COLLEGE STUDENTS' MENTAL HEALTH AND DRUG USE OUTCOMES DURING THE STAY-AT-HOME ORDER

By

Alexander Hain

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Committee Membership

Dr. Gregg Gold, Committee Chair

Dr. Whitney Ogle, Committee Member

Dr. Brandilynn Villarreal, Committee Member

Dr. Amber Gaffney, Program Graduate Coordinator

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Abstract

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The COVID-19 pandemic has affected people of all ages causing increased drug usage and worsening mental health in addition to hospitalization and death. The current study investigated how the United States' stay-at-home orders affected the mental health and drug use of young adult college students. This population is of particular interest because young adults are at most risk of drug use developing into addiction. Two hypotheses related to the self-medication hypothesis were investigated: (1) there will be a significant increase in drug use during the stay-at-home order when compared to drug use prior to the stay-at-home order and (2) feelings of isolation and poorer mental health symptoms will be positively related to greater use of non-stimulant drugs. One-hundred and thirty-nine college students were recruited from Cloud Research and social media to fill out a survey. A significant positive correlation was found between nicotine use and feelings of isolation/depressive symptoms. This is consistent with the self-medication hypothesis, which posits that one will self-prescribe drugs to relieve psychological discomfort. In post-hoc exploratory analyses this research found that increased financial hardship and COVID-19 related stress were positively associated with higher reported depressive symptoms, anxiety, and boredom proneness. Additionally, COVID-19 related stress was positively associated with feelings of isolation. The current finding differs from research prior to COVID-19 that found increased nicotine use in young adult college students was

not associated with increased depressive symptoms. This suggests that pandemic related stressors are associated with worsening mental health for college students across the United States.

Table of Contents

List of Tables

List of Figures

List of Appendices

Introduction

In late 2019, a novel coronavirus called SARS-CoV-2 quickly spread through China. By March of 2020, the SARS-CoV-2 virus (hereafter referred to as COVID-19) had become a pandemic that affected most of the world. In response, many health and government officials recommended social distancing protocols to help reduce the spread of this deadly virus. A whole year later cases are still increasing at higher rates than we have seen prior, with more than 460,000 confirmed COVID-19 related deaths and more than 26.9 million confirmed cases in the United States alone as of February 2021 (Allen et al., 2021). The Unites States stands out for having the worst COVID-19 response when compared to Brazil (the second leading country in COVID-19 related deaths) with just over 230,000 deaths and compared to India (the second leading country in COVID-19 confirmed cases) with more than 10 million confirmed cases as of February 6th, 2021 (Allen et al., 2020). This disparity could be explained by several factors within the United States like poor government enforcement, mask-wearing becoming a partisan issue, the spread of misinformation, or citizens ignoring social distancing protocols. Many people may be asymptomatic and in a highly connected global market this means that COVID-19 spreads quickly and silently, as people continue to travel and gather.

This pandemic has caused worsening mental health in people for various reasons including financial stress, isolation, fear of catching or spreading the virus, and abrupt changes in daily routine (Pfefferbaum & North, 2020). Those who use social media as their primary source of information regarding COVID-19 have reported increased substance usage to cope with the pandemic (MacMillan et al., 2021). In a 2018 Pew

Research survey, Shearer (2018) found that 36% of younger adults often got their news from social media, indicating that young adults are at highest risk for increased substance (e.g., legal and illegal drugs, nicotine, alcohol) use during the pandemic. One possible explanation for this increase in substance use is an increased rate of boredom that results from the limited number of activities available. Boredom affects people of all ages, but young adult college students are new to freedoms that allow them to go and do as they please which leads to more active lives. This active lifestyle that many college students have could make them more prone to feelings of boredom due to COVID-19. In a study done before the COVID-19 pandemic by LePera (2011), boredom proneness was found to be positively correlated with anxiety, depression, and substance use in participants ages 22 to 70 (M = 31, SD = 10.7). This could explain why people of all ages, especially college students, have increased their substance usage amid the quarantine.

Substance Use

Prior to the COVID-19 pandemic, young adulthood (18-25) had been found to be the period of life drug use and abuse peaks which increases chances of harm or continued use (Stone et al., 2012). Looking at the literature published since the beginning of the pandemic will give a better sense of how substance use changed as a result. A study looking at 310 students across 14 universities in Spain during the lockdown found that about 1 in 3 college students reported moderate-to-high risk levels for use of alcohol and tobacco (Lázaro-Pérez et al., 2020). Which means that participants had moderate to high levels of consumption of these substances which poses possible health, financial, legal, or family problems; additionally, consumption at these levels indicates “probable future

