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The Effects of COVID-19 on the Mental Health of Senior Citizens and High School Students

Uma Kamath

Mental health disorders are a leading health issue among adults and teenagers. Public health organizations and governments have highlighted an increase in mental health issues during the COVID-19 pandemic. This research uses a survey of 83 students and 95 senior citizens to understand the impact of COVID-19 on mental health. The results indicate that COVID-19 has negatively affected the mental health of students, seniors living in nursing homes and, to a lesser extent, seniors living at home. The impact is greater for external factors than internal factors for students and seniors living in nursing homes. These results have implications for future research on online education, social media usage, and other forms of technologies that limit in-person interactions. The results also indicate that it is important for public health policy to weigh the benefits of various restrictions against the detrimental effects such restrictions have on mental health.

Keywords: Mental health, COVID-19, students, senior citizens, internal factors, external factors

Introduction

Approximately 20% of adults experience a mental health disorder in some form, including depression, anxiety, and insomnia, regardless of external factors (Gerlach, 2021). Left untreated, mental health disorders can have serious impacts on people of all ages. In early 2020, many places in the United States underwent lockdown and experienced social distancing restrictions due to the COVID-19 pandemic. The restrictions resulting from the lockdown forced people to stay at home or be isolated from others. Various researchers (Abbott, 2021; Lee et al., 2020), public health organizations (Centers for Disease Control National Center on Health Statistics, 2020; World Health Organization, 2022), governments (U.S. Department of Health & Human Services, 2021; Washington State Department of Health, 2021), and news media out-

lets (CNBC, 2022; Reuters, 2022) have highlighted an increase in mental health symptoms among all age groups. The rapid increase in mental disorder symptoms raises questions and concerns about potential impacts of the pandemic on people susceptible to these symptoms.

There are very widely held perceptions about how mental health has been impacted among various individuals. These issues, manifested in the form of eating and sleeping patterns or the way people interact with others, could have unknown short-term and long-term effects on people's behavior. There have been and will continue to be numerous surveys and research studies to understand various aspects of the COVID-19 pandemic, including the effects on the general population. There have also been and will continue to be numerous studies to understand the psychological and physiological effects of the pandemic.

Despite these studies, the effect of the pandemic on mental health is not completely understood. This project aims to understand the extent of mental health problems specifically in senior citizens and high school students and gain an understanding of the contributing factors. This research project will help uncover answers to questions and concerns that a lot of people may have about possible changes and impacts to mental health over the past year and a half. The project will also help people with mental health concerns to better understand themselves and how the COVID-19 pandemic may have impacted them.

Review of Literature

Mental Health Overview

The World Health Organization defines mental health as “a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community” (World Health Organization, 2018). Mental health is the emotional, psychological, and social well-being that allows humans to think, emote, feel, act, and interact with each other (Center for Disease Control and Prevention, 2021; World Health Organization, 2018).

Poor mental health can be the result of several socioeconomic, biological, and environmental factors (World Health Organization, 2018). Some of these include genetic factors, physical health issues, unhealthy lifestyle including poor eating habits and lack of physical fitness, poor sleeping habits, physical violence, abuse, trauma, neglect, sexual violence, rapid social changes, gender discrimination, social exclusion, social or economic disadvantage such as poverty or debt, human rights violations, unemployment, loss of job, and stressful work environment. Being the victim of bullying has also been identified as a factor towards poor mental health in adolescents (American Psychological Association, 2010). Some of these potential causative factors, such as rapid social changes, social exclusion, poor sleeping habits, poor eating habits, and lack of adequate physical fitness, are likely to have been exacerbated due to the restrictions imposed during the COVID-19 pandemic.

