family due to travel restrictions and health concerns. Many students living in on-campus housing were suddenly forced to pack up and move out in the middle of the semester, some without a place to go. Other reported impacts include *change of physical health habits (-)* (*n* = 29), *difficulty attaining necessities (-)* (*n* = 17), *change of environment (0)* (*n* = 10), *change of physical health habits (0)* (*n* = 7), *change of routine (0)* (*n* = 5), *change of routine (+)* (*n* = 2), and *change of physical health habits (+) (n = 1).*

Physical health: Impacts related to physical health were reported 0.56 times per student, on average, and reported by 41.5% of the sample. The top five reported physical health impacts were *increased health concerns (-)* (*n* = 87), *concerns of COVID-19 related events (-)* (*n* = 29), *increased caregiving (-)* (*n* = 26), *COVID-19 case in close proximity (-)* (*n* = 22), and *inability to help others as hoped (-)* (*n* = 7). Most of the impacts in the physical health category were related to the participant's concern for the health of themselves and their loved ones. Students also had a shift in priority, with increased attention to the changing world around them. 22 students reported that someone close to them contracted COVID-19. Many students had to take on extra care-taking responsibilities, and several felt as though they had little control over protecting loved ones. Other reported impacts include *loss of a loved one (-)* (*n* = 1), *lack of support for own physical condition (-)* (*n* = 1), *cancelled personal medical visit/ procedure (-)* (*n* = 1), *perceived underperformance for family (-)* (*n* = 1), and *expressed willingness to help others (+)* (*n* = 1).

Finance/work: Impacts related to *finance/work* were reported 0.68 times per student, on average, and reported by 43.5% of the sample. The top five reported finance/work related impacts were *loss of job (-)* (*n* = 78), *financial strains (-)* (*n* = 55), *extra financial expenses (-)* (*n* = 22), *concern of financial loss (-)* (*n* = 19), and *fewer employment opportunities (-)* (*n* = 10). 25% of all participants had either lost their job or had someone they were financially connected to lose their job due to COVID-19. Participants struggled to financially support themselves and their families, while having to continue paying rent for housing they no longer lived in. Students stated concerns and worries regarding the economic downturn and their current and future job opportunities. Other reported impacts include *increased workload (-)* (*n* = 7), *stress of job uncertainty (-)* (*n* = 7), *reduced workload (-) (n* = 5), *lack of physical work resources (-)* (*n* = 2), *increased workload (0)* (*n* = 2), *less spending on non-essential activities (-)* (*n* = 1), *less spending on non-essential activities (+)* (*n* = 1) *and exploring economic opportunities (+)* (*n* = 1).

Social life: Impacts related to *social life* were reported 0.66 times per student, on average, and reported by 50.5% of the sample. The top five reported social life impacts were *deprivation of social gathering/ interaction (-)* (*n* = 105), *feelings of loneliness/ separation (-)* (*n* = 35), *deprivation of celebration opportunity (-)* (*n* = 18), *increased family time/ connection (+)* (*n* = 16), and *deprivation of college experience (-)* (*n* = 13). 105 participants were affected by a decreased ability to spend time with others and attend social gatherings, while 35 students reported feelings of loneliness and isolation. Many college students felt they were missing out on a crucial college experience. Participants were also deprived of celebrating special events with their loved ones, including the ability to walk across the stage for graduation. However, 16 participants reported that the pandemic allowed them to spend more time with family. Other reported impacts include *decreased alone time (-)* (*n* = 9), *more time for personal life (+)* (*n* = 6), and *increased access to family support (+)* (*n* = 3).

Mental health: Impacts related to *mental health* were reported 0.73 times per student, on average, and reported by 52.7% of the sample. The top five reported mental health impacts were *compromised mental health (-)* (*n* = 118), *sense of gratitude (+)* (*n* = 36), *resilience efforts (+)* (*n* = 17), *positive outlook (+)* (*n* = 12), *need to adopt/ improve habits/ skills (-)* (*n* = 10). 38% of all participants reported a decrease in their psychological and emotional well-being. Students had newfound or increased stress, anxiety, depression, and/or loss of interest and energy for life. Several students felt they needed to adopt or improve upon habits and skills to adapt to new circumstances. On a positive note, 36 students felt the pandemic gave them a sense of appreciation and gratitude for things they normally took for granted, like the health and safety of loved ones and financial security. Some students made efforts to remain positive in the face of darkness and expressed optimism and hopefulness for the future. Other reported impacts include *need to adopt/ improve habits or skills (+)* (*n* = 8), *reconsideration of life (+)* (*n* = 6), *loss of access to mental health resources (+)* (*n* = 6), *negative/ uncertain outlook (-)* (*n* = 2), and *feelings of discrimination (-)* (*n* = 2).

