Creative EDM Assignment:

COVID-19 and its Impact on College Students' Well-Being and Academic Achievement

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Problem Statement

The COVID-19 pandemic has introduced uncertainty and insecurity into many aspects of our lives, from having to deal with the death or illness of a loved one, extended quarantines, experiencing abrupt work from home implementations, to being anxious and fearful as the virus spreads. At one point, many of us felt like the world had stopped moving and that everything had come to a pause. However, children need to continue learning, and the sudden school closures led many countries to implement remote and/or virtual education programmes. While the reason behind this was to keep students in "school" and to continue allowing them to progress academically, and while this has prompted a wave of innovation in education, we can't help but wonder: How has the pandemic impacted student learning and well-being? More specifically, we will be examining college students, and our research questions are as follows:

1. How has online learning affected college students' well-being and mental health?

2. Do their well-being and mental health impact their academic success?

The paper will start with a literature review of the most relevant and significant publications regarding COVID-19's impact on college students. We will then discuss the analysis plan, which will include methods that will be used to address this problem. Lastly, we will end with a discussion of the results we will be looking for, its implications, possible challenges, and limitations.

Literature Review

Academic Success

The COVID-19 pandemic has brought the world into unprecedented times. In education, students were forced to adapt to online learning. Particularly, higher education has seen drastic negative impacts on student trajectories. Morona (2020) notes that the pandemic led to steep

declines in enrollment at community colleges in particular, even as education shifted to online learning platforms. Because community colleges serve more diverse student populations than four-year institutions (in terms of such characteristics as age, race, socioeconomic status, full-time vs. part-time enrollment, etc.), enrollment declines have been due to the fact that community college students have many more non-academic obligations than traditional university students. These obligations include working full-time jobs, caring for children, and tending to their families' needs, all of which take time away from school. Moreover, since these students are away from school, there is a higher likelihood that they will end up dropping out and not finishing their degrees. Thus, online learning as a result of the pandemic has exacerbated dropout rates, and therefore negatively impacted academic success, at community colleges.

Aguilera-Hermida (2020), conducted a study that looked into college students' perspectives on adoption, use, and acceptability of emergency online learning. Attitude, affect, and motivation were studied, as well as perceived behavioral control (ease of using technology, self-efficacy, and accessibility) and cognitive engagement. The participants included 270 students who filled out a 36-item questionnaire; the reported ethnicities were: 50% Caucsian, 14.5% Asian, 11.1% Black/African, 10.7% Multiethnic, 8.1% Hispanic/Latinx, 2.2% Other, and 3.7% preferred not to answer. The results show that students preferred face-to-face instruction over online instruction, and that those who preferred this struggled to adapt to online learning. They also found that although students didn't report a grade change, they reported a decrease in each of the following five constructs: knowledge/learning, concentration, level of engagement, class attendance, and interest and enthusiasm. For many, their motivation decreased after the transition to online learning. Thus, the data show how students' attitudes, motivation, self-efficacy, and technological use all play a role in their cognitive engagement and academic

success. In this case, lower motivation and self-efficacy after the transition to online learning affected students' academic performance. Adopting an online learning environment is not only a technical issue but a pedagogical and instructional challenge (Aguilera-Hermida, 2020). Educational institutions must be aware that accessibility is crucial for a successful online learning experience.

Mental Health and Well-Being

In addition, the literature abounds with research on the pandemic's impact on the mental health of college students. For example, Lederer et al (2020) point out that the abrupt shift to online learning forced students to distance themselves away from all their peers, which negatively impacted their sense of social connectedness, as well as their sense of belonging on their respective campuses. The devastating loss of life due to the coronavirus not only caused such a shift, it also heightened feelings of uncertainty about the future, which has led to increased feelings of isolation and depression. As a result, the pandemic has severely increased mental health issues among students, which has brought up questions about how higher education institutions would respond and support their students' mental wellbeing.

Besides social distancing from peers to contain the spread of the virus, many countries started to use quarantine or physical separation policies as well. Short- to medium-term lockdowns, voluntary house limitations, social and public events suspension, and travel restrictions were all part of the quarantine. This has impacted many people's physiological well-being as well as a slew of individual and community health, financial, psychological, and educational concerns (Meo et al., 2020).