dependency" (Lázaro-Pérez et al., 2020, p.7). This sample was collected in the beginning of June 2020, when most of the country was under strict confinement which would have drastically increased feelings of isolation. Additionally, Lázaro-Pérez et al. (2020) found that almost 23% of respondents reported marijuana use at moderate-to-high risk levels; and for sedative use, 10% of respondents reported moderate-to-high risk levels of use. Lázaro-Pérez et al. (2020), commented that "the percentage of sedative use within the general context of drug consumption reflects the self-diagnosis and self-medication of syoung university students" meaning that students are identifying negative thoughts or feelings within themselves and resorting to sedatives to mitigate these feelings (p. 9). Similarly, Koob et al. (2020) commented that "social isolation could serve as a source of stress that motivates drinking to cope" which can cause a downward cycle to begin, as their feelings only worsen once the alcohol wears off (p. 1034). This was supported by Chodkiewicz et al. (2020) who found that in a sample of 443 adults (18-68, *SD* = 11.31), 28.22% of respondents drank at levels that put them at risk of negative outcomes and 13.80% of respondents reporting that they had increased their drinking since the beginning of the pandemic. Those who increased their drinking during the pandemic reported rarely or never adopting positive reframing strategies for coping, worse mental health, and suicidal thoughts (Chodkiewicz et al., 2020).

The findings from Chodkiewicz et al. (2020) and Lázaro-Pérez et al. (2020) give support for the self-medication hypothesis which, "focuses on individual risk by considering substance use as a response to manage negative emotions stemming from a traumatic experience" (Kopak & Van Brown, 2020, p. 1097). COVID-19 has been a very

traumatic experience for many people so it is not surprising that some may try to self-medicate especially in a time where it is best to stay home and only see a doctor if absolutely necessary. One study evaluated the cases of intoxication reported to the Toxicological Information Center of Rio Grande do Sul in Brazil, which found that recreational drug use has gone up since the beginning of the pandemic and use of prescribed medication for psychiatric treatment has gone down (dos Santos et al., 2020). Additionally, individuals over the age of 19 had shown an increase in the use of recreational drugs since the beginning of the pandemic (dos Santos et al., 2020). Interestingly, dos Santos et al. (2020) also found that suicide attempts had gone down possibly because of being locked down with friends or family; however, suicides using a recreational drug as the suicidal agent had gone up. For those being locked down away from friends and family, COVID-19 has been especially hard on their mental health.

Mental Health

In a review of studies that evaluated the psychological impact of quarantines from past virus outbreaks (SARS, Ebola, 2010 H1N1 influenza pandemic, Middle East respiratory syndrome, and the equine influenza), most studies found stressors such as "longer quarantine duration, infection fears, frustration, boredom, inadequate supplies, inadequate information, financial loss and stigma" led to negative psychological effects which were described as confusion, anger, and post-traumatic stress symptoms (Brooks et al., 2020, p. 912). This is notable because every stressor that Brooks et al. (2020) cited has been present during the COVID-19 pandemic. In the United States we experienced stay-at-home orders that lasted months and because it was not strictly enforced, our

infection rates continue to climb. We experienced widespread fear because we knew little about the virus and how it actually was spread, which ties into inadequate information. The longer we were under stay-at-home orders the more boredom increased and in turn, many became very frustrated with the orders claiming that it was unconstitutional to require us to stay home. In the United States, we experienced inadequate supplies of necessities including disinfectants, cleaning supplies, masks, and toilet paper among various other items. Countless numbers of people experienced financial loss whether it was losing their business, losing a job, pay cuts, or having their hours cut due to restrictions. In addition, many people lost assets like cars and houses during the pandemic since they were not able to make payments. Within the United States stigma was prevalent, from mask wearing being stigmatized as an infringement of people's "freedoms", to the horrific, hateful stigma that the Asian community in the United States continues to endure.

Looking at mental health outcomes from COVID-19 thus far, symptoms of anxiety and depressive disorders significantly increased in the United States during April to June of 2020 when compared to the same period in 2019 (Czeisler et al., 2020). Ettman et al. (2020) found in a United States nationally representative survey that when compared with the most recent population-based estimates, the prevalence of depression symptoms was 3 times higher during the COVID-19 pandemic compared to pre-pandemic levels. In a study of undergraduates at a medical college in China, 24.9% of respondents reported anxiety ranging from mild anxiety to severe anxiety (Cao et al., 2020). Additionally, Cao et al. (2020) suggested that their results indicated that COVID-

19-related anxiety was most associated with the source of their parent's income, their place of residence, if they were living with their parents, and if a relative or acquaintance was infected with COVID-19. Having a steady source of income, living in a city, and living with parents were protective factors against anxiety, whereas knowing someone who had COVID-19 was a risk factor (Cao et al., 2020). In another study from China, that was 52.8% college students with 87.9% having a bachelor's degree or higher, 16.5% of respondents reported moderate-to-severe depressive symptoms, 28.8% reported moderate-to-severe levels of anxiety, and 8.1% reported moderate-to-severe level of stress (Wang et al., 2020).