Impact of Mental Health

Like physical health, good mental health is vital to humans and poor mental health can affect how we handle stress, relate to others, and make decisions (Center for Disease Control and Prevention, 2021). Some forms of poor mental health have been found to increase the risk of physical health conditions such as diabetes, heart disease, and stroke (National Institute of Mental Health, 2015). Poor mental health also manifests in the form of mental illnesses such as depression, anxiety, insomnia, post-traumatic stress disorder (PTSD) or major depressive disorder, and drug, opioid and substance use. Poor mental health can also lead to unhappiness and decreased enjoyment of life, family conflicts, relationship difficulties, social isolation, missed work or school, other problems related to work or school, risk-taking behaviors, human rights violations, legal and financial problems, poverty, and homelessness (World Health Organization, 2021). Children with mental health issues may underperform in schoolwork (Bowen, 2011) or be at risk of committing suicide (American Psychological Association, 2010). Healthy eating habits, alcohol and drugs avoidance, regular exercises, reduced time spent on social and online media, spending time with family and friends, volunteering, meditation, deep breathing and other relaxation exercises, setting realistic goals, seeking help when needed, therapy, and medical treatment are some of the remedies to improve mental health (Spielman, 2017; National Institute of Mental Health, 2021).

Impact of COVID-19 Pandemic on Mental Health

Mental health issues have always been prevalent across the world, even before the start of the COVID-19 pandemic. One in seven 10--19-year-olds globally is estimated to suffer from mental health issues, and suicide is the fourth leading cause of death among 15–19-year-olds (World Health Organization, 2021). 18.1% of U.S. adults ages 18 years or older are estimated to suffer from some form of mental health issue in any given year (U.S. Department of Health and Human Services, 2021).

Social distancing and other restrictions imple-

mented as a response to COVID-19 can most likely cause a negative impact on one's mental health (Javed, 2020). Initial studies conducted within the first three months after the onset of COVID-19 indicate an increase in various mental health issues among adolescents (Jones, 2020). Similarly, an increase in mental health issues was also found in adult age groups within the first five months after the onset of COVID-19 (Panchal et al., 2021). Approximately 24% of adults ages 65 and older reported mental health issues approximately 6 months after the onset of COVID-19 (Koma, 2020). Other studies, however indicated that compared with younger age groups, older adults were found to have experienced fewer mental health issues approximately 8 months after the onset of COVID-19 (Vahia, 2020).

Gap Analysis

Most studies were conducted within the first few months after the onset of COVID-19. Additionally, findings from these studies have yielded conflicting results. This project specifically aims to investigate the impact of COVID-19 on two groups of participants – high school students and senior citizens over the age of 65 -- and specifically after a longer time period with more time having passed for COVID-19 to have affected people. Mental health is a broad topic and previous studies have looked at the impact of COVID-19 on mental health more holistically. This project seeks to delve deeper into specific factors regarding social changes, social exclusion, thinking patterns, sleeping habits, eating habits, and physical fitness influencing mental health, classified into internal and external factors. Internal factors, such as eating patterns or stress levels, cause changes in the participants' thoughts, self-perception, emotions, emotion regulation, and feelings during the pandemic. External factors, such as participation in extracurricular activities or desire to spend time with others, cause changes in participants' interactions and communications with others, social behaviors, and desire to participate in social activities during the pandemic.

Methodology

Study Design

This study involved giving surveys to a group of high school students and a group of senior citizens. The survey included various statements related to the mental health of the participants, and each participant was asked to score on a scale of 1 - 5 how they felt after the pandemic for each of the statements, with 1 being the least relevant to the participants and 5 being the most relevant. As shown in Appendix A and Appendix B, survey statements were grouped into internal statements, external statements, and control statements. Internal statements included any changes in participants' own feelings, thought processing, and emotions during the pandemic. External statements included any changes in the way participants behave and interact with others during the pandemic. Control statements included participants' feelings, behaviors, thought processing, and emotions irrespective of an external stimulus. Thus, the control statements signify the participants' inherent traits and pre-pandemic scores and serve as a baseline to identify changes in their post-pandemic state, which are measured through the internal and external statements. Each internal and external statement included a corresponding control statement and the difference between the post pandemic score and the corresponding control score represented the impact of the pandemic on their mental health.

