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Impacts of the COVID-19 Pandemic on College Student Brain Health

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IMPACTS OF THE COVID-19 PANDEMIC ON COLLEGE STUDENT BRAIN HEALTH

by

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ABSTRACT

The intent of this study was to investigate the impact of the COVID-19 pandemic on the well-being and subjective cognition in college students. The purpose of this study as well was to investigate if those who had tested positive for COVID-19 in the past had lower levels of subjective cognitive health and if students who were affected more during the pandemic experienced more disruptions to their wellbeing. Participants (N = 105) were recruited online via the Prolific platform and took part in an online survey administered on Qualtrics. A correlational analysis was performed to examine the effects of the pandemic, and broadly on wellbeing and subjective cognition. Results illustrated that students who endorsed more education-related COVID impacts (e.g., inability to join a club on campus) endorsed higher scores on the Perceived Stress Scale ($r = 0.48$, $p < .001$), lower scores on the PROMIS subjective cognition measure ($r = -.40$, $p < .001$), higher technostress scores on the communication overload subscale ($r = .30$, $p = .005$), and lower scores on the academic performance subscale ($r = -.26$, $p = 0.011$). This study found no significant difference in perceived stress scale scores amongst those who had and had not tested positive for COVID-19. The results highlight the need for interventions to support students' mental health and cognitive functioning during pandemics, focusing on reducing communication overload and enhancing academic performance. Furthermore, the findings may be useful in informing educational policies that prioritize student well-being during times of crisis.

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CHAPTER I: INTRODUCTION

Significance

The COVID-19 pandemic presented an unprecedented number of issues that the world was not adequately prepared to deal with. Individuals around the world had to switch their lives and livelihoods from physical to digital in a matter of days without guidance. Also, with the nationwide lockdown (see Figure 1 for example of lockdown across 9 states), mask mandates were also enforced around the country.