In a study of Turkish Adults between the ages of 18 and 65 (M = 23.30, SD = 6.97), COVID-19-related stress was associated with higher levels of somatization, anxiety, depression, and overall psychological problems (Arslan et al., 2020). However, this study found that being older, coming from a higher socioeconomic background, and having a higher education level were associated with lower adverse mental health symptoms. Poorer, younger individuals with less education were at the highest risk of experiencing adverse mental health symptoms due to the pandemic. This could be indicative of young adult college students who often have very little money, have taken out large loans, and only have a high school diploma or associates degree. Lee (2020), showed that correlations of higher COVID-19 anxiety were associated with those who were younger and had a higher education. These findings differ slightly from Arslan et al.'s (2020) findings in that those with a higher education were more susceptible to COVID-19-related stress. Conversely one study from Brooks et al.'s (2020) review of

past virus outbreaks found that characteristics like younger age (16-24) and lower levels of formal education were associated with negative psychological impacts from the quarantine period. This indicates that young adults are some of the most at-risk for experiencing some form of negative psychological impact from the COVID-19 pandemic. College students of this age group may have some buffer from these effects due to their higher education level, though those findings are inconsistent. Additional research into how young adult college students are dealing with these negative psychological states may help identify additional buffering or exacerbating factors. Some possible buffering factors that might be worth investigating are social support, financial security, or exercise. Whereas some exacerbating factors that might be worth investigating in this population are isolation, boredom, or substance use. Some individuals use substances to escape or relieve some of the negative psychological feelings that they are experiencing. However, doing so from a young age can have detrimental effects if a pattern of substance use is adopted to cope with these negative psychological states ((Felner et al., 2020; Gerrard et al., 2012)

Self-Medication Hypothesis

The self-medication hypothesis posits that "individuals discover that the specific actions or effects of each class of drugs relieve or change a range of painful affect states" (Khantzian, 1997, p. 231). This hypothesis does not explain the specific biological processes that go into one developing addiction; however, it does give some insight as to how substance use to help remedy one's own feelings of discomfort can evolve into dependence or addiction. Khantzian (1997) discusses two aspects of the self-medication

hypothesis: the first being that “drugs of abuse relieve psychological suffering” and the second being that “a person’s preference for a particular drug involves some degree of psychopharmacological specificity” (p. 232). This hypothesis supports the notion that substance can sometimes be used as a form of coping. Opioids and other forms of blockers are widely used in Western medicine to cope with physical pain. They are so vastly over-prescribed that they have become a source of addiction, which has led to the well-reported opioid epidemic in the United States (Meldrum, 2016).

In the United States and other first world countries, psychological distress and pain has long been stigmatized as noted by Schomerus et al. (2012). Schomerus et al. (2012) observed two major trends in a meta-analysis on the evolution of public attitudes regarding mental illness: the public’s mental health literacy has increased, yet attitudes towards people with mental illness have not changed for the better from their past unfavorable levels, and for those with schizophrenia, attitudes have become more negative over time. This may cause many to feel that they must deal with their psychological distress on their own rather than seeking help from a professional. Additionally, it is possible that those suffering from increased psychological distress do not have insurance to help them pay for such professional help. Unfortunately, legal substances are costly and require a doctor’s prescription. In turn, one option is to self-medicate using illegal substances to help relieve their feelings of distress.

During the COVID-19 pandemic, as mentioned above, people are struggling financially and those who have lost their job will not have access to health insurance provided through their employer. On top of the already present stigma placed upon

seeking help for mental illness, during the pandemic we have been instructed to only seek in person medical help if there is an emergency. Individuals seeking help for psychological distress may be forced to seek help remotely which, if living with others, can be difficult to find the privacy needed to talk openly. This may be particularly true for young adults and college students, many of which have been forced to move back in with their parents or family members as college dorms have closed.

Attentional Theory of Boredom Proneness

According to LePera (2011), the attentional theory of boredom proneness posits that "the cultivation of attention should reduce an individual's propensity to experience boredom" (p. 16). This means that by increasing the aspects of one's environment that are found interesting or developing one's mindfulness, one could reduce the amount of boredom they experience. LePera (2011) found in her sample of 138 adult participants between the ages of 22 and 70 (M = 31, SD = 10.7), that boredom proneness was significantly positively associated with substance use and anxiety and/or depression.

A study of 823 participants from the University of Waterloo and York University in Canada verified that boredom was a distinctly different affective state from apathy, anhedonia, and depression (Goldberg et al., 2011). Goldberg et al. (2011), found that boredom and depression were highly correlated, however boredom was statistically independent of the other measured affective states. In another study, 186 Chinese residents living in Hong Kong filled out a survey measuring their level of boredom proneness, mindfulness, depression, anxiety, and stress (Lee & Zelman, 2019). Lee & Zelman (2019) found that for participants who scored low in mindfulness, boredom

proneness predicted depression, anxiety, and stress; however, for those who scored higher in mindfulness, boredom proneness was not correlated to these negative affective states. In Yang et al. (2019), they found in a sample of 746 college students in China that boredom proneness mediated the relationship between mindfulness and depression. They found a direct pathway from mindfulness to depression in that mindfulness can reduce depression; however, this is lessened by those who score higher in boredom proneness because mindfulness can be more difficult for these individuals.