Meo et al. (2020) conducted a study to see how two weeks of quarantine affected medical students' mental health and learning habits during this period of social isolation. The online

questionnaire was distributed among the 625 medical students through their emails. The survey questions were scored on a five-point likert scale. The total number of participants who responded were 530; 45% of male and 55% of female. The survey results show that 44.1% of the total respondents indicated a sense of being emotionally detached from family, friends and fellow students, and one fourth of them felt disheartened during their quarantine. With the current trend of quarantine and isolation due to Covid-19, the deterioration in mood seems to have occurred sooner than one might have expected.   Meo et al. (2020) ultimately suggested engaging in healthy physical, intellectual and educational activities to help combat the negative effects quarantine had on the medical students.

Analysis Plan

Our analysis plan will include: 1) how we will collect the data, 2) how the data will be prepared and cleaned, and 3) what analytical methods will be used to run the analyses. As we have mentioned before, we are examining the sudden shift from in-person to fully online learning and its impact on college students' mental health/well-being and academic success, and if these variables differ for students of different races.

Data Collection

Our data will be collected in the form of self-reported questionnaires that will be given to college-aged students. We will be targeting students between the ages of 18 to 22 years old, which are primarily undergraduate students. We will be using a snowball sampling method, where we will ask existing study subjects to recruit future subjects from among their acquaintances. The reason for this sampling method, even though it is non-random, is that it would allow us to reach the most number of undergraduate students during a short time.

Qualifying Questions

Our survey will first begin with qualifying questions (screening questions) to determine if the participant is eligible to participate in our study. Since we are looking for data from undergraduate college students who were impacted by the shift to online/remote learning, the two questions in this section would be: 1) Are you an undergraduate college student (aged 18-22)? And 2) Did you take classes online/remotely during the fall 2020 semester? To respect the time of all respondents, these questions help to immediately identify anyone who doesn't qualify as our target audience.

Effect of Online Learning on College Students' Well-Being and Mental Health

Our first question aimed to assess the mental health status and overall well-being of undergraduate students. To measure this construct, we will first assess their general stress levels using the Perceived Stress Scale (see Appendix A), which asks subjects about their feelings and thoughts during the past month (Cohen et al., 1983). It consists of 10 questions on a 5-point scale: 0: never, 1: almost never, 2: sometimes, 3: fairly often, 4: very often.

We will then have 10 more questions on pandemic-specific stressors such as its effect on their own or loved ones' health, financial situation, sleeping and eating habits, academic workload, social relations, anxiety and depressive thoughts. These were also marked on a 5-point scale: 0: none, 1: mild, 2: moderate, 3: severe, 4: very severe.

Effect of Online Learning on College Students' Academic Success

For the second question, we will be using two sub-questions to guide our data collection: 1) How did students perform in Fall 2020 relative to a typical school year (Fall 2019)? And 2) Have students made learning gains since schools switched to a completely online learning format? The survey questions to assess these two guiding questions will ask students for their Fall 2019 and Fall 2020 GPA.

Demographic Questions

The survey will end with a set of demographic questions. These include age, gender, academic year, major, and race.

Data Preparation and Cleaning

Each sub-section below shows how each variable will be scored, coded, or cleaned.

Perceived Stress Scale Score

For scoring of the perceived stress scale, the scores of questions 4, 5, 7, and 8 will be reversed. For these questions, the scores will change to: $0 = 4$, $1 = 3$, $2 = 2$, $3 = 1$, $4 = 0$. Then, all 10 scores will be added up to get the total. Scores ranging from 0-13 would be considered low stress, 14-26 as moderate stress, and 27-40 as high perceived stress.

Pandemic Specific Stressors

The scores for the pandemic specific stressors questions would simply be added up. The higher the score, the higher the stress and the greater the effect of the online learning environment and pandemic on the subject.

Student Performance (GPA)

The difference between the two GPAs will be taken to create a third variable (GPA_Diff).

Analytical Methods

We will first run some descriptive analyses of our data. This would include basic information such as count, mean, standard deviation, minimum, etc. for variables such as the perceived stress scale score and pandemic specific stressors. This shows us the stress levels of the students as a result of the pandemic since these were aimed to evaluate their stress levels in the past month.