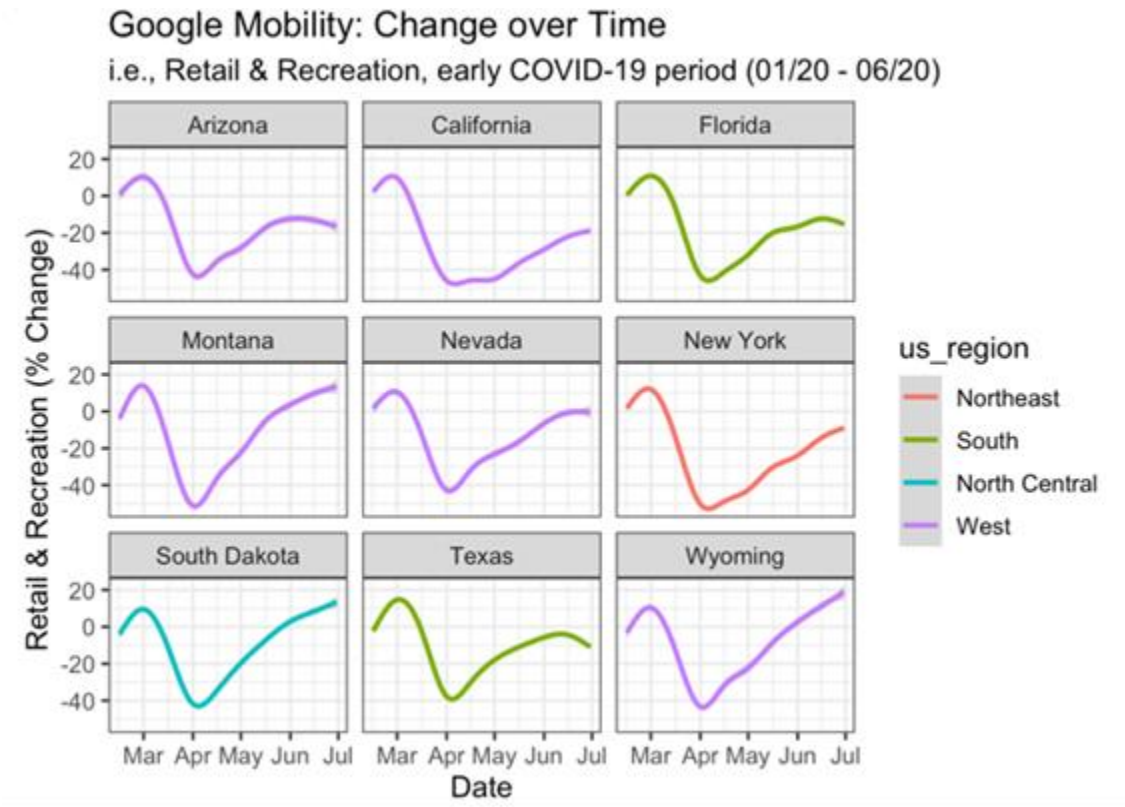

Figure 1. Google Mobility: Retail and Recreation (% change) over early COVID period (01/2020 – 06/2020), across 9 states in major US regions. Source: https://www.google.com/covid19/mobility/

At the beginning of the pandemic, mask usage in America averaged around 74% with a high of 77% as the pandemic went on. Over time, mask usage reportedly fell to 23% by July

2021 (IHME, 2022). Keep in mind that part of the data (see Figure 2 below) is projected and an estimation, while some are actual reported numbers from states.

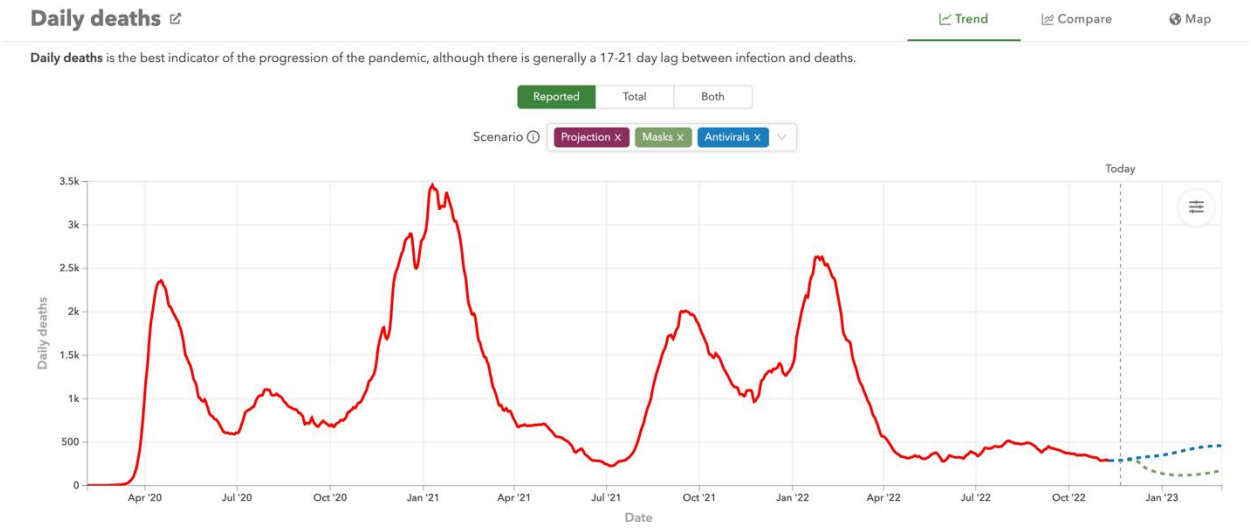

Figure 2. Daily deaths associated with COVID-19, since the beginning of the pandemic. Source: https://covid19.healthdata.org/united-states-of-america?view=daily-deaths&tab=trend

Students especially were impacted by this sudden change, with many of them losing years of in-person social interaction to online classes. A cross-sectional survey study of students at Texas A&M University found within their research that a high proportion of students surveyed reported concerning amounts of depressive and anxious behaviors, and suicidal thoughts (Wang et al., 2020). Of participants surveyed, 71.26% of participants surveyed reported increased levels of stress and anxiety since the pandemic started (Wang et al., 2020). A meta-analysis of multiple studies also concluded that across 28 cross-sectional studies with 432,918 college age participants presented prevalent scores of anxiety, depression, and stress. 29% showed anxiety, 37% showed signs of depression, and 23% reported signs of stress. These percentages suggest that the mental health of these college students was generally affected during the pandemic (Wang et al., 2021). Also, additional literature presents the issue of the aftereffects of being infected with COVID-19 might present additional risks to the mental health of students (Beatty, 2023). Participants were presented with a subjective opinion survey and the results imply that

those who experienced symptoms such as prolonged loss of taste or smell, might be more likely to be at a higher risk for depression (Beatty, 2023). This also puts them at risk for a decline in their academic performance, which is the main concern of this study (Beatty, 2023).