Negative impact: On average, each participant reported 5.43 aspects of negative impact with a standard deviation of 2.4. Of 309 students, 308 students reported at least one negative impact, with a total of 1,678 negative impacts reported. The top five most common negative impacts were *change of environment* (*n* = 128), *compromised mental health* (*n* = 118), *transitioning online difficulty* (*n* = 111), *deprivation of social gathering/ interaction* (*n* = 105), *and increased health concerns* (*n* = 87).

Positive impact: On average, participants reported .37 aspects of positive COVID-19 related impacts with a standard deviation of .72. Of 309 student responses, 81 students reported at least one positive impact, with a total of 115 positive impacts reported. The top five most reported positive impacts were *sense of gratitude* (*n* = 36), *resilience efforts* (*n* = 17), *increased family time/ connection* (*n* = 16), *positive outlook* (*n* = 12), and *need to adopt/ improve habits or skills* (*n* = 8). The most reported positive impact was the *sense of gratitude* in which students felt that the experience of the COVID-19 pandemic had allowed them to view situations in a new light. Students had newfound or increased gratitude for things like the health and safety of their family and financial security. Some students expressed optimism and hopefulness for the future and committed to voluntary behavioral efforts to remain positive such as exercise and participating in activities they enjoy. 12 students gained positive skills or habits as a byproduct of adjustments they had to make to continue to succeed in a new format. Students had more time to spend with their families and more time for their personal life due to online school.

Table 1. Reported Specific Impacts Under the Specific Themes With Representative Quotes of the Negative Impacts

Parent Code	**Verbatim Code**	**Number of student responses that used the code**	**% of student responses that used the code**
Academics (74.4%) *M* = 1.67 *SD* = 1.51 "...having all online [classes] I am struggling to keep up my grades"	Transitioning online difficulty (-)	111	35.92
	Distraction at home (-)	76	24.60
	Lack of physical study resources (-)	67	21.68
	Struggling to concentrate for study (-)	62	20.06
	Decreased productivity (-)	49	15.86
	Compromised professional development opportunities (-)	43	13.92
	Decreased motivation (-)	41	13.27
	Increased study load (-)	20	6.47
	Loss of extracurriculars (-)	19	6.15
	Lower grades (-)	10	3.24
	Less time for schoolwork/ study (-)	10	3.24
	Increased testing stress (-)	6	1.94
	Course dropping (-)	2	0.65
	More time for schoolwork (+)	3	0.97
	Higher grades (+)	2	0.65
	Increased productivity (+)	1	0.32
Housing/ Travel (82.7%) *M* = 1.50 *SD* = 1.07 "I was abruptly told I needed to evacuate my building..."	Change of environment (-)	128	41.42
	Change of routine (-)	84	27.18
	Restricted travel/ visits (-)	69	22.33
	Physical confinement (-)	68	22.01
	Moving issues (-)	50	16.18
	Change of physical health habits (-)	29	9.39
	Difficulty attaining necessities (-)	17	5.50
	Change of routine (+)	2	0.65
	Change of physical health habits (+)	1	0.32
	Change of environment (0)	10	3.24
	Change of physical health habits (0)	7	2.27
	Change of routine (0)	5	1.62
Physical Health (41.5%) *M* = 0.56 *SD* = 0.79 "My uncle and my aunt have been diagnosed as positive..."	Increased health concerns (-)	87	28.16
	Concerns of COVID-19 related events (-)	29	9.39
	Increased caregiving (-)	26	8.41
	COVID-19 case in close proximity (-)	22	7.12
	Inability to help others as hoped (-)	7	2.27
	Loss of a loved one (-)	1	0.32
	Lack of support for own physical condition (-)	1	0.32
	Cancelled personal medical visit/ procedure (-)	1	0.32
	Perceived underperformance for family (-)	1	0.32
	Expressed willingness to help others (+)	1	0.32
Finance/ Work (43.5%) *M* = 0.68 *SD* = 0.90	Loss of job (-)	78	25.24
	Financial strains (-)	55	17.80
	Extra financial expenses (-)	22	7.12
	Concern of financial loss (-)	19	6.15

