

## Problem Statement

Since the onset of the COVID19 pandemic, education at all levels has been offered mostly online in a synchronous or asynchronous manner with some courses being conducted in a hybrid model with both in-person and online options or components. Despite the many benefits of working/studying from home or a personal space, there have been numerous reports citing an adverse degradation of mental health of individuals across the board. The primary purpose of this project is to understand the causes of people's degrading mental health, determine key choke points and recommend changes to the format of online education to aid improvements in individual's mental health.

## Methodology

Online surveys using Google Forms and interviews conducted via Zoom were the two needfinding techniques used to collect data for this investigation. The surveys were immensely valuable as they allowed for fast distribution and rapid collection of large quantities of data from a varied user domain to be analyzed and used to understand the key user issues. The interviews, on the other hand, provided limited yet detailed information from a select group of participants in a free-form manner.

### *Google Form Survey:*

The survey was created using Google Forms and distributed using the CSC 212 and CS Majors mailing lists along with being shared on social media via Facebook. In both these methods of survey propagation, only the general research idea was disclosed alongside an estimated time commitment of 2 minutes to maximize user participation. The survey was designed to optimize user participation and information retrieval. Thus, the survey consisted mainly of multiple choice questions, albeit, formulated in three different manners. There were two short answer questions included at the very end to allow participants to share deeper insights. The last question asked for individuals to leave contact information if they were willing to be contacted for a quick follow-up interview. Although the survey did not explicitly ask for demographic information to ensure maximum user comfort in survey participation, the varied domains in which the survey was advertised yields a high probability that participants are a good representation of the actual student population at the University of Rochester.

The survey aimed to collect information that would shed light on trends regarding: distribution of online vs in-person class participation and its impact of mental health, impact online learning & social distancing on contact with family and friends and its cascading effects on mental health, and, lastly, impacts of online learning on sleep and in-turn its impact on mental health.

All questions were given to all participants. No sections were created. The survey design is explicitly provided in the **Appendix A**.

*Iterations:*

The survey design process had three iterations and in each iteration questions were added or re-worded to either expand the kind of data collected or aid easy data analysis later on. I conducted iterations through a process of manual testing of the survey and by thinking critically about what information certain questions would be providing and what the implications of question phrasing and response options would be on future data analysis. Only the final version was shared to participants.

*Interview:*

I chose to interview four individuals including two respondents of the survey who left contact information and thus showed interest in a quick follow-up interview. Apart from the two respondents, I chose a senior majoring in Psychology and a senior majoring in Chemistry to ensure a diverse participant population and a straightforward comparison of education and mental health before and during the pandemic. Each interview was conducted via Zoom to ensure adherence social distancing protocols and lasted about 5 minutes. I did not record the interviews for the sake of privacy and user comfort thus relying primarily on my note taking for recapitulation of the interviews' main findings.

At the start of each interview, I provided the interviewee with a general introduction with the problem statement, followed by a couple structured questions regarding their answers to the last two free form questions on the survey and then logical follow-ups to their responses. This method allowed me to achieve a level of consistency across interviews while leveraging the uniqueness of each individual's experience to gain a better understanding of the issue at hand. I ensured that proper gratitude was conveyed to the participants for their time and ensured that their information will be treated as confidential.

Please find attached the notes from the interviews in **Appendix B**.

## Results

*Survey:*

The survey got 32 responses in an acceptable distribution of on-campus and off-campus/at-home students with 62.5% of the respondents being on-campus, 18.8% being off-campus and 18.8% being At-Home. This seems to be an accurate representation of the current student population's distribution of living conditions given the high magnitude of students choosing to return to campus for hybrid education for the Spring semester. This is also

an inspiring statistic as it shows that an analysis of our data can provide insights on how to improve online education and mental health for both on-campus, off-campus and remote students.

Where do you live?