Participants

Participants for the high school group were drawn from students at Tompkins High School in Katy, Texas who were attending school remotely for one or both semesters during the 2020-2021 school year. Participants for the senior citizens group were people of age 65 and above in Houston and neighboring suburbs, either living at home or nearby nursing care facilities that were closed to visitors for about a year. Although a bigger sample size was desirable, COVID-19 and other limitations allowed for a sample size that consisted of 83 high school students, 53 senior citizens from nursing care facilities, and 42 senior citizens living at home. Interested high school participants were obtained by a few teachers making announcements in

their classes and word of mouth communications. All participants were clearly informed that their participation was completely voluntary and that they could withdraw at any time, including after having participated in the experiment. Additionally, the parent or guardian of each high school participant was required to provide written consent (shown in Appendix C) for participation. Several senior nursing care homes in Katy were approached to recruit participants, but only three senior nursing homes participated in the project. Seniors living at home were solicited through phone calls or face-to-face requests.

Survey Mechanism

The participants were grouped into two categories - high school students and senior citizens. Additionally, the senior citizens were sub-grouped by where they lived – in a nursing care facility or their home. Each participant was asked to fill out the survey online through a Google form but was also given the option to fill it out on paper. The survey provided a list of statements, and the participants were asked to rate on a scale of 1 - 5 how much each statement related to them. To prevent any bias, each participant was given the same survey within their group, and surveys were kept anonymous. The survey for high school students comprised 38 statements of which 11 pertained to the participant's internal statements, 8 pertained to external statements, and the remaining 19 represented control statements corresponding to each internal and external statement. The survey for senior citizens comprised 34 statements of which 10 pertained to the participant's internal statements, 7 pertained to external statements, and the remaining 17 represented control statements corresponding to each internal and external statement. For the most part, the high school students and senior citizens were asked the same survey questions so that the two groups could be compared in a reasonable manner. However, each test group was also asked a few questions that pertained specifically to their age group to understand differences between age groups. Copies of the survey statements are shown in Appendix A and Appendix B.

Care was taken to maintain complete confidentiality. Names and other personal information were not collected, recorded, or published. No gender, racial/ethnic, or other personal information were observed

or collected. All scores were kept anonymous, and it is impossible to link the scores to any of the individual participants. This process was reviewed and approved by an Institutional Review Board before administering the surveys.

Data Analysis and Hypotheses

The raw scores provided by each participant to each survey statement were tabulated. The statements were grouped by internal and external types and score averages were analyzed against equivalent control score averages. For each group of statements, the difference between the control scores and post pandemic scores represented the magnitude of the effect of the pandemic on their mental health. The analysis was similarly repeated for all the statements grouped together.

Change in internal group scores was also compared to change in external group scores. Change in scores for seniors living in nursing homes was compared to seniors living in their homes. Finally, change in scores for high school students was compared to change in scores for all seniors.

For comparing scores within each group, a paired sample t-test was used. Assuming the pandemic has impacted the mental health of participants, the null hypothesis is that the score after the pandemic is less than or equal to the control score.

$$H_0: \mu_{\text{PostPandemicScore}} \leq \mu_{\text{ControlScore}}$$

$$H_a: \mu_{\text{PostPandemicScore}} > \mu_{\text{ControlScore}}$$

For comparing the changes in internal group scores to changes in external group scores, a paired sample t-test was used. Assuming that isolation has impacted participants' thoughts and emotions to a greater extent than their interactions with others, the null hypothesis is that the change in internal group scores is greater than or equal to the change in external group scores.

$$H_0: \mu_{\text{Internal}} \geq \mu_{\text{External}}$$

$$H_a: \mu_{\text{Internal}} < \mu_{\text{External}}$$

For comparing the change in scores for seniors living in nursing homes to seniors living at home, a two-sample t-test was used. Assuming seniors living in nursing homes had fewer interactions with oth-

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ers than seniors living at home, the null hypothesis is that the change in scores for seniors living in nursing homes is less than or equal to the change in scores for seniors living at home.

$$H_0: \mu_{\text{NursingHome}} \leq \mu_{\text{Home}}$$

$$H_a: \mu_{\text{NursingHome}} > \mu_{\text{Home}}$$

For comparing the change in scores for high school students to the change in scores for all seniors, a two-sample t-test was used. Assuming seniors were better able to cope with the pandemic restrictions, the null hypothesis is that the change in scores for high school students is less than or equal to the change in scores for all seniors.

$$H_0: \mu_{\text{HighSchoolStudents}} \leq \mu_{\text{Seniors}}$$

$$H_a: \mu_{\text{HighSchoolStudents}} > \mu_{\text{Seniors}}$$

The data was then analyzed using either a paired sample t-test or a two-sample t-test, as specified earlier depending on the groups being analyzed, in Mi-

crosoft Excel to identify any statistically significant inferences. A two-sample t-test is a statistical test used to infer whether the means of two data sets are significantly different (Mendenhall et al., 1995). The p-value or observed significance level, which is the smallest value of α for which test results are statistically significant (Mendenhall et al., 1995) will be compared against a significance level (α) of 0.05 to determine whether the null hypothesis can be rejected or not.