Online learning experience: what is online/remote learning?

Online learning and remote learning are two similar sounding terms, but are executed differently. Remote learning usually requires the student to attend class via Zoom or some other kind of online meeting platform. These meetings happen at the same time every week, and this mode of learning is somewhat similar to a face-to-face classroom experience (Alamo Colleges, n.d.). On the other hand, online learning does not require students to attend a virtual meeting and this mode offers a more flexible approach for those who might not have time to attend weekly class meetings. Prior to the COVID-19 pandemic remote learning through Zoom did exist, but it was not as common as we know it today (University of Kansas, n.d.). Online learning was very common in college courses before the pandemic but rose in popularity shortly after (University of Kansas, n.d.). Remote learning was introduced to keep students safe, while also not compromising their learning experience. However, many students have socioeconomic barriers in their way that were not as much of an issue while they were in the physical classroom (Mukhtar et al., 2020). There are issues such as a possible lack of internet access at home, or a student not possessing a laptop for educational purposes. Other problems occur, such as children not being attentive while listening to a lecture, or the subject requires hands-on learning that is just not possible in a remote setting (Mukhtar et al., 2020). The difference between online and remote learning is that online learning was an alternative to the traditional classroom setting, while remote learning was response to a new set of issues that were created due to the pandemic.

Few were properly prepared with how to acclimate to the significant changes that remote learning presented, and therefore there was some significant oversight.

Online learning experience: Impact of Technostress

An important aspect to consider when looking at the issue of cognitive performance regarding the pandemic is technostress. *Technostress* was first defined by Brod (1982) as a new ailment of adaptation that is caused by inability to deal with and cope with new technologies in a way that is healthy for the user (Alvarez-Risco et al., 2021). Today when we are looking at the effects of technostress and what it is in the modern era, we are also including frequent use of technology and lack of physical interaction. Previously, technostress might have only been limited to new technologies, but today it is frequency and inability to avoid constant screen-time that seems to be the issue. In a recent study by Alvarez-Risco et al. (2021) found that the COVID-19 pandemic has increased work-home conflict and modified many core aspects of life to being solely online. This has also increased exhaustion, which had a negative impact on the academic performance of the college students present in this study. When home and the workplace become one, there is not always a way for proper boundaries to be established. Individuals might be expected to always be available, such as receiving messages outside of working hours regarding work-related matters that could have been handled during the day. Students who were previously taking in-person classes were expected to move completely online in a matter of minutes. Some of these students might not be able to properly handle online classes, and their performance would then suffer because of this.

Another aspect to recognize with respect to the issue of cognition overall is the impact on work and stability. During the pandemic many individuals were transferred to work at home, while some were furloughed, and others were laid off entirely. Such sudden changes may cause a

significant level of stress, and some might not cope with these changes as well as others. In a study conducted on 293 Israeli participants, the results indicated that employees that were furloughed, meaning they were placed on an unpaid and temporary leave of absence, showed significantly higher levels of perceived stress in comparison to those who might have already been unemployed prior to the beginning of the COVID-19 pandemic (Mimoun et al., 2020). With this in mind, we investigated how this stress might correlate to issues of food and housing instability as well. As individuals are laid off or furloughed, the problem of providing for themselves and others becomes a focal point. Not only is the entire world shutdown, but now there are not many opportunities for employment that do not pose a significant risk to your health and others. Not to mention the already present issue of a shortage of affordable housing and the cost of living increasing, an individual losing their job on top of that might present a ripple effect of stress and negative impacts on their cognitive performance. Researchers at Duke University surveyed 3,141 counties in the United States. These counties put legislation into place between the beginning of the pandemic until November 2020 that aimed at reducing evictions and aiding in the reduction of housing instability (Jowers et al., 2021). The team of researchers concluded that with preventative legislation, infections from COVID-19 decreased by 3.8% and deaths from COVID-19 decreased by 11% (Jowers et al., 2021). The small changes in legislation to safeguard those who might have been struggling with steady housing prior to the pandemic resulted in a less stressed and safer community.