32 responses

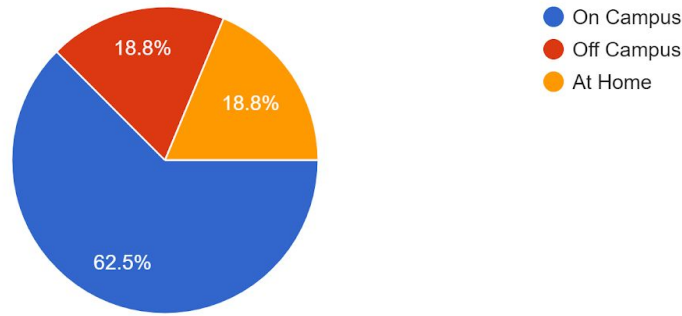


Figure 1: Pie chart showing responses indicating participants living situation

The survey also captured a robust distribution of online and in-person class participation. The distribution of responses are shown in the charts below. This is indicative of a successful completion of a goal set during survey design of capturing numerical data on online vs in-person participation in order to control for these variables to account for changes in the latter responses.

How many in-person classes are you taking this semester?

32 responses

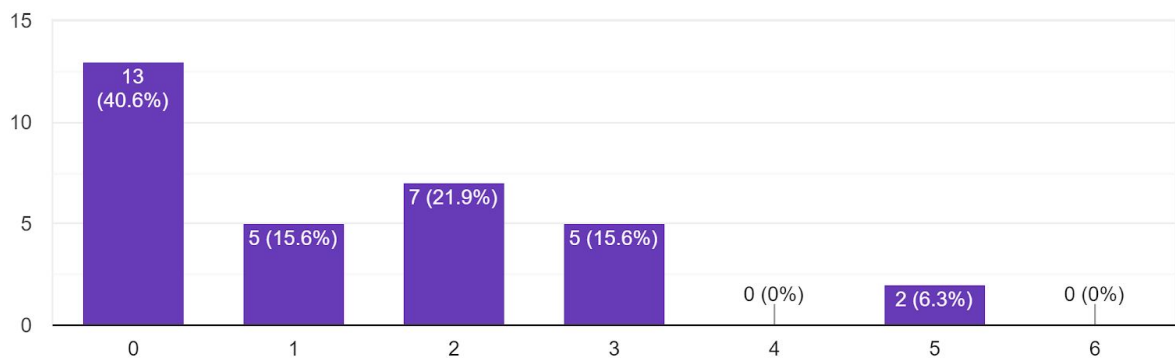


Figure 2: Bar plot showing responses indicating distribution of in-person class participation

How many fully online courses are you taking this semester?

32 responses

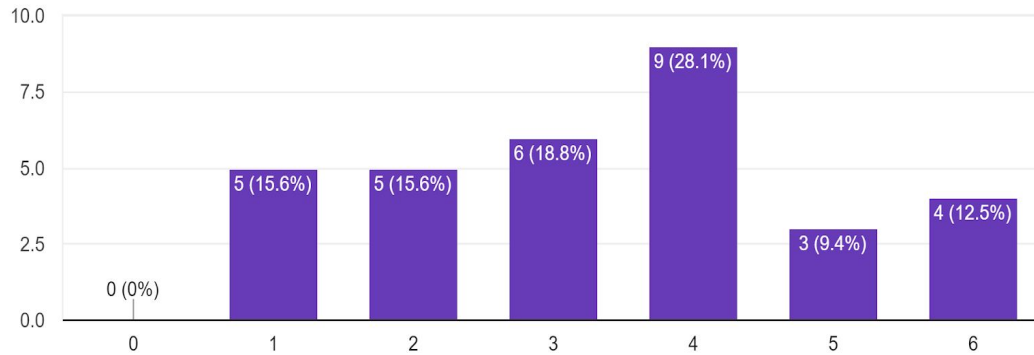


Figure 3: Bar plot showing responses indicating distribution of online class participation

how many hours of sleep do you get each night on average?