Results

Averages for internal, external, and all statements for each group of participants are plotted in Figures 1, 2 and 3. Each of these graphs indicate that the scores have increased after the pandemic. Change in scores appear to be higher for external statements than for internal statements for high school students and seniors living in nursing homes. These graphs also indicate that the change in scores is relatively smaller for seniors living at home.

Figure 1: High School Student Response Average Scores

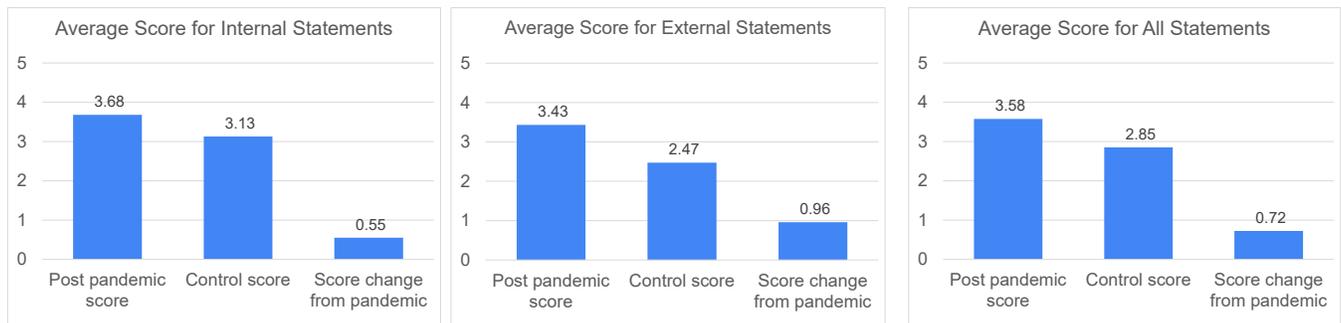
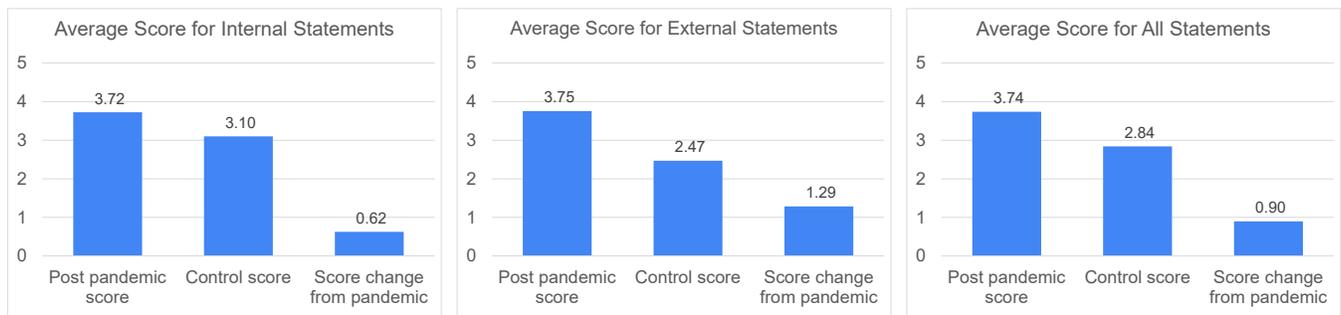
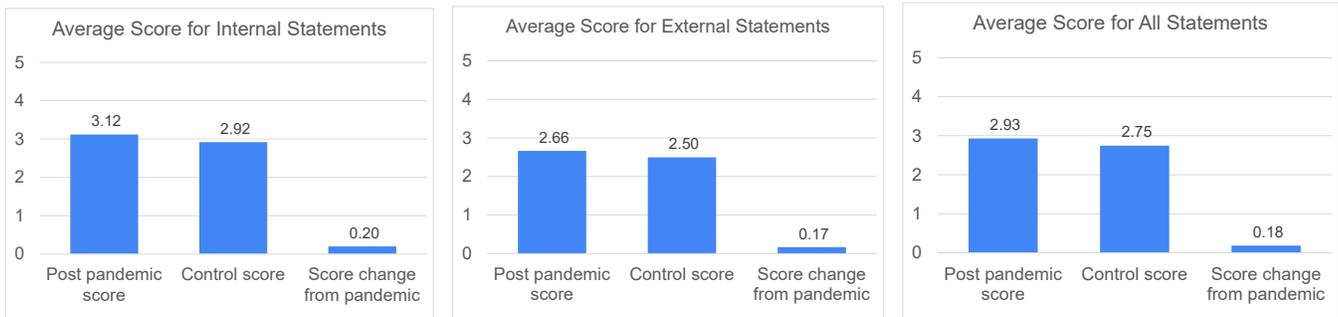