Along with stress from work and school, COVID-19 had an impact on families and other personal relationships. Remaining isolated in a space with your partner for months might warrant some unexpected stress and strain, while for others it might strengthen the relationship in terms of intimacy and closeness (Schokkenbroek et al., 2021). Spending time with your partner on a

consistent basis for an extended period might also allow for reflection about the relationship overall. A repeated measure ANOVA was conducted on 1,491 participants and researchers found that perceived relationship stress significantly changed over the span of the pandemic for both women and men (Schokkenbroek et al., 2021). For example, women experienced higher levels of perceived stress, as they felt neglected by their partners, and tension was higher than normal, which caused relationship conflicts (Schokkenbroek et al., 2021). Although, researchers in Spain found that marital and other familial relationships did not present a significant increase in conflict during the COVID-19 pandemic in comparison to pre-pandemic conditions (Rodríguez-Domínguez et al., 2022). This presents the question of whether increases in stress during the pandemic are due to cultural factors as well as societal.

A factor that is relatively new and not as researched is long COVID syndrome (LCS) and how it affects cognition. What we know is that LCS might cause brain fog in those affected and infected individuals might experience COVID symptoms for longer than expected. Some symptoms might not go away either (Asadi-Pooya et al., 2022). In a recent study in the Fars province of Iran, 2,696 COVID-19 patients took part in an over the phone questionnaire three months after their stay at the hospital. The questionnaire was created to study the existence and possible effect of long COVID syndrome-associated brain fog (Asadi-Pooya et al., 2022). One thousand six hundred and eighty or 62.3% of patients reported experiencing long COVID syndrome. However, only 194 (7.2%) of patients experienced long COVID syndrome along with brain fog (Asadi-Pooya et al., 2022). Brain fog is defined as a term used to explain or describe when individuals experience a feeling of mental slowness, as well as an altered ability to concentrate (Asadi-Pooya et al., 2022). Researchers also found that within their sample of patients, women were mostly affected by brain fog after experiencing COVID (Asadi-Pooya et

al., 2022). They also found significant associations with how COVID affected the patient and whether that patient experienced brain fog. They are also interested to see if the patient experienced onset respiratory issues and if the patient was also admitted into the ICU (Intensive Care Unit) (Asadi-Pooya et al., 2022). This study was conducted on a moderate size sample from one area of the world, and they were able to glean significant results that point to the existence of COVID-19 affecting cognition. Another issue researchers are concerned about is "pandemic brain" in college students. "Pandemic brain" is similar to brain fog except the bouts of forgetfulness and overall feeling of cognitive slowness is believed to be caused by the pandemic and COVID-19 itself (Buelow et al., 2023). Researchers used three parts of the ADMC (Adult Decision Making Competence) scale to examine the objective cognition of their participants (Buelow et al., 2023). They found that while participants did not make consistent choices throughout the study, they were confident in their choices. Researchers believe this might imply that uneducated but confident choices might lead to bothersome personal health choices (Buelow et al., 2023). On the other hand, researchers who are also studying cognition of college students who have been previously infected with COVID-19 found that infection did not influence their levels of objective cognition (Francis et al., 2023). They did not want to generalize, but researchers found that in college students specifically, the effects were not strong enough to create a measurable average difference in those who were previously infected and those who were not (Francis et al., 2023).

The Present Study

In this present study, we assessed college aged students and surveyed how they believe their wellbeing and cognitive health has been affected with the COVID-19 pandemic. Whether it

is long COVID-associated brain fog, or just an overall feeling of stress, we investigated how the recent pandemic has shifted individual's lives, as well as their cognition.