32 responses

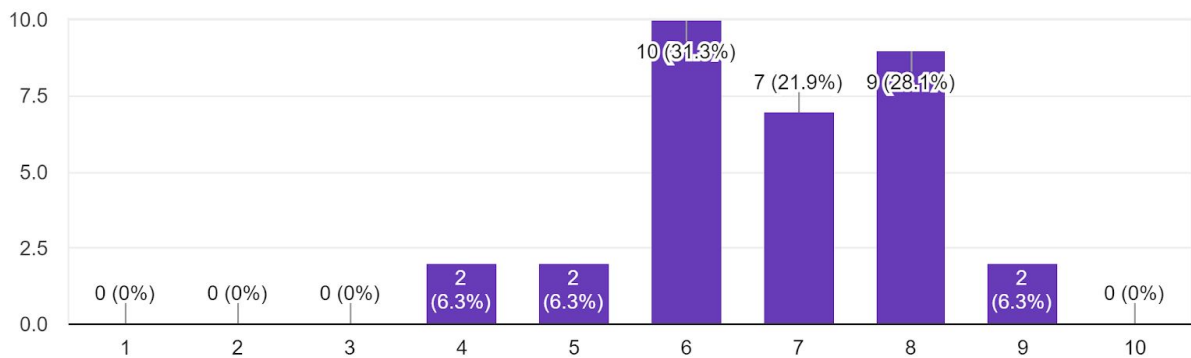


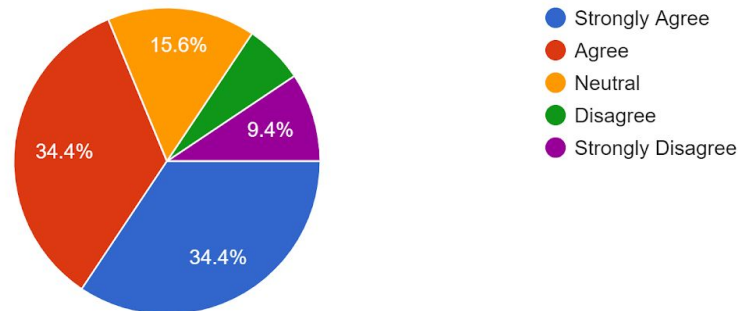
Figure 4: Bar plot showing responses indicating distribution of average daily sleep

The survey also demonstrated an expected distribution of sleep patterns with a few concerning outliers. This is a key datapoint that may reveal fundamental differences in the sleep patterns of in-person and online students and cascading trends on mental health. The survey also collected data on how well participants were keeping in contact with friends and family by using now widely available text messaging and voice/video calling technologies. Similarly, the survey also captured information about the impact of academic load on stress and happiness. These data points potentially reflect very valuable trends however further analysis by controlling for in-person vs. online participation is necessary to gain any meaningful insights. Unfortunately, this report cannot cite such analysis

All the data collected is showcased in **Appendix C**.

The survey collected further data on impacts of social distancing on individuals' feeling of loneliness. Interestingly, and perhaps expectedly, only 15.7% of the respondents disagreed or strongly disagreed with the statement: "I feel lonely due to social distancing rules".

To what extent do you agree with this statement: I feel lonely due to social distancing rules  
32 responses



*Figure 5: Pie chart showing responses indicating impacts of social distancing on feelings of loneliness*

The survey aimed at collecting information on whether individuals were able to pay attention to online lectures at similar levels to in-person lectures as by observation it was known that falling academic performance leads to deprecating mental health. Interestingly, 78.2% of respondents disagreed or strongly disagreed with the statement: I find it easy to concentrate on online lectures while 84.4% of respondents agreed or strongly agreed with the analogous statement: I find it easy to concentrate on in-person lectures. Furthermore, only 9.4% of respondents said they find it easy to concentrate on online lectures and none said it strongly.

There was another question included to see how sleep was impacted by online education. The responses indicated that 50% of respondents were getting less sleep than before the onset of online/hybrid education. Similarly, 66.7% of respondents were less in touch with friends now than before the onset of online/hybrid education. These are impactful findings as sleep and social interactions are fundamental towards healthy human mental health since we are extremely social animals. Lastly, 59.4% of survey participants said they had worse mental health since the onset of online education and perhaps more importantly no participant reported experiencing better mental health.

The open-response questions at the very end provided key insights into the user's psyche further supporting the trends that the preceding survey questions captured. Please refer to Appendix C for a more vivid understanding of the survey design.