Figure 2: Seniors Living in Nursing Homes Response Average Scores



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Figure 3: Seniors Living at Home Response Average Scores



A t-Test was used in Microsoft Excel to confirm whether the score after the pandemic is less than or equal to the control score. Results of this test for high school student responses are shown in Tables 1, 2, and 3. For all three groupings of survey statements, the p-value is less than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{PostPandemicScore}} \leq \mu_{\text{ControlScore}}$) can be rejected. This indicates that the pandemic score is greater than the control score.

Table 1: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for Internal Statements for High School Students

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.68	0.76	83	82	7.3721	< .0001
Control score	3.13	0.85	83			

Table 2: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for External Statements for High School Students

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.43	0.78	83	82	11.8956	< .0001
Control score	2.47	0.86	83			

Table 3: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for All Statements for High School Students

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.58	0.72	83	82	10.4427	< .0001
Control score	2.85	0.81	83			

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Results of t-test for responses from seniors living in nursing homes are shown in Tables 4, 5, and 6. For all three groupings of survey statements, the p-value is less than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{PostPandemicScore}} \leq \mu_{\text{ControlScore}}$) can be rejected. This indicates that the pandemic score is greater than the control score.

Table 4: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for Internal Statements for Seniors in Nursing Homes

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.72	0.75	53	52	7.4672	< .0001
Control score	3.10	0.92	53			

Table 5: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for External Statements for Seniors in Nursing Homes

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.75	0.55	53	52	12.3993	< .0001
Control score	2.47	0.90	53			

Table 6: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for All Statements for Seniors in Nursing Homes

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.74	0.61	53	52	10.7182	< .0001
Control score	2.84	0.86	53			

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Results of t-test for responses from seniors living at home are shown in Tables 7, 8, and 9. For all three groupings of survey statements, the p-value is less than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{PostPandemicScore}} \leq \mu_{\text{ControlScore}}$) can be rejected. This indicates that the pandemic score is greater than the control score.

Table 7: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for Internal Statements for Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	3.12	0.61	42	41	2.2196	0.0160
Control score	2.92	0.89	42			

Table 8: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for External Statements for Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std Deviation	Observations	df	t-value	p-value
Post pandemic score	2.66	0.91	42	41	3.6933	0.0003
Control score	2.50	0.98	42			

Table 9: Paired Two Sample t-Test of Post Pandemic Score Compared with Control Statements for All Statements for Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Post pandemic score	2.93	0.66	42	41	3.1714	0.0014
Control score	2.75	0.89	42			

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Results of t-test for changes in internal group scores compared with changes in external group scores are shown in Tables 10, 11, and 12. For high school students and seniors living in nursing homes, the p-value is less than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{Internal}} \geq \mu_{\text{External}}$) can be rejected. This indicates that the change in internal group scores is less than the change in external group scores. For seniors living at home though, the p-value is greater than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{Internal}} \geq \mu_{\text{External}}$) cannot be rejected and therefore we cannot confirm that the change in internal group scores is less than the change in external group scores.