CHAPTER II: THE PRESENT STUDY

Literature Gaps and Overview

Overall, we have outlined how the COVID-19 pandemic has presented factors that could affect one's mental health. Students were sent home without a clear timeline of when they would head back, and adults were shifted to an at-home workplace or furloughed. Technostress was brought to the forefront, as students and adults alike were presented with new technology and expected to cope instantly. Many individuals stayed quarantined in their homes with minimal contact from the outside world. Some individuals lost loved ones, and some are experiencing the effects of COVID long after they tested negative. With all these factors to consider, one is curious as to how more than a year of uncertainty and stress would have affected an individual's cognitive function. The literature presents a common theme of uncertainty around the subject of COVID as well. Due to the nature of the pandemic, there is still a need for more research to be done regarding the effects of the virus itself. The effects of COVID-19 seem to not be limited only to health issues either.

Research Questions

RQ1: Do college-aged students who have been previously infected with COVID-19 continue to experience lower levels of subjective cognitive health (e.g., brain fog, abilities to concentrate)?

Hypothesis 1: Majority of students will be experiencing symptoms of brain fog, though we might expect to see more brain fog reported in those who report having had the COVID-19 virus.

RQ2: Are impacts from the early pandemic period (e.g., loss of job, loss of loved one, shift in format at work, school) still affecting students' subjective cognition today?

Hypothesis 2: College students who were affected more than average throughout the pandemic period, are more likely to be still experiencing disruptions to their overall wellbeing (2a: perceived stress; 2b: diet quality; 2c: technostress from the classroom/at work, 2d: subjective cognition).

CHAPTER III: METHOD

The present study investigates subjective cognition throughout the COVID-19 pandemic in the context of a survey study (conducted online via Prolific).

Participants

105 participants were recruited from Prolific, an online platform for collecting data, and were directed to the survey using the platform Qualtrics. Our final sample size was 90, given that 11 did not consent and four did not pass the attention check. All participants were required to be over the age of 18, self-reported as college students, and must be living in the United States. This was a paid study through Prolific where participants were paid immediately upon completion as per payment guidelines. This study takes between 8 - 10 minutes (with compensation totaling $2; 10 min duration).

Materials & Measures

Scoring for each measure below followed the standard scoring algorithm provided in each relevant validation measure.

Demographics

Participants were asked questions regarding their race, age, sex, ethnicity, and gender. Participants were also asked what state they reside in and what was the highest degree they have completed.

Ten Item Personality Inventory (TIPI)

This is a personality trait assessment tool that provides a measure of the OCEAN factors (Openness to Experience, Conscientiousness; Extraversion; Agreeableness; Neuroticism). It consists of ten items and participants rated their responses on a 7-point scale (1 – disagree strongly to 7 – agree strongly) (Gosling et al., 2003). From the TIPI, five scores are extracted, taking the mean of each set of two items for: (1) Openness to Experience, (2) Conscientiousness; (3) Extraversion; (4) Agreeableness; (5) Neuroticism.

Perceived Stress (PSS)

This is a stress assessment tool that is administered to participants, assessing perceived stress over the last month (i.e., current stress). Participants rated their responses on a 4-point scale (0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 – very often) (NH Department of Administrative Services, 1983). After reverse scoring of relevant items, scores were summed to create a total PSS score, as well as a categorization of low (pss_score >= 0 & pss_score <= 13), medium (pss_score >= 14 & pss_score <= 26), and high perceived stress (pss_score >= 27 & pss_score <= 40).

Technostress measure

This is a scale that is used to test how participants feel about technology and how it relates to their perceived stress levels. All items are rated on a Likert scale of 1 through 5 for each subscale (communication overload, social overload, technostress, exhaustion, academic performance). Questions included: “I feel my personal life is being invaded by social media” and “I have performed academically as well as I anticipated I would” (Alvarez-Risco et al., 2021). For each subscale, a sum score was created.

COVID Impacts (General)

This survey, with questions coming from the NORC Covid Impacts survey, is to measure the effects of COVID and how it impacts stress levels and everyday life during and after the pandemic. Participants were asked a series of questions, such as, “Which of the following measures, if any, have you taken in response to the coronavirus?” They are presented with a list of answers to choose from if the question pertains to them (NORC, 2020). We used this survey tool to collect data about experiences across the pandemic period. A sum score was created from all endorsed items.