"...my family and I have been struggling financially"	Fewer employment opportunities (-)	10	3.24
	Increased workload (-)	7	2.27
	Stress of job uncertainty (-)	7	2.27
	Reduced workload (-)	5	1.62
	Lack of physical work resources (-)	2	0.65
	Less spending on non-essential activities (-)	1	0.32
	Exploring economic opportunities (+)	1	0.32
	Less spending on non-essential activities (+)	1	0.32
	Increased workload (0)	2	0.65
Social Life (50.5%) *M* = 0.66 *SD* = 0.75 "Social distancing has threatened to take a toll on my social life, and it has become much more work to keep in touch with my friends and continue to build those relationships ..."	Deprivation of social gathering/ interaction (-)	105	33.98
	Feelings of loneliness/ separation (-)	35	11.33
	Deprivation of celebration opportunity (-)	18	5.83
	Deprivation of college experience (-)	13	4.21
	Decreased alone time (-)	9	2.91
	Increased family time/ connection (+)	16	5.18
	More time for personal life (+)	6	1.94
	Increased access to family support (+)	3	0.97
Mental Health (52.7%) *M* = 0.73 *SD* = 0.85 "...I fear I am slipping back into a depression"	Compromised mental health (-)	118	38.19
	Need to adopt/ improve habits or skills (-)	10	3.24
	Loss of access to mental health resources (-)	6	1.94
	Negative/uncertain outlook (-)	2	0.65
	Feelings of discrimination (-)	2	0.65
	Sense of gratitude (+)	36	11.65
	Resilience efforts (+)	17	5.50
	Positive Outlook (+)	12	3.88
	Need to adopt/ improve habits or skills (+)	8	2.59
	Reconsideration of life (+)	6	1.94

Note. Percentages indicate the percentages of students reporting at least one relevant impact within the theme. Each theme may contain positive, negative, or neutral aspects of reported impact. + indicates positive impact. – indicates negative impact. 0 indicates neutral impact.

Quantitative Analysis Results for Group Differences

Females (*M* = 5.57, *SD* = 2.45) reported significantly more negative impacts than males (*M* = 4.49, *SD* = 1.78; *t*(307) = 2.65, *p* = 0.009). Additionally, females (*M* = 1.57, *SD* = 1.08) reported significantly more housing/travel impacts than males (*M* = 1.18, *SD* = 0.91; *t*(54.58) = 2.44, *p* = 0.018). See Table 2 below for details.

Table 2. Results of t-tests and Descriptive Statistics for Academic Impacts, Housing/Travel Impacts, and Negative Impacts by Gender

Outcome	**Group**						**95% CI for Mean Difference**		
	Male			**Female**					
	M	***SD***	***n***	***M***	***SD***	***n***		***t***	***df***
Housing/ Travel[b]	1.18	0.91	39	1.57	1.08	270	0.07, 0.71	2.44**	54.58
Negative Impact[a]	4.49	1.77	39	5.57	2.45	270	0.28, 1.88	2.65**	307

[a]Equal variances assumed. [b]Equal variances not assumed.
**$p < .01$.

Black students (*M* = 0.04, *SD* = 0.20) reported significantly fewer positive impacts when compared to Non-Black students (*M* = 0.40, *SD* = 0.74, *t*(115.41) = 6.24, *p* = 0.000) in the sample. In addition, Asian students (*M* = 2.15, *SD* = 1.31) reported significantly more academic impacts than White students (*M* = 1.52, *SD* = 1.52; *t*(186) = -2.23, *p* = .027). See Table 3 and 4 for details.

Table 3. Results of t-tests and Descriptive Statistics for Positive Impacts between Black vs. non-Black students

Outcome	Group						95% CI for Mean Difference		
	Black/African American			Nonblack					
	M	*SD*	*n*	*M*	*SD*	*n*		*t*	*df*
Positive Impact[a]	0.04	0.20	26	0.40	0.74	283	0.25, 0.48	6.24***	115.41

[a]Equal variances not assumed.
***$p < .001$.