Table 10: Paired Two Sample t-Test of Change in Score for Internal Statements Compared with External Statements for High School Students

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Internal statements	0.55	0.68	83	82	-5.8650	< .0001
External statements	0.96	0.74	83			

Table 11: Paired Two Sample t-Test of Change in Score for Internal Statements Compared with External Statements for Seniors in Nursing Homes

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Internal statements	0.62	0.61	53	52	-8.2881	< .0001
External statements	1.29	0.75	53			

Table 12: Paired Two Sample t-Test of Change in Score for Internal Statements Compared with External Statements for Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Internal statements	0.20	0.58	42	41	0.3322	0.3707
External statements	0.17	0.29	42			

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Results of t-test for the change in scores for seniors living in nursing homes compared with seniors living at home are shown in Tables 13, 14, and 15. For all three groupings of survey statements, the p-value is less than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{NursingHome}} \leq \mu_{\text{Home}}$) can be rejected. This indicates that the change in scores for seniors living in nursing homes is greater than the change in scores for seniors living at home.

Table 13: Two Sample t-Test of Change in Score for Internal Statements for Seniors Living in Nursing Homes Compared with Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Seniors living in nursing homes	0.62	0.61	53	90	3.4948	0.0004
Seniors living at home	0.20	0.58	42			

Table 14: Two Sample t-Test of Change in Score for External Statements for Seniors Living in Nursing Homes Compared with Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Seniors living in nursing homes	1.29	0.75	53	70	9.8955	< .0001
Seniors living at home	0.17	0.29	42			

Table 15: Two Sample t-Test of Change in Score for All Statements for Seniors Living in Nursing Homes Compared with Seniors Living at Home

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
Seniors living in nursing homes	0.90	0.61	53	88	6.9813	< .0001
Seniors living at home	0.18	0.38	42			

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Results of t-test for the change in scores for high school students compared with seniors are shown in Tables 16, 17, and 18. For all three groupings of survey statements, the p-value is greater than the significance level (α) of 0.05. As a result, the null hypothesis ($H_0: \mu_{\text{HighSchoolStudents}} \leq \mu_{\text{Seniors}}$) cannot be rejected and therefore we cannot confirm that the change in scores for high school students is greater than the change in scores for seniors.

Table 16: Two Sample t-Test of Change in Score for Internal Statements for High School Students Compared with Seniors

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
High school students	0.55	0.68	83	168	1.1758	0.1207
Seniors	0.44	0.63	95			

Table 17: Two Sample t-Test of Change in Score for External Statements for High School Students Compared with Seniors

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
High school students	0.96	0.74	83	176	1.4608	0.0729
Seniors	0.79	0.82	95			

Table 18: Two Sample t-Test of Change in Score for All Statements for High School Students Compared with Seniors

	Summary Statistics			Results		
	Mean	Std. Deviation	Observations	df	t-value	p-value
High school students	0.72	0.63	83	172	1.5018	0.0675
Seniors	0.58	0.63	95			

Discussion and Conclusions

This research reveals that the COVID-19 pandemic has affected the mental health of high school students, senior citizens living in nursing homes, and senior citizens living at home, although the extent of the impact for senior citizens living at home does not appear to be significant at a cursory glance. These results indicate that online and virtual interactions cannot substitute for the benefits of physical and in-person interactions and dispel the myth that some may have about high school students adequately coping with the mental health challenges through social media and online interactions. For high school students, the increased mental health issues could also be due to increased social media activity. For senior citizens in nursing homes, in addition to reduced social interactions, the pandemic restrictions may have also curtailed healthy physical activities.

For high school students and senior citizens living in nursing homes, the impact of COVID-19 is greater for external statements than for internal statements. This is understandable as the external statements require interactions with others and these interactions were restricted due to COVID-19 due to either online classes for high school students or restrictions on visitors in nursing homes. For senior citizens living at home though, there is no statistical difference between change in internal group scores and change in external group scores. This is most likely due to these senior citizens continuing to interact with their family members and possibly with others although on a very restricted basis.