Addiction can come in many forms. Yang et al. (2020) found evidence that bored minds may be more susceptible to addiction. In a study of 1099 college students Yang et al. (2020) found that boredom prone students of both high and low attentional control were more likely to use their mobile phone as a source of stimulation which could develop into problematic use. They found that students of high attentional control were able to self-regulate and seek activities that stimulated them which may have reduced their feelings of depression (Yang et al., 2020). Conversely, they speculated that those of lower attentional control may be stuck in a constant state of boredom leading to increased feelings of depression and problematic phone use (Yang et al., 2020). These relationships are purely correlational, and the directionality is unknown; however, it is important to note the correlation between high boredom proneness, increased feelings of depression, and addictive-like phone use.

Many are familiar with the classic Rat Park experiments which manipulated social isolation and the environmental stimulus of the rats to look for differences in addiction patterns (Khoo, 2020). These studies have faced serious methodological criticisms due to

the inability thus far to have a successful direct replication; however, Khoo (2020) notes that contemporaneous and subsequent research has supported the conceptual reproducibility of these experiments. These experiments overall demonstrate that social and environmental enrichment helped to reduce drug consumption for the rats (Khoo, 2020). Social and environmental enrichment has been theorized to reduce substance use in humans as well.

South African adolescents experience high levels of leisure boredom due to lack of community recreation and leisure resources available to them, leaving the adolescents to be under-stimulated by their environment (Wegner, 2011). In turn, this may cause them to search for activities to stimulate them, which increases their chances of engaging in risky behavior such as the use of illegal substances (Wegner, 2011). Due to the prevalence of substance use in this population, Weybright et al. (2015) performed an intervention study on 2,580 students from schools in a low-income township in South Africa. It was found that both high trait and state leisure boredom were associated with higher levels of substance use (Weybright et al., 2015). This means that adolescents who were more boredom prone as a trait characteristic tended to use more substances and that adolescents who found themselves experiencing boredom more frequently (state leisure boredom) were also more likely to use substances. Weybright et al. (2015) did not find a significant reduction in substance use as a result of their intervention, which was teaching the adolescents how to restructure their trait or state leisure boredom.

Due to the restrictions that have been implemented to help slow the spread of COVID-19, many community recreation and leisure resources that are normally available

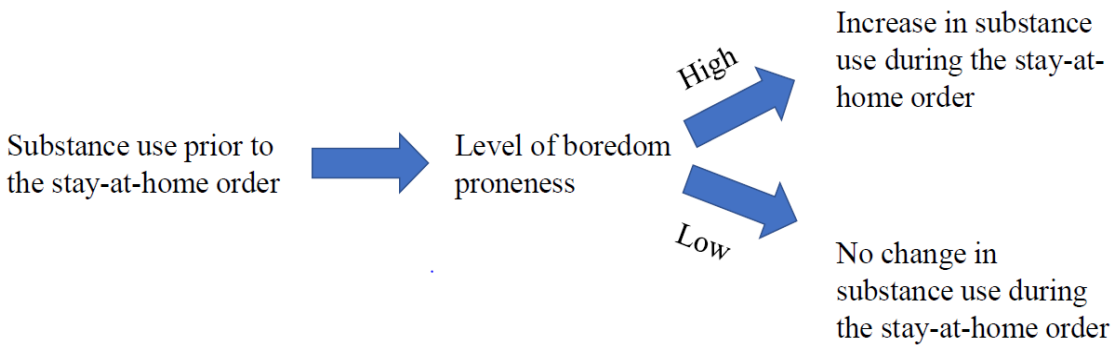
in the United States have been closed. For young adults this can be seen in the closures of clubs, bars, bowling alleys, concerts, gyms, etc. A combination of a lack of a stimulating environment and minimal social interaction may cause an increase in substance use within this population in the United States, especially those who are more prone to feelings of boredom. Additionally, more boredom prone individuals are expected to develop worsening mental health due to lack of stimulation and social interactions available to them during the pandemic.

Goals of this Study

The overarching goal of this study is to evaluate the mental health and substance use of young adult college students during the COVID-19 pandemic. Furthermore, I hoped to find evidence in support of both the self-medication hypothesis and the attentional theory of boredom proneness. I tested four primary hypotheses. Hypothesis 1: There will be a significant increase in substance use during the stay-at-home order when compared to substance use prior to the stay-at-home order. This is supported by both the self-medication hypothesis and the attentional theory of boredom proneness. Hypothesis 2: Feelings of isolation and poorer mental health symptoms will be positively related to greater use of non-stimulant substances. This is to test the self-medication hypothesis which states that people increase their substance use to alleviate psychological discomfort. People are expected to use non-stimulant substances like depressants to alleviate this discomfort because it can help them to relax and remove them from their current mind state. People are expected to use hallucinogens to alleviate psychological discomfort because hallucinogens allow the user to experience an escape from the reality

they are currently living in even if it is only for a short period of time. Hypothesis 3: Boredom proneness will be a moderator between substance use prior to the stay-at-home order and substance use after the stay-at-home order. The moderation effect will be that those who score higher on boredom proneness will be more likely to increase their substance use compared to those who score low on boredom proneness (see Figure 1.). Hypothesis 4: Social isolation and better adherence to the stay-at-home order will be negatively related to the use of stimulant substances, respectively. This is based on findings that first year college students (ages 17-19) who were stimulant users spent on average more time going out and socializing than their nonuser peers (Arria et al., 2008). Indicating that stimulant substances are more of a social drug than other forms of substances. Which is why it is expected that those who are more isolated and better adhering to the stay-at-home order will use fewer stimulant substances.