### *Interviews:*

Out of the four selected interview participants, only 1 reported studying in a fully online manner. The other three had some distribution of online and in-person commitments. The interview participants were two seniors, one sophomore and one junior. Interview lengths ranged from 3 minutes to 5 minutes.

The interviews satisfied their role of providing an opportunity for detailed and personal responses from individuals experiencing online/hybrid education. The interviews provided deep insights into the emotions and difficulties of the current realities.

The general sentiment of the interviewees was that social distancing has been instilling a feeling of isolation and heavier social media use leading to a grave impact on their mental health and college experience. Although the fully online interviewee was an outlier in claiming no adverse impact on her mental health, even she did experience an anxiety attack in the middle of an online class.

Interviewees also mentioned difficulty in performing well in the online academic setting due to lack of motivation, involvement, concentration and instruction leniency. This trend was reported to be impacting people's mental health negatively as well as academic performance seemed closely linked with perceptions of self-worth in the college setting.

## Discussion

What is abundantly clear, through the interviews and surveys, is that that shift to remote education is negatively impacting mental health at a large scale. The common complaints include limited social interaction leading to acute isolation and extended screen time leading to exhaustion. Furthermore, there is a robust indication that students are struggling with paying attention to online classes, which is impacting their academic performance and in turn their mental health. Additionally, there has been a stark decline in average daily sleep hours since the onset of online education which not only has negative mental health implications but serious physical health consequences. In order to work towards improving mental health during online education amidst a global pandemic, these key complaints need to be addressed.

Although social distancing protocols are causing feelings of isolation in large swathes of individuals, they are crucial to overcome the pandemic while waiting for herd immunity to be achieved through widespread vaccination drives. In order to reduce feelings of isolation, novel ways of organizing communities online should be developed and existing methods such as multiplayer online games such as Among Us and Call of Duty should be leveraged to instill a sense of belonging and community that is indicated to be missing as of now. This does further the problem of extended screen time however.

Students complained about extensively long, boring lectures and more strict expectations impacting their mental health. Modifying how instructors are delivering content online to be more engaging and lenient deadlines/grading would greatly alleviate people's stress due to academics and aid their ability to concentrate on long zoom lectures. Shortening lectures to be 50 minutes instead of 75 minutes would also be an impactful improvement.

Researching and developing widely available mobile aides for helping people get consistent, high-quality sleep would highly benefit mental and physical health. Encouraging healthy social media behaviour is also of critical need.

## Limitations

A severe limitation of this study was that a key component of the analysis was unable to be completed. That component is controlling for the number of online vs in-person classes and their impact on contact with friends and family, sleep hours, academic stress, and happiness. This unfortunate circumstance is the result of it taking till around 11:00 pm on 2/15/2021 for the survey responses to cross the 30 response threshold, thus not leaving enough time for the more advanced analysis that was planned. I aim to address this in future work.

There is also the characteristic voluntary response bias in the survey data since it is not required. This is somewhat mitigated by students of 212 filling out each other's surveys, however, it does not solve the larger problem of a response group potentially unrepresentative of the actual population. This problem is further exacerbated by the nonresponse bias as the vast majority of individuals in both mailing lists and Facebook did not respond to the survey.

In hindsight, I wish I had sent the survey a day earlier to have gotten 30+ responses early enough to do an advanced numerical statistical test such as p-value analysis.

## Appendix A

### *Survey*

- 1. How many in-person classes are you taking this semester?**
- 2. How many fully online courses are you taking this semester?**
- 3. How many hours of sleep do you get each night on average?**
- 4. Where do you live?**
- 5. How frequently do you text/call friends in a week?**
- 6. How frequently do you text/call your family in a week?**
- 7. To what extent do you agree with this statement: I feel stressed out due to my academic workload**
- 8. To what extent do you agree with this statement: I feel happy when I am in class**