COVID Impacts (Student)

This survey, with questions based off the NORC Covid Impacts survey, was created to measure the effects of COVID on students, and how it impacts stress levels, and everyday life during and after the pandemic. Participants were asked a series of questions, such as, “Which of the following measures, if any, have you taken in response to the coronavirus?” (NORC, 2020). They are presented with a list of answers, such as, “having a hard time making friends”. We used this survey measure that we created to collect data about *student experiences* across the pandemic period. A sum score was created from all endorsed items. Items are available in Table 1.

Table 1. COVID Impacts Student Survey created for this project.

Question: Which of the following have you experienced during or after the COVID-19 pandemic?	
1	Switched to online classes
2	Avoiding going to class if possible
3	Interacting with friends solely online
4	Deciding to go to a local college instead of moving away
5	Deciding to not join clubs or teams
6	Having a hard time making friends
7	Feeling socially isolated
8	Having a difficult time paying attention
9	Feeling anxious when going out
10	Feeling anxious in crowded places
11	Feeling easily overwhelmed
12	Having feelings of pessimism over world events and news
13	Grades slipping
14	Missed assignments
15	Did not attend office hours
16	Deciding to not attend campus events
17	Feeling burnt out
18	Wanting to stay home all day
19	Other _____

Rapid Eating Assessment Protocol (REAP)

This is a survey that is designed to help researchers and other providers assess dietary habits and levels of physical activity of participants. Participants were asked a series of questions, such as, "You or a member of your family usually shops and cooks rather than eating sit-down or take-out restaurant food?" (Brown University, 2004). They answered either usually/often, sometimes, rarely/never, or does not apply to me. We used this survey tool to research the effects of food instability and how it might affect one's physical health and brain health (Snap-ed Connection, 2004). A sum score was created from all items on the likert scale.

Subjective cognition

To measure and collect information about subjective cognition, we used the PROMIS® Cognitive Function v.2.0 - Short Form 6a. This is a scale used to assess cognitive deficits that has six items, rated on a five-point scale (5 – never, 4 – rarely (once), 3 – sometimes (two or

three times), 2 – often (about once a day), and 1 – very often (several times a day)). An example of an item is, “My thinking has been slow” (Northwestern University, 2020). A sum score was created across all items.

Procedures

Participants were informed that they are taking part in an online-based research study about cognition. They were then directed to a page that asks for their consent and for them to agree to participate in the study. Those who participate in the study will be able to complete the study from their own personal devices, i.e., any computer or cellular device with internet access. Participants had as much time as they needed to answer each question. Midway through the survey, they were subjected to a simple attention check question (e.g., if you are reading this select the color blue; if they select a color other than blue, they will be excluded). Participants were directed to fill out demographic surveys that asked them questions about things such as their age, year in college, race, etc. They were presented with various questionnaire measures that are listed above - (see Materials and Measures). After they complete all items, participants were thanked, and then automatically compensated for their time.

Analysis Plan

We used R for pre-processing of Qualtrics data (using Qualtrics R package, qualtRics). We used Jamovi (Jamovi, 2022) for the t-test and correlational analyses. The t-test was used to examine the relationship between the mean levels of subjective cognitive health in participants who had COVID and those who did not. The correlational analysis was used to examine the relationship between the measures listed above.

CHAPTER 4: RESULTS

Sample Demographics

Our recruited sample size was originally N = 105, however 11 failed to consent and 4 failed the attention check, so final analyses are presenting results from 90 participants. Age ranged from 18 to 70 with a mean age of 28.5 (SD = 9.94). 49.4% of the sample identified as female, 49% as male, and 1.1% as Other. The sample identified primarily as White (59%) – and 11.2% identified as Hispanic or Latinx. In computing perceived stress scores and applying cut scores, our sample was predominantly made up of participants in the moderate perceived stress category (54%), 33% in the low perceived stress category, and 12% in the high perceived stress category. We initially intended to conduct analyses comparing wellbeing measures by region of the United States, however due to imbalanced sample sizes by region, and final sample size, we are underpowered to make comparisons.

Table 2. Sample breakdown by region of the United States.