The results indicate that mental health of senior citizens living in nursing homes has been impacted to a greater extent than the mental health of those living at home. While COVID-19 imposed a variety of restrictions at different times, nursing homes had some of the most stringent restrictions especially before vaccines were rolled out. Often senior citizens were confined to their rooms with very little interaction with anyone other than a couple of caretakers. Senior citizens living at home, however, most likely could choose to interact with others especially if they were living with other family members or friends.

The results also indicate that there is no statistical difference in the extent of mental health impact on high school students than that on senior citizens. In

other words, the mental health of all groups of participants in this study have been affected by the restrictions imposed by COVID-19.

These results have implications for future research on online or virtual education, social media usage, and other forms of technologies that limit in-person interactions because of the impact that they may have on mental health. The results also indicate that it is important for public health policy to weigh the benefits of various restrictions such as lockdowns, isolation, online activities, travel bans, etc. against the detrimental effects such restrictions have on the mental health of various groups of the population.

Limitations and Future Research

Getting participants was a significant challenge due to ongoing restrictions from COVID-19. As a result, the sample size was smaller than what was originally desired. A follow-up study could be done to understand whether the results hold for other groups such as younger students and college students.

The results indicate that a lack of in-person interaction with others is a significant contributor to the effect on mental health. This could be further studied by performing similar research using participants that continued to interact with others during the pandemic such as healthcare workers and law enforcement personnel.

The study does not delve into any differences from participant gender or race. Further research would be required to understand whether the results are consistent for different genders or racial backgrounds.

All the high school participants were from the same high school and neighborhood and therefore probably have similar socioeconomic backgrounds. Similar biases may also have existed for the senior citizen sample. To eliminate any biases, students from other high schools and neighborhoods and senior citizens from other areas would be needed.

When conducting research with surveys, there may be “social response bias” or “subject bias” – respondents may not always answer honestly to present themselves in a positive manner or to support what they think the research is trying to show. This can be overcome by using a larger sample size, repeating the

research with a different sample, or measuring physiological responses, although they can be more difficult to define for mental health, because they may be less susceptible to demand bias.

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Appendix A: Survey Statements for High School Students

Please read each statement and rate how much the statement relates to you on a scale of 1-5, 1 being the least relevant and 5 being the most relevant. Compared to before the start of the COVID-19 pandemic in March 2020:

Internal Statements:

During the pandemic I prefer to stay at home more and do not go out.

During the pandemic I believe I criticize myself more for my mistakes.

During the pandemic when I do not feel my best, the amount of sleep I get each night significantly changes.

During the pandemic when I am feeling down, the amount of food I eat significantly changes.

During the pandemic I tend to experience more negative emotions when receiving criticism.

During the pandemic I have become more introverted and prefer to be alone more often.

During the pandemic I feel more depressed.

During the pandemic I feel more anxious.

During the pandemic I require more focus and effort on certain academic areas.

During the pandemic I feel more pessimistic towards people and daily activities and events.

During the pandemic I feel more stressed.

External Statements:

During the pandemic I have been spending very little time with friends and family by choice.

During the pandemic, I limit my time spent with others more to get my work done, even if I do not want to do so.

During the pandemic when I meet someone new, I feel more scared or nervous.

During the pandemic when I am feeling down, I am more likely to surround myself by people who feel the same way.

During the pandemic when I interact with others, I feel that they do not understand the message of what I am trying to communicate to them the way I understand myself.

During the pandemic my enjoyment in clubs or interactive/fun activities has decreased.

During the pandemic my number of friends has

decreased.

During the pandemic I feel lonelier using online classes and/or platforms than attending classes and/or activities in person.

Control Statements:

I prefer to stay at home and do not go out.

I criticize myself for my mistakes.

When I do not feel my best, the amount of sleep I get each night significantly changes.

When I am feeling down, the amount of food I eat significantly changes.

I tend to experience negative emotions when receiving criticism.

I am introverted and prefer to be alone.

I feel depressed.

I feel anxious.

I require more focus and effort on certain academic areas.

I feel pessimistic towards people and daily activities and events.

I am always stressed.

I spend little time with family and friends.

When I have a lot of things to do, I limit my time spent with others to get my work done, even if I do not want to do so.

When I meet someone new, I feel scared or nervous.