9. **To what extent do you agree with this statement: I feel that I am learning course material well**
10. **To what extent do you agree with this statement: I feel lonely due to social distancing rules**
11. **To what extent do you agree with this statement: I find it easy to concentrate on online lectures**
12. **To what extent do you agree with this statement: I find it easy to concentrate on in-person lectures**
13. **Are you getting more or less sleep nowadays compared to BEFORE online/hybrid education?**
14. **Are you more or less in touch with family nowadays compared to BEFORE online/hybrid education?**
15. **Are you more or less in touch with friends nowadays compared to BEFORE online/hybrid education?**
16. **Is your mental health now better or worse compared to BEFORE online/hybrid education?**
17. How has online learning impacted your mental health?
18. How has social distancing impacted your mental health?
19. If you would be ok with a 5-10 mins follow-up interview, please leave your email here:

The bold questions were required.

The response choices were as follows:

- Q. 1-2 : Numeric from 1-6
- Q. 3: Numeric from 1-10
- Q. 4: On Campus, Off Campus, At Home, Other
- Q. 5-6: Everyday, Every other day, 2-3 days in the week, Rarely, Never
- Q. 7-12: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree
- Q: 13-15: More, the same, Less
- Q: 16: Better, the same, Worse
- Q: 17-19: Short answer, open form

## Appendix B

### Interview Notes

#### *Interview 1:*

Mental health hasn't been impacted although she did have one single anxiety attack during online lecture. She only attends online lectures since she doesn't like wearing a mask. Her contact with her family and friends has been the same as she is good with using technology.

#### *Interview 2:*



Mental health has been impacted quite a bit due to loneliness being amplified due to being unable to meet old friends and meet new ones. College seems no better than Youtube since its not the same social experience and He feels that he is losing the best years of his life. Contact with family has been ok though.

*Interview 3:*

Can't focus on anything let alone boring, slow online classes. Suffering from mild ADHD due to so much time being spent online. Finds himself typing in youtube and facebook into chrome all the time without even realizing it. Feels insane and that he can't deal with this sh\*t any longer.

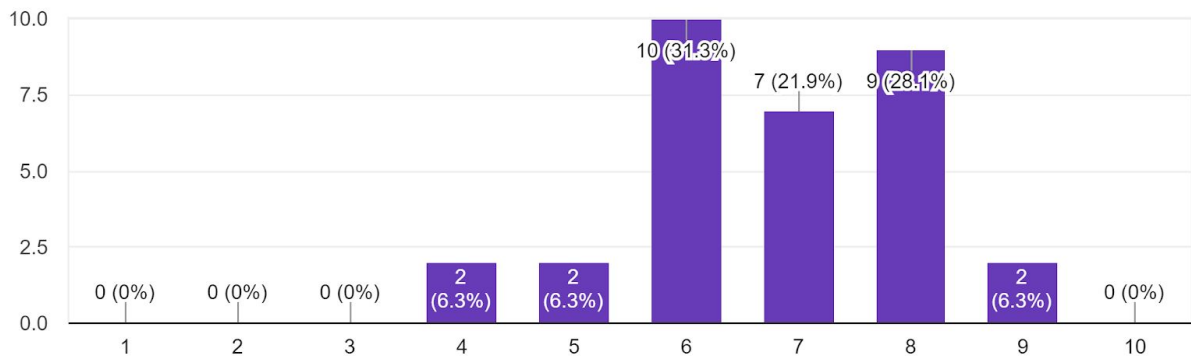
*Interview 4:*

My academics have a strong influence on my self-esteem, and they have been hindered since the start of the pandemic. Having the opportunity to see friends on campus (in dining halls, etc.) works for me although it is scary to think what happens if the university further cracks down on social gatherings. I am really bad at being in touch with people online.

## Appendix C

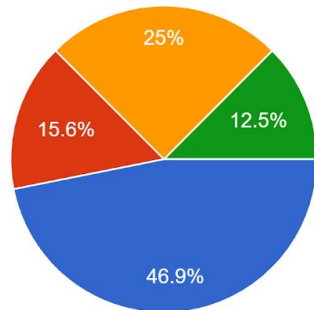
how many hours of sleep do you get each night on average?

32 responses



How frequently do you text/call your family in a week?