REGION	PROPORTION OF SAMPLE
Northeast	**0.12**
South	**0.51**
North Central	**0.17**
West	**0.20**

As shown in Figure 3 below, most participants completed the survey within 10 minutes (with a few outliers).

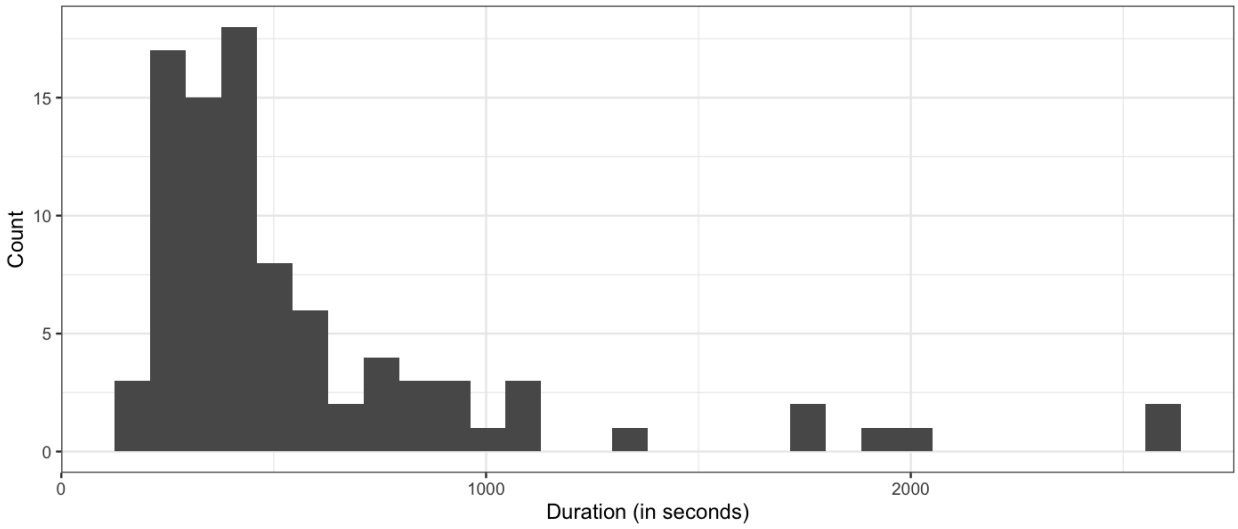

Figure 3. Survey completion time distribution.

Research Question 1: Impact of COVID-19 Infection on Subjective Cognition

We executed an independent samples t-test (Hypothesis 1: Group 1 ≠ Group 2) to compare the mean scores of subjective cognitive functioning between two groups, those who endorsed that they have had COVID-19 (N=43) throughout the pandemic, and those who have not (N=47). Results of the t-test did not yield a significant difference in mean scores between the two groups ($t(88) = 0.124$, $p = 0.901$; $M_{COVID+} = 20.4$, $SD = 6.45$; $M_{COVID-} = 20.3$, $SD = 6.18$). The effect size, measured by Cohen's d, was small ($d = 0.026$).

Research Question 2: Impact of COVID-19 Burden on Wellbeing

Lastly, we conducted a correlation analysis to examine the relationship between self-reported COVID impacts and measures of wellbeing (i.e., subjective cognition, perceived stress, REAP, technostress). We explored each of the five technostress subscale measures (i.e.,

academic performance, communication overload, technostress, social overload, and exhaustion) to unpack what exactly about technology during the pandemic was most influential. Results of the correlational analysis supporting hypothesis two are listed in Table 2 below.

Table 3. Correlational analysis results for Research Question 2.