We will then run a logistic regression with multiple independent variables (perceived stress, pandemic specific stressors) to see if their well-being had an impact on their academic success (GPA as the dependent variable). In Python, we would use OLS from statsmodels to get a more comprehensive model summary. This way, we can see the r squared value, coefficient of each variable, standard errors, t-values, and p-values. We would then use a confusion matrix to evaluate our model's accuracy. We would split the data into 2 (80:20), retrain the model with the training data, feed the Xs in the testing dataset and obtain the predicted Ys, compare the predicted Ys with what is actually in the testing dataset to get a confusion matrix, and finally get an accuracy score.

In addition, we would also run a clustering analysis. This is so that we can determine if there are groups hidden within our dataset. We would first find the number of clusters using silhouette plots. The plot with the highest silhouetter score would indicate that that number of clusters would be the best for our analysis. Then, we would run a k-means cluster and visualize it with a scatterplot. These clusters (if any) would give us insight into students with similar features or demographics and would allow us to make sense of the data/explain the results.

Discussion

Our discussion section will include: 1) what results we expect to see, 2) possible limitations, and 3) implications of our study.

Expected Results

We plan to collect data from undergraduate college students with an age range of 18 to 22 years old. Therefore, we expect the number of participants to be more than more than 100, which we believe is not difficult to reach. Due to the pandemic and students' personal issues, we also expect our results to show that students have generally high levels of stress. This would be

applicable to general stress levels (perceived stress scale) and for pandemic specific stressors. This would be indicated by the p-values from our logistic regression analysis. Furthermore, we expect to see that these stress levels (which indicate their well-being and mental health) have a negative effect on their academic performance (GPA). The average GPA across the total population should be around 3.0 out of 4.0 scale. While students' majors and courses vary among entire populations, we expect the average GPA to fall between that range. We will evaluate our data by using the Confusion Matrix to obtain the accuracy score. We believe that the accuracy score should be above 50%. Lastly, we expect to see distinct groups of clusters from our data set. This could give us insight into whether or not different groups of students (maybe by race) have been impacted less or more by the pandemic and shift to online learning.

Possible Limitations

One limitation is that we were only using grade point average (GPA) to assess student academic performance. This could pose many problems as there could be multiple other third variables that could affect their academic success. For example, their interactions with their professors, class attendance, teacher to student ratio, etc. We believe that communication, interaction, and participation can be real challenges for students particularly when they are pursuing their education online. Hence, these variables could be further explored in a future study.

Another limitation is our sampling method. The survey would be completed by students themselves. Thus, there may be subjective bias toward the result of the responses. For example, students might rush through the questionnaires and not pay full attention to them. Students could also be dishonest in their responses due to the social desirability bias. Availability as well as the

amount of time students are putting into surveys are definitely crucial to the overall results because these factors could ultimately lead to inaccurate results.

Implications

At the end of our research, we would like to conclude that the spread of the pandemic causes both students' online learning shift and students' well-being, which have a direct effect on students' overall performance in school. We would like to propose three areas for further implication of the result. First is to provide online learning support for remote learning students. This could be a rehabilitation for students or even offering an online advisor program for students to ensure that students stay on top of the school work. More importantly, to help support students' well-being tactically. Second is to monitor remote learning students. Our result can serve as a useful tool to develop policies for monitoring students remotely. The data will also allow schools to be able to determine pain points and make further improvement on the overall online learning system. Third is for schools to make adjustments to their online curriculum. As mentioned in the limitation section, communication, interaction, and participation are prone to be crucial issues. These would prevent students from excelling in courses. Therefore, schools can design more activities to promote interaction among instructors and peers. In the end, we believe that if students' received proper treatment for both their curriculums and well-being, students would definitely have a much higher chance to maximize their full potential in school. This is to make students' online learning experience more memorable and worthwhile.

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Appendix A

Perceived Stress Scale

For each question choose from the following alternatives:
0 - never   1 - almost never   2 - sometimes   3 - fairly often   4 - very often

_____   l. In the last month, how often have you been upset because of something that happened unexpectedly?

_____   2. In the last month, how often have you felt that you were unable to control the important things in your life?

_____   3. In the last month, how often have you felt nervous and stressed?

_____   4. In the last month, how often have you felt confident about your ability to handle your personal problems?

_____   5. In the last month, how often have you felt that things were going your way?

_____   6. In the last month, how often have you found that you could not cope with all the things that you had to do?

_____   7. In the last month, how often have you been able to control irritations in your life?

_____   8. In the last month, how often have you felt that you were on top of things?

_____   9. In the last month, how often have you been angered because of things that happened that were outside of your control?

_____   10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?