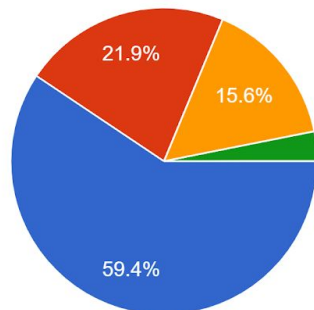
32 responses



- Everyday
- Every other day
- 2-3 days in the week
- Rarely
- Never

How frequently do you text/call friends in a week?

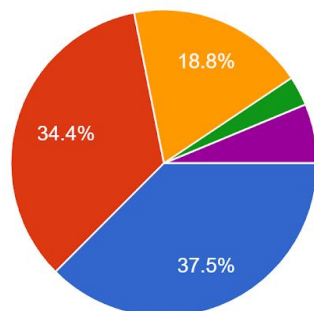
32 responses



- Everyday
- Every other day
- 2-3 days in the week
- Rarely
- Never

Do you agree with this statement: I feel stressed out due to my academic workload

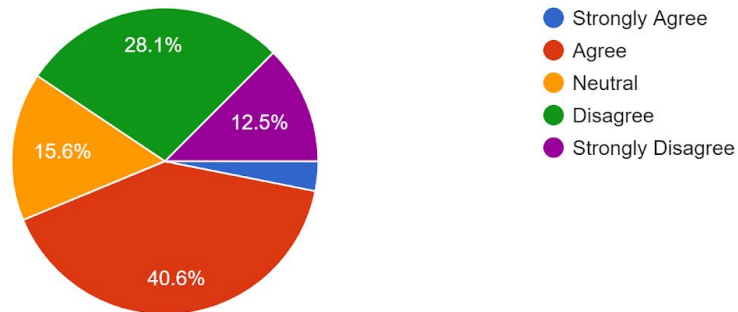
32 responses



- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

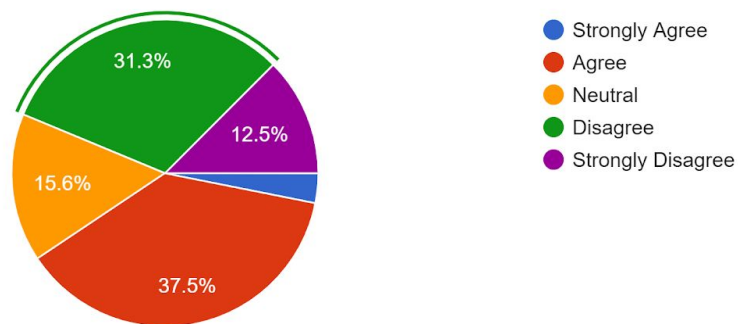
Do you agree with this statement: I feel happy when I am in class

32 responses



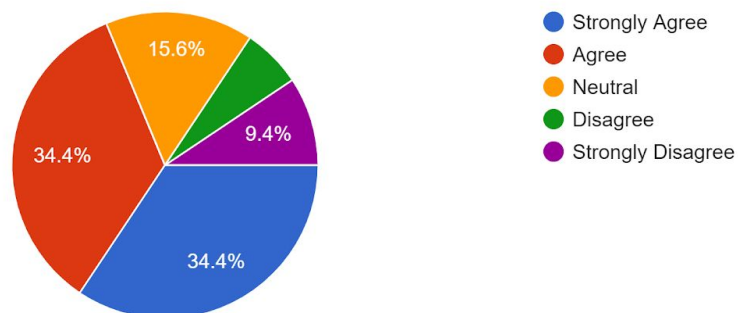
Do you agree with this statement: I feel that I am learning course material well