Figure 1.
Visualization of Hypothesis 3



Method

Participants

For the mental health and drug use survey during the stay-at-home order, participants were college students between the ages of 18 and 25 (participants could not begin the survey until they stated that they were between 18 and 25 years of age), as young adulthood is the period of life when drug use and abuse peaks (Stone et al., 2012). A total of 242 survey responses were collected from college students across the United States. After removing the cases that incorrectly answered the attention check questions (*n* =32) or did not meet study parameters (reported that they were not currently enrolled in college (*n* = 32), or reported a history of diagnosed substance use disorder (*n* = 41) or psychotic disorders (*n* = 63); for more detail refer to measures section), this left a final sample of 139 participants (*M* = 22 years of age, *SD* = 2.05). This was less participants than the goal of 395 participants which was required to achieve a power of .80 for a small effect size (*F*-squared = .02). The final sample was primarily White (55%), followed by Hispanic or Latino (19%), Black or African American (12%), and Asian or Pacific Islander (11%). Less than 1 percent of participants reported being Native American or American Indian, Middle Eastern, or Other. Of the participants in the final sample, 78% reported identifying as female and 21% reported identifying as male, with less than 1% reporting identifying as non-binary or non-conforming. Participants in the survey reported a range of different living situations during the COVID-19 pandemic with living with parents being the largest group (30%), followed by living with family (25%), living with roommates they were friends with (25%), living alone (12%), and living with

roommates they were not friends with (6%). Though current college enrollment was a requirement to participate in the study, 33 participants did not specify the name of the institution that they were enrolled in. These participants were still included in the final analyses under the assumption that they preferred not to disclose that information. Of the participants that chose to disclose this information: 42% went to schools in the southern region of the United States, 26% went to schools in the western region of the United States, 19% went to schools in the midwestern region of the United States, and 13% went to schools in the northeastern region of the United States.

Design

The current study was a cross-sectional online survey, with predictor variables being measures of the participant's mental state (depressive symptoms, anxiety level, feelings of isolation, perceived stress, and boredom) and the outcome variable being change in drug use from before the stay-at-home order (retrospectively reporting on the first week of Fall 2020 semester) and during the stay-at-home order (mid-January 2021). Data collection began in late January 2021 and lasted until mid-February 2021 to allow for a week prior that did not contain any major holiday celebrations which could have increased substance usage and mental health symptoms. This collection period also aligns with the period in which most major universities begin their spring semester to give some congruency with participant reporting of the beginning of the fall semester. Additionally, cases of COVID-19 were expected to rise following holiday travel and celebrations in December.

Procedure

Participants were recruited through social media posts (Instagram and Twitter) (n = 16) using convenience sampling to obtain the initial group and then through snowball sampling by participants sharing the link to the survey. Additional participants were recruited using Cloud Research (n = 123), which is a crowdsourcing website powered by TurkPrime that allows the researcher to filter respondents by demographics like age and education level. Participants from Cloud Research were not statistically different from participants recruited from social media on major study variables except for feelings of isolation (Cloud Research: M = 18.07, SD = 5.83, Social Media: M = 22.81, SD = 2.01, $t(57.43) = -6.53$, $p < .001$, d = 0.86) and perceived stress level (Cloud Research: M = 15.20, SD = 5.28, Social Media: M = 18.75, SD = 4.58, $t(20.56) = -2.86$, p = .01, d = 0.68). Participants followed the link from the social media post or Cloud Research to the survey on Survey Monkey. First, participants had to read through the informed consent form prior to beginning the survey. It was requested that they complete the study while not under the influence of any substance, other than those prescribed to them by their doctor. Once they consented to the research, they filled out demographic information (11-items) to verify that they were within the required parameters for participation. If they did not fit within the parameters, then they were navigated away from the webpage. The survey took participants on average about 7 to 8 minutes to complete. Participants who responded to the survey from the social media post were not compensated for their participation. Those recruited through Cloud Research were compensated about 1.75 USD for completion of the survey. Following completion of the survey participants were

directed to a page that consisted of debriefing information, sources for psychological and drug abuse help, links to information regarding drug misuse, and were asked to share the survey with other college students. Participants recruited from social media were able to share the post with other college students using the original post link, but participants recruited through Cloud Research were not able to share the survey link. This study was approved by the Humboldt State University Institutional Review Board number 20-004.