When I am feeling down, I surround myself by people who feel the same way.

When I interact with others, I feel that they do not understand the message of what I am trying to communicate to them the way I understand myself.

I have little enjoyment in clubs and/or interactive activities.

I have very few friends.

I feel lonely.

Appendix B: Survey Statements for Senior Citizens

Please read each statement and rate how much the statement relates to you on a scale of 1-5, 1 being the least relevant and 5 being the most relevant. Compared to before the start of the COVID-19 pandemic in March 2020:

Internal Statements:

During the pandemic I prefer to stay at home more and do not go out.

During the pandemic I believe I criticize myself more for my mistakes.

During the pandemic when I do not feel my best, the amount of sleep I get each night significantly changes.

During the pandemic when I am feeling down, the amount of food I eat significantly changes.

During the pandemic I tend to experience more negative emotions when receiving criticism.

During the pandemic I have become more introverted and prefer to be alone more often.

During the pandemic I feel more depressed.

During the pandemic I feel more anxious.

During the pandemic I feel more pessimistic towards people and daily activities and events.

During the pandemic I feel more stressed.

External Statements:

During the pandemic I have been spending very little time with friends and family by choice.

During the pandemic, I limit my time spent with others more to get my work done, even if I do not want to do so.

During the pandemic when I meet someone new, I feel more scared or nervous.

During the pandemic when I am feeling down, I am more likely to surround myself by people who feel the same way.

During the pandemic when I interact with others, I feel that they do not understand the message of what I am trying to communicate to them the way I understand myself.

During the pandemic my enjoyment in interactive/fun activities has decreased.

During the pandemic my number of friends has decreased.

Control Statements:

EFFECTS OF COVID-19 ON MENTAL HEALTH – SENIOR CITIZENS AND STUDENTS

I prefer to stay at home and do not go out.

I criticize myself for my mistakes.

When I do not feel my best, the amount of sleep I get each night significantly changes.

When I am feeling down, the amount of food I eat significantly changes.

I tend to experience negative emotions when receiving criticism.

I am introverted and prefer to be alone.

I feel depressed.

I feel anxious.

I feel pessimistic towards people and daily activities and events.

I am always stressed.

I spend little time with family and friends.

When I have a lot of things to do, I limit my time spent with others to get my work done, even if I do not want to do so.

When I meet someone new, I feel scared or nervous.

When I am feeling down, I surround myself by people who feel the same way.

When I interact with others, I feel that they do not understand the message of what I am trying to communicate to them the way I understand myself.

I have little enjoyment in interactive/fun activities.

I have very few friends.

each statement relates to you.

Time commitments: Complete participation time is expected to take no more than 10 minutes.

Potential risks of study: There is minimal risk since humans are the subject of the experiment, but the risks should not be significant.

Benefits: Better understanding of yourself, opportunity to network with AP Psychology teacher, opportunity to contribute towards an understanding of effects of COVID-19 on mental health on high school students and senior citizens.

How confidentiality will be maintained: No names will be collected, recorded, or published. Participants will only be identified by random numbers. All data will be kept anonymous.

Right to Refuse or Withdraw: Please note that participation in this study is completely voluntary. You may decline to participate at any time without any negative consequences. Even after agreeing to participate, you may stop participating at any time without any repercussions.

Teacher Sponsor to contact if you have any questions about the study: Ms. Colleen Thompson, email: colleenthompson@katyisd.org.

By signing this form, you are attesting that you have read and understood the information above and you freely give your consent/assent to participate or give permission for your child to participate.

Participant Consent

Date: _____

Signature: _____

Name: _____

Parent/Guardian Consent

Date: _____

Signature: _____

Name: _____

Appendix C: Consent Form

Student Researcher: Uma Kamath

Title of Project: The Effects of COVID-19 on Mental Health of Senior Citizens and High School Students

You are being asked for your voluntary participation in this research project. Please read the following information about the project before providing your consent in the appropriate area below.

Purpose of the project: To understand the extent of the effects of COVID-19 on the mental health of senior citizens and high school students and the contributing factors.

If you participate, you will be asked to: Complete an anonymous survey that requires you to read a list of statements and rate on a scale of 1-5 how much