32 responses

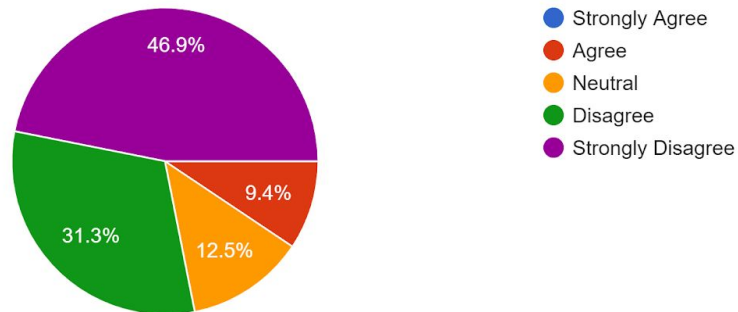


To what extent do you agree with this statement: I feel lonely due to social distancing rules

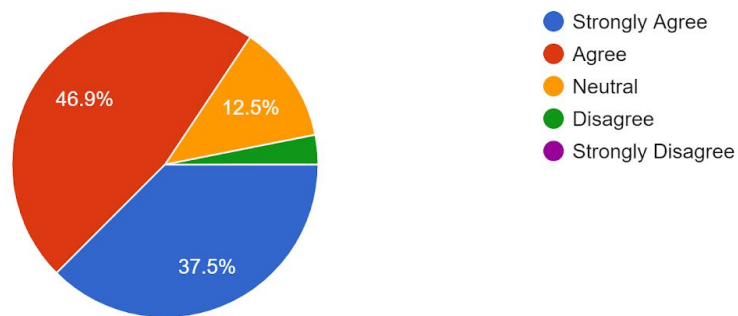
32 responses



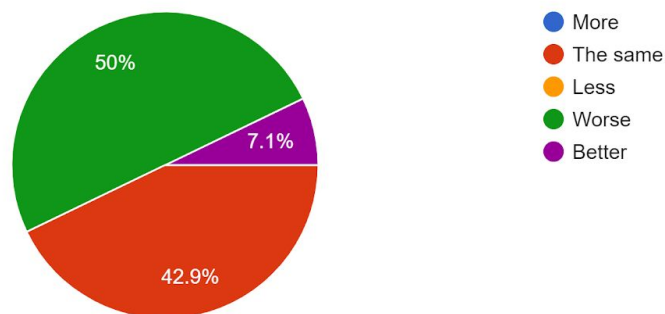
To what extent do you agree with this statement: I find it easy to concentrate on online lectures  
32 responses



To what extent do you agree with this statement: I find it easy to concentrate on in-person lectures  
32 responses

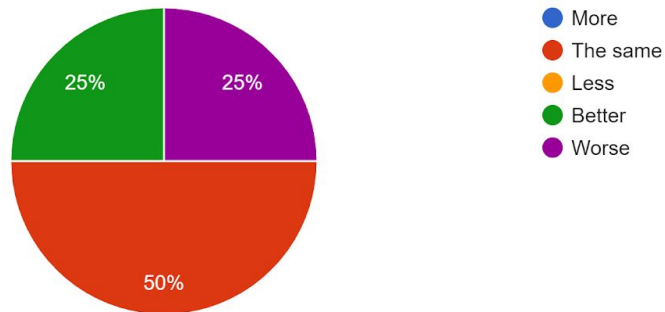


Are you getting more or less sleep nowadays compared to BEFORE online/hybrid education?  
28 responses



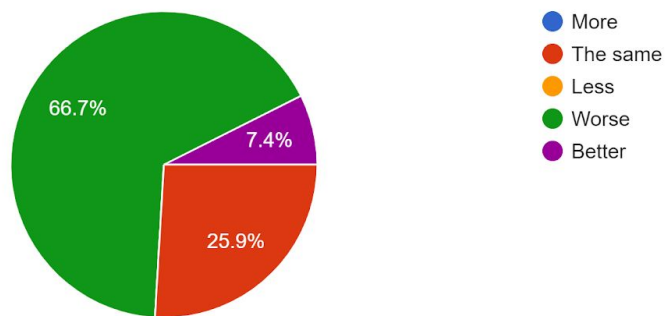
Are you more or less in touch with family nowadays compared to BEFORE online/hybrid education?

28 responses



Are you more or less in touch with friends nowadays compared to BEFORE online/hybrid education?

27 responses



Is your mental health now better or worse compared to BEFORE online/hybrid education?

32 responses