Table 4. Results of t-tests and Descriptive Statistics for Academic Impacts between White vs. Asian participants

Outcome	Group						95% CI for Mean Difference		
	White			Asian					
	M	*SD*	*n*	*M*	*SD*	*n*		*t*	*df*
Academic Impact[a]	1.52	1.52	154	2.15	1.31	34	-1.18, -0.07	-2.23*	186

[a]Equal variances assumed, [b]Equal variances not assumed.
* $p < .05$.

Participants in the fully online degree program ($M = 4.64$, $SD = 1.76$) reported significantly lower numbers of negative impacts than those in the residential degree program ($M = 5.53$, $SD = 2.46$; $t(54.88) = -2.73$, $p = .009$) and reported significantly fewer academic impacts ($M = 0.72$, $SD = 0.85$) than those in the residential degree program ($M = 1.80$, $SD = 1.53$; $t(69.69) = -6.52$, $p < .001$). Fully online and residential students were equivalent with respect to impacts in all other domains. See Table 5 for details.

Table 5. Results of t-tests and Descriptive Statistics for Academic Impacts and Negative Impacts by Type of Educational Program

Outcome	Group						95% CI for Mean Difference		
	Fully Online			Residential Online					
	M	*SD*	*n*	*M*	*SD*	*n*		*t*	*df*
Academic[a]	0.72	0.85	36	1.82	1.53	273	-1.44, -0.76	-6.52***	69.69
Negative Impact[a]	4.64	1.76	36	5.53	2.46	273	-1.56, -0.24	-2.73**	54.88

[a]Equal variances not assumed.
**$p < .01$. ***$p < .001$.

Discussion

This study aims to identify COVID-19 impacts as reported by U.S. college students in a large public university and to examine potential differences in COVID-19 impacts by gender, ethnicity, and educational programs. We identified six themes with 61 aspects of impacts as perceived by college students. Although most reported impacts were negative, some positive impacts were reported as well. We also found differences in perceived COVID-19 impact by gender, ethnicity, and educational programs.

Specifically, the perceived impacts revolve around six themes: *academic impact, housing and travel impact, physical health impact, financial and work impact, social life impact, and mental health impact*. This finding both replicates and extends the existing literature of reported impacts of the pandemic from domestic and international samples.

The majority of reported impacts were categorized as negative, which echoes findings from the current literature (e.g., Aucejo et al., 2020; Karasmanaki & Tsantopoulos, 2021). For example, Aucejo et al. (2020) reported large negative effects of COVID-19 on undergraduate students of ASU including loss of a job, loss of internship opportunities, reduced income, delayed graduation, withdrawing from classes, major change intention, change in study hours, etc. López-Castro et al. (2021) reported significant impediments of the pandemic on home life, social environment, work life, and the physical, emotional, and mental health of college students in New York. Another study also reported that US full-time college students suffered from anxiety and stress due to the pandemic (Hoyt et al., 2021).

Nevertheless, we also identified positive impacts reported by participants from our study that corroborate the extant literature, such as feeling a sense of gratitude for things they normally took for granted and feeling the pandemic gave them more time to spend with family and more time for themselves. The current literature reports positive effects of the pandemic including more time to explore one's own interests, better sleep quality, a break from the routine of usual daily life, more time with loved ones, increased connection with family and friends, and more social and family support (Ivbijaro et al., 2020; López-Castro et al., 2021; Mazumder et al., 2021; Williams et al., 2021; Zhang & Ma, 2020).

It is interesting to note that 96% of participants in New York City (López-Castro et al., 2021) and 58-78% of participants in China (Zhang & Ma, 2020) reported experiencing at least one positive impact of the pandemic, while only 26.2% of participants in this study reported experiencing a positive impact. This discrepancy could potentially be due to the nature of the instrument used to collect the data. Much of the existing findings on COVID-19 impact are based on closed-ended survey items which, while being time efficient and easy to interpret and analyze, might not fully encompass the respondents' thoughts and experiences.