Measures

Participants were asked to identify their demographic information, drug usage, depressive symptoms, level of anxiety, feelings of social isolations, perceived stress, and level of boredom (see appendix for full items of measures). Participants were asked their age to determine if they fit within the parameters and to evaluate if there are any age differences. Following this, they were asked if they turned 21-years-old since the semester began which could have had an influence on their substance usage. Then, participants were asked about diagnosed history of psychotic disorders and diagnosed history of substance use disorders since these disorders might skew the data. This is because individuals with psychotic disorders have been found to be at higher risk for increased substance use (Hartz et al., 2014). Participants also had to identify the College or University that they were currently enrolled in and their class level in Fall 2020. This was needed to verify that they were currently enrolled in college classes during the pandemic. Following this, participants were asked if they needed to access any mental health resources since the beginning of the semester with “Yes” or “No” options. If the participants indicated that they needed to access mental health resources, they were asked

to indicate to what extent they agreed with the following statement, “Needing to use mental health resources negatively impacted my academic performance this semester.” This item was rated on a 5-point Likert-type scale ranging from 1 = “Strongly disagree” to 5 = “Strongly agree”. Participants also needed to identify their current living situation which could affect their mental health and drug usage. Finally, participants were asked about the gender that they most closely identify with and the ethnicity that they most closely identify with. Following this, participants were asked if there was currently a stay-at-home order in their area which had a “Yes” or “No” option. If yes, they were asked how well they were adhering to the stay-at-home order on a 5-point Likert scale with responses ranging from 1 = “Not at all” to 5 = “I only go out when absolutely necessary”. They then were asked to indicate if they felt that COVID-19 had caused them to experience financial hardship (1-item) with responses ranging from 1 = “Strongly disagree” to 5 = “Strongly agree” on a 5-point Likert scale.

This survey also consisted of 6 scales to assess participant’s drug use, depressive symptoms, anxiety, social isolation, perceived stress, and boredom. Additionally, participants were also required to correctly answer attention check questions which I created that state, “In the last month, how often have you tied your shoes using chopsticks?” (1 = “Never” to 5 = “Very Often”) and “I put my pants on headfirst” (1 = “Strongly disagree” to 5 = “Strongly agree”). For the attention check question concerning tying shoes, only participants that responded “Never” (n = 144) were kept for analyses. For the attention check question concerning how the participant put their pants on, only responses of “Agree” (n = 5) or “Strongly Agree” (n = 1) were removed from analyses.

Drug Use

The survey consisted of questions that I created regarding participants' drug use before the stay-at-home order (11-items) and their drug use during the stay-at-home order (11-items). For drug use prior to the stay-at-home order, participants were asked about their drug use during the first week of the Fall 2020 semester. For drug use during the stay-at-home order, participants were asked about their past week's drug usage. The drugs that were of interest were recreational use of: nicotine, Adderall (non-prescription use), cocaine, MDMA (Molly, M, Ecstasy, X, XTC), marijuana, lysergic acid diethylamide (LSD), psilocybin mushrooms (magic mushrooms), alcohol, Xanax (non-prescription use), Opiates (non-prescription use), and Nadropax (fictitious drug). Nadropax is a fictitious drug used in multiple other studies to detect over reporting of drug use. Participants had to indicate having never used this drug or not in the past week for their responses to be included in final analyses (n = 6)(Fernández-Calderón et al., 2018). Responses for this section ranged from 1 = "not in the past 7 days" to 5 = "20+ times in the past 7 days" on a 5-point scale, or participants indicated that they had never used the substance before. This scale was summed together to obtain an overall substance use score for the past week with "I have never used this substance before" and "not in the past 7 days" both being equal to "0". For each time period, the substances were added together with "Once in the past 7 days" being equal to "1" and "20+ times in the past 7 days" being equal to "4" and higher scores corresponding to greater substance use.

Depressive Symptoms

Participants then filled out the Beck Depression Inventory short form (13-items: α = .83) (Beck & Beck, 1972; Reynolds & Gould, 1981) which asked that they indicate the statement that best describes the way they were feeling during the past two weeks. An example for this would be "Sadness" as the prompt with responses ranging from 1 = "I do not feel sad" to 4 = "I am so sad or unhappy I can't stand it" on a 4-point scale. This scale was scored by summing together the responses with higher scores indicating higher levels of depressive symptoms. The Beck Depression Inventory short form has been validated in adults in Western, Industrialized nations and Iran, and has been shown to have a correlation of .93 with the Beck Depression Inventory standard form which has been validated in numerous other countries (e.g., Australia, Bulgaria, Israel, Nigeria, Sweden) (Reynolds & Gould, 1981; van Hemert et al., 2002).

Anxiety

Next, the Covid Anxiety Scale (5-items: α = 0.93) (Lee, 2020) asks participants how much they had been bothered by each symptom in the past month. An example of this is "I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus." This scale had responses ranging on a 5-point scale from 1 = "Not at all" to 5 = "Nearly every day over the last 2 weeks". This scale was scored by summing together the responses of each item with higher scores indicating more COVID-19-related anxiety symptoms. This measure has been validated in adults in Industrialized nations and adults who speak Bangla, most of whom have a bachelor's degree or higher (Ahmed et al., 2020; Evren et al., 2020; Lee, 2020). Additionally, it was found that Covid Anxiety Scale

scores were “strongly, positively associated with functional impairment, alcohol or drug coping, negative religious coping, extreme hopelessness, and passive suicidal ideation” (Lee, 2020, p. 399).