Measure 1	**Measure 2**	**Correlation (*r*)**	**P-value**
COVID Impacts (student)	*Perceived Stress*	0.484	< .001
	Subjective Cognition	-0.403	< .001
	Technostress (communication overload)	0.299	0.005
	Technostress (academic performance)	-0.269	0.011
	Technostress (exhaustion)	0.185	0.084
	Technostress (social overload)	0.169	0.116
	Technostress (technostress)	0.057	0.598
	REAP	0.149	0.168
COVID Impacts (general)	*Perceived Stress*	0.056	0.602
	Subjective Cognition	**-0.016**	**0.878**
	Technostress (communication overload)	**0.138**	**0.194**
	Technostress (academic performance)	**0.062**	**0.564**
	Technostress (exhaustion)	**0.113**	**0.289**
	Technostress (social overload)	**0.073**	**0.492**
	Technostress (technostress)	**0.032**	**0.765**
	REAP	**0.043**	**0.691**
COVID Impacts (general)	*COVID Impacts (student)*	0.497	< .001
Subjective Cognition	*Perceived Stress*	-0.592	< .001
	REAP	-0.335	0.001
REAP	*Perceived Stress*	0.269	0.011

We found a moderate significant positive correlation between the COVID impact student measure and the perceived stress scale ($r = 0.497$, $p < 0.001$), a significant negative correlation

with the subjective cognition measure (r = -0.403, p < .001), a significant positive correlation with the communication overload subscale of the technostress measure (r = 0.299, p = 0.005), and a significant negative correlation with the academic performance subscale of the technostress measure (r = 0.299, p = 0.005). There was no relationship between the burden of COVID impacts (neither student or general impacts) and diet quality. There was no relationship between the general COVID impacts measure and any measure of interest (all p's > 0.05).

CHAPTER 6: DISCUSSION

Summary of results

Results illustrated that students who endorsed more student-related COVID impacts (e.g., inability to join a club on campus), endorsed higher scores on the Perceived Stress Scale (r = 0.48, p < .001), lower scores on the PROMIS subjective cognition measure (r = -.40, p < .001), higher technostress scores on the communication overload subscale (r = .30, p = .005), and lower scores on the academic performance subscale (r = -.26, p = 0.011). This study found no significant difference in perceived stress scale scores amongst those who have and have not tested positive for COVID-19. From what we learned with the technostress measure, students felt as if they were receiving too many technology-related communications, and this may have contributed to their overall burden on wellbeing. Our results are consistent with existing literature presented above. Similar to the study by Francis et al. (2023), wer also found that in our sample, participants with previous COVID-19 infections did not affect levels of subjective cognition.

Limitations

The present study has notable limitations. First, the study is applying a self-report approach, via an online survey on Prolific, three years into the pandemic. Secondly, we did not

collect any objective measures of wellbeing – which could possibly be in alignment or show different effects than observed in self-report. The study might also be vulnerable to recall bias, as we are asking participants to recall their feelings and struggles from three years prior. Participants may not accurately remember or might leave out important parts by accident. Also, we required that participants in our study must be in college (as per Prolific pre-screening), however we did not ask if they were in college during 2019-2021. Given that the Prolific platform we used does not continually require additional screening to ensure participants' information is up to date, it is possible some that we recruited as students, may have since graduated. Mental health struggles as well during the unprecedented times of the COVID-19 pandemic might have also presented unique challenges for those in our study and may affect their abilities to accurately recall their memories from that period.

Future Directions

Future research within this topic could include, examining secondary data to explore the pandemic related influence on general wellbeing in students as the pandemic unfolded (i.e., since late 2019), rather than taking a cross-sectional lens, retrospectively as we have done in the present study. This may bring a rounder perspective to the research and make it more generalizable. Another direction for this work could include partnering with universities to examine the support measures available and utilized throughout and after the pandemic (and by whom). This would include monitoring if resources were available and used throughout the pandemic, or if they were not used and the usage tapered off over time. What might be particularly interesting to explore is who was NOT utilizing resources and why.

Implications

The findings of the present study imply that students are indeed still struggling and may not be aware of all the wellness resources that are available to them. Perhaps they are not properly advertised by the university, or they are in an odd spot (or off-hours), making them difficult to access. However, it is important that universities find and reach out to the students who need help.

Conclusion

This study found no significant difference in subjective cognition and perceived stress scale scores amongst those who have and have not tested positive for COVID-19. The results highlight the need for interventions to support students' mental health and cognitive functioning during pandemics, focusing on reducing communication overload and enhancing academic performance. Furthermore, the findings may be useful in informing educational policies that prioritize student well-being during times of crisis.

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