For example, López-Castro et al. (2021) used the Epidemic-Pandemic Impacts Inventory (EPII), a survey with 92 items of four forced-choice options (i.e., YES (Me), YES (Person in Home, NO, NA). In Zhang and Ma (2020), a questionnaire with forced-choice response options was used to collect data on changes in social and family support as a result of COVID-19. The individual impact items might have primed participants to consider and agree with positive impacts that they might not have otherwise considered. Responses from our participants might be a more accurate representation of salient and consciously experienced positive impacts. According to Cassels and Birch (2014), open-ended survey questions are more suitable in capturing emotions than forced-choice questions. Our study adds to the literature by suggesting that only a small percentage of college students considered any positive aspects of the pandemic and the transition to virtual learning. More studies are needed to replicate our finding.

Our study also revealed gender differences in perceived COVID-19 impact that extends the current literature in and outside of the US. We found that female students perceived significantly more negative impacts overall than male students. This finding is consistent with Ding et al. (2020)'s finding that female college students possessed higher risk perception of the pandemic. Female students may be more sensitive in how they perceive COVID-19 impacts and risks due to potential differences in thinking processes between genders (Ding et al., 2020). In contrast, Williams et al. (2021) found that females perceived more positive changes than males, when asked whether they had experienced a specific positive change. This could suggest that females perceive more impacts overall and are more sensitive to how their life has been affected.

The literature also suggests that females are more vulnerable than males in mental health issues. Hoyt et al. (2021), for example, found that female college students in the US had reported worse well-being than their male peers. Yan et al. (2021) reported that Chinese females experienced more psychological stress than males; however, they were less likely to seek medication attention for COVID-19-related symptoms. A systematic literature review of the impacts of the pandemic indicated that females are more vulnerable to mental health issues and have higher psychological distress (Xiong et al., 2020). One possible explanation for this is that females are more likely to be in retail, healthcare, and service industry jobs that are more vulnerable to impacts of COVID-19 (Xiong et al., 2020; Yan et al., 2021). Females may also be more likely to be aware of and report mental health issues. Our study, however, did not find a significant difference between reported mental health impacts by gender. Given that the participants all came from a large psychology class with course contents on mental health and mental disorders, it could be that participants were more exposed to mental health knowledge and resources to boost their own mental health. As such, more studies are needed to test the gender disparity in terms of the impact on mental health during the pandemic.

Further, we found that female students reported more impacts in academics and housing and travel aspects as compared to male students. Research shows that women surpass men in academic achievement and graduation rate in college (e.g., Buchmann & DiPrete, 2006; Goldin et al., 2006). Female participants may have been more attentive and sensitive to impacts on their learning experiences and academic pursuit given their stronger academic orientation. One unique finding in our study is the gender differences in housing and travel impacts. Female students could be more likely to move back home during the pandemic to help their families given the fact that women often spend more time in domestic activities than men (e.g., Jolly et al., 2014). It should be noted that our gender variable is from a school record that does not include gender minority related information. Given the current rise in gender minority students, it is also important to examine how gender minority students may perceive COVID-19 impact differently than their cisgender and heterosexual peers.

Concerning racial disparities in the impact of COVID-19, most studies indicate that minority groups, especially Black and Latinx communities, were more negatively impacted than their White counterparts (Hu, 2020; Miller et al., 2021; Ruprecht et al., 2021; Staniscuaski et al., 2021; The Atlantic Monthly Group, 2021). In our study, we found no statistically significant differences between racial groups in perceived negative impacts of COVID-19. This could potentially be due to efforts by UF to support minorities and lessen the gap in impact. For example, UF allocated $40,000 to a Racial Justice Research Fund in July 2020 to promote inclusivity and equity among students (Kays, 2020). More studies are needed to examine the differences in negative COVID-19 impact across racial groups.

Regarding racial differences in perceived positive impacts of COVID-19, while López-Castro et al. (2021) found that White participants perceived fewer positive changes than Hispanic/Latinx participants relating to COVID-19, our study found that Black students perceived significantly fewer positive impacts of the pandemic than students of other racial groups as a whole and via separate paired comparison. This finding may reflect structural, social, educational (Mustaffa, 2017), financial (Couch et al., 2020) and medical disadvantages (Nelson, 2002) experienced by Black populations. Active efforts

to reduce racial disparity in higher education and foster resilience in Black students should be incorporated into college services to boost resilience in students.