Social Isolation

Participants then filled out an adapted, English version of the Social Isolation Measure (4-items: α = .83) (Murberg & Bru, 2001), an example of this is “You feel that the virus (COVID-19) makes it difficult to visit family and friends” with responses ranging from 1 = “Not at all” to 6 = “Very much” in a 6-point Likert format. This scale was scored by summing together the responses of each item with higher scores indicating higher feelings of social isolation because of the COVID-19 pandemic. This measure has been validated in adults in Norway suffering from congestive heart failure, which is a disease that has a high rate of morbidity and mortality (Murberg & Bru, 2001). Additionally, this measure has been used in Canada to assess feelings of isolation in survivors of brain injuries and their caregivers (Proctor & Best, 2015).

Perceived Stress

Participants then filled out the English version of the Coronavirus Stress Measure (5-items: α = .83) (Arslan et al., 2020). An example of an item from this scale is “How often have you been upset because of the COVID-19 pandemic?” This was scored on a 5-point Likert scale ranging from 1 = “Never” to 5 = “Very Often”. This scale was scored by summing all items together to create an overall score with higher scores indicating more perceived COVID-19-related stress. This measure has been validated in adults from Turkey (which is considered to be a newly Industrialized nation), 91% of them having a

university diploma and was adapted from Cohen's (1983) Perceived Stress Scale (Arslan et al., 2020).

Boredom

Finally, participants completed the Short Boredom Proneness Scale (8-items: α = .88) (Struk et al., 2017) to assess their mental state during the stay-at-home order. The authors of this scale recommended use of a 5-point Likert scale, rather than the 7-point Likert scale they originally used because they believed participants had difficulty differentiating between response options. The responses for this Likert scale ranged from 1 = "strongly disagree" to 5 = "strongly agree".

This scale was scored by summing together responses of each item with higher scores indicating more proneness to boredom. This scale has been "significantly correlated with all aggression measures, as well as with depression, anxiety, stress, ADHD symptoms, spontaneous mind-wandering, and lapses of attention" (Struk et al., 2017, p. 355). The Short Boredom Proneness Scale has been validated in undergraduate college students in Industrialized nations (Lee & Zelman, 2019; Struk et al., 2017).

Results

Using R, data was cleaned and checked for skewness, kurtosis, multicollinearity, and normality prior to testing the four hypotheses. Missing data was imputed using mean imputation when necessary. Using the "pwr2ppl" package in R, a sensitivity analysis was conducted for each hypothesis. All analyses that were performed were significantly under powered with a sample size of only 139, with the exception of the third hypothesis. The *t*-test that was performed for my first hypothesis only had power of .09. For the first regression model (hypothesis 2) there was power of .06. For the second regression model (hypothesis 3) there was power of 1. For the third regression model (hypothesis 4) there was power of .23. A correlation table and descriptive statistics for main study variables is included below in Table 1. The correlation table shows that in this sample substance use prior to the stay-at-home order and substance use during the stay-at-home order were highly correlated (r = .91). Which may have contributed to no evidence being found to support any of the four hypotheses.

Table 1.

*M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval. The confidence interval is a plausible range of population correlations that could have caused the sample correlation. * indicates p < .05. ** indicates p < .01.*

Variable	*M*	*SD*	1	2	3	4	5	6
1. Substance Use Prior	2.09	2.78						
2. Substance Use During	2.03	2.81	.91** [.88, .94]					
3. Depression	24.34	8.60	.22* [.05, .37]	.19* [.02, .34]				
4. Anxiety	6.54	2.90	.17* [.00, .33]	.13 [-.04, .29]	.29** [.13, .44]			
5. Isolation	18.61	5.72	-.05 [-.22, .11]	-.01 [-.18, .15]	.18* [.01, .33]	.22* [.05, .37]		
6. Boredom	24.43	6.38	.12 [-.05, .28]	.10 [-.07, .26]	.66** [.56, .75]	.33** [.17, .47]	.17* [.01, .33]	
7. Perceived Stress	15.61	5.31	.11 [-.06, .27]	.10 [-.07, .26]	.47** [.33, .59]	.48** [.35, .60]	.53** [.39, .64]	.56** [.44, .67]

Hypothesis 1

The first hypothesis that substance use would significantly increase during the stay-at-home order was tested using a Welch's *t*-test. Substance use prior to the stay-at-home order ($M = 2.09$, $SD = 2.78$) was not significantly different from the reported substance use during the stay-at-home order ($M = 2.03$, $SD = 2.81$), $t(275.98) = 0.2$, $p = .84$, $d = 0.02$.