Additionally, while other researchers found that Asian students reported more financial and physical health impacts (López-Castro et al., 2021) and felt less anxiety (Hoyt et al., 2021) than their White peers, our study found that Asian students reported significantly more academic impacts compared to White students. Mau (1997) found that Asian-American and Asian immigrant high school students scored higher on cognitive tests measuring academic achievement, and had higher perceived parental academic expectations compared to White American students. This higher importance placed on academics could potentially explain why Asian students perceived more academic impacts during the swift transition to online learning. These disparities between White and Asian students should be further investigated by future studies.

We found that students in the fully online degree program reported significantly fewer academic impacts and significantly fewer overall negative impacts compared to students who enrolled in the residential degree program. Students without prior experience of fully online school were more affected by the sudden transition and therefore may have been disproportionally impacted during the pandemic. Students enrolled in the fully online degree program most likely experienced fewer academic effects of the pandemic because they did not have to swiftly transition platforms in the middle of the semester. Their programs were already designed for virtual learning, and they may have chosen online schooling due to its benefits and flexibility. Residential students might have struggled with technological difficulties, lack of resources at home, and transition to a new platform with little warning or time to prepare.

Our finding, consistent with the current literature, suggests that prior experience in online school is a protective factor in times of environmental crisis. Educational institutions should continue to implement and expand effective virtual platforms to ensure that learning is always accessible. According to Chang et al. (2021) and Stevenson and Zweier (2011), a mix of virtual and in-person methods may be the most efficient way to teach students. As technology improves and society advances, we can expect virtual and blended courses to gain even more popularity.

Conclusion

We identified six themes with 61 aspects of impacts as perceived by college students of one large online class in a large public university: *academic impact, housing and travel impact, physical health impact, financial and work impact, social life impact, and mental health impact*. Students reported mostly negative impacts, although some positive impacts were reported as well. Students in the fully online program prior to the pandemic reported significantly fewer academic impacts and fewer overall negative impacts than students in the residential educational programs taking the online course. Female students reported significantly more negative impacts overall, and, specifically more impacts related to academics and housing/ travel in comparison to male students. Black students perceived significantly fewer positive impacts of the pandemic than students of other racial groups as a whole or via separate paired comparison, although no racial differences were found in comparing negative impacts. Asian students reported significantly more academic impacts compared to White students. This research expands the current literature by identifying both negative and positive impacts of COVID-19, gender and racial disparity in perceived impact, and educational program differences in students' perceived impact.

Recommendations

Our study suggests that higher education administrative and instructional facilities and personnel should be responsive to impacts on college students with evidence-based strategies to support students' academic and life success in times of environmental crisis. Some ways to provide support include implementing virtual communication platforms (Ashokka et al., 2020), offering peer mentoring on topics such as stress management and time management (Kazerooni et al., 2020), scheduling video calls with students (Hodgson & Hagan, 2020), and publishing short videos discussing relevant topics including maintaining focus and emotional well-being (Blasco et al., 2020). In the case of a pandemic, institutions should also make active efforts to reduce racial and gender disparity and foster resilience in minority students by ensuring a positive campus climate (Mills, 2021) and increasing teacher emotional support (Romano et al., 2021), student interactions with instructors and peers (Korgan & Durdella, 2016), and school support (Cunningham & Swanson, 2010). Future research should be devoted to replicate and further extend our findings to examine college students' perceived impacts and make potential intervention efforts to buffer students' negative experience of the pandemic and boost resilience during the environmental crisis.

Limitations

Given the contribution of the study, our research is limited by the convenience sampling of students enrolled in a large online psychology course which precludes the generalization of findings to the general population. We also have a relatively small sample size in group comparisons. Last, perceived COVID-19 impact data was based on coding of qualitative verbatim data which is subject to interpretations. While we attempted to interpret the raw verbatim data in a consistent, reliable, and unbiased way, we acknowledge the possibility of alternative interpretation in the coding. Future research should replicate our findings with larger and random or representative samples. Future studies will also

benefit from using both qualitative and quantitative survey data on perceived impact for a more complete understanding of COVID-19 impact as perceived by students.

Authorship Contribution Statement

Wang: Concept and design, data acquisition, data coding training, data interpretation, drafting manuscript, critical revision of manuscript, admin, supervision, final approval. Shabash: Data coding/interpretation, drafting manuscript, critical revision of manuscript. Sterghos: Data analysis/interpretation, drafting manuscript.

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