Hypothesis 2

The second hypothesis that was tested, using multiple regression, was that feelings of isolation (predictor variable) and poorer mental health symptoms, which include depressive symptoms and feelings of anxiety (predictor variables), would be positively related to greater use of non-stimulant substances (outcome variable). Independently, none of the predictor variables significantly predicted greater use of non-stimulant substances: feelings of isolation (R^2 = .01, f^2(1, 137) = 2.01, p = .16), depressive symptoms (R^2 = .02, f^2 (1, 137) = 2.65, p = .11), and feelings of anxiety (R^2 = .01, f^2(1, 137) = 1.39, p = .24). Taken together, social isolation, depression, and anxiety did not significantly predict greater use of non-stimulant substances, R^2 = .03, f^2 (3, 135) = 1.42, p = .24. Within this sample, feelings of isolation and poorer mental health symptoms were not significant predictors of increased use of non-stimulant substances.

Hypothesis 3

The third hypothesis was tested using a moderated linear regression to see if boredom proneness would moderate the relationship between substance use prior to the stay-at-home order (predictor variable) and substance use during the stay-at-home order (outcome variable). Taken together, boredom proneness and substance use prior to the stay-at-home order significantly predicted substance use during the stay-at-home order, R^2 = .84, f^2(3,135) = 234.2, p < .001. Although this set of variables significantly predicted substance use during the stay-at-home order, only substance use prior to the stay-at-home order reached significance (β = 0.93, p < .001). The interaction between substance use prior to the stay-at-home order and boredom proneness was not significant

(β = -0.02, p = .134). This indicates that within this sample, boredom proneness did not moderate the interaction between substance use prior to the stay-at-home order and substance use during the stay-at-home order.

Though boredom proneness was not a moderator of substance use, further analyses were performed using a simple regression model to determine if it was predictive of the other variables of interest within the study. The first of these analyses looked to see if boredom proneness (predictor variable) would predict increased depressive symptoms (outcome variable). Boredom proneness was found to significantly predict increased depressive symptoms, R^2 = .44, $f^2(1, 137) = 106.4$, $p < .001$. This indicates that participants who scored higher on the boredom proneness scale reported more depressive symptoms. Following this test, anxiety (outcome variable) was used as the dependent variable in the regression equation (with boredom proneness being the predictor variable). This test indicated that boredom proneness significantly predicted more feelings of anxiety in participants, R^2 = .11, $f^2(1, 137) = 16.52$, $p < .001$. This shows that as participants scored higher on boredom proneness, they also reported more feelings of anxiety. Next, I examined if boredom proneness (predictor variable) predicted feelings of isolation (outcome variable) during the pandemic. Boredom proneness was found to be a significant predictor of participants' feelings of isolation, R^2 = .03, $f^2(1, 137) = 4.18$, p = .04. This means that the more boredom prone the participant was, the more isolated they reported feeling. The last test using boredom proneness was whether boredom proneness (predictor variable) predicted perceived stress levels (outcome variable). Boredom proneness was a significant predictor of participants' perceived stress

levels, $R^2 = .32$, $f^2(1, 137) = 63.55$, $p < .001$. This indicates that as scores on the boredom proneness scale went up, participant's perceived stress levels also went up.

Hypothesis 4

The fourth hypothesis was tested using a multiple regression to see if an increase in feelings of isolation (predictor variable) and higher reported adherence to the stay-at-home order (predictor variable) would be negatively correlated with the use of stimulant substances (outcome variable). Independently neither predictor variable reached statistical significance when predicting use of stimulant substances: feelings of isolations ($R^2 = .02$, $f^2(1, 16) = 0.28$, $p = .60$) and adherence to the stay-at-home order ($R^2 = .04$, $f^2(1, 16) = 0.74$, $p = .40$) Taken together, feelings of isolation and adherence to the stay-at-home order did not significantly predict use of stimulant substances, $R^2 = .04$, $f^2(2, 50) = 1.01$, $p = .37$.

Post-Hoc Exploratory Analyses

Some additional post-hoc exploratory analyses were performed. Using a simple regression model, I examined the relationship between financial hardship and perceived stress level with financial hardship being used as the predictor variable. The data indicated that as financial hardship increased the perceived stress levels also increased, $R^2 = .16$, $f^2(1, 137) = 1.01$, $p < .001$. Subsequently, the relationship between financial hardship and the other major variables within the study were examined using a Hierarchical regression model, with the first model using financial hardship to predict the remaining variables of interest and then adding in perceived level of stress into the second model (see Table 2).

Table 2.

*Model df (2, 136). * p < .05, ** p < .01, *** p < .001.*

	Depression	Anxiety	Isolation	Boredom	Substance use During Stay-At-Home
	β	*β*	*β*	*β*	*β*
Financial Hardship	.33***	.20*	.16	.29***	.16
R^2 Change	.11***	.04*	.03	.08***	.03
Financial Hardship	.18*	.01	-.06	.08	.15
Perceived Stress	.40***	.48***	.55***	.53***	.04
R^2 Change	.13***	.19***	.25***	.24***	.00
R^2 Model	.24***	.23***	.28***	.32***	.03

Table 2 shows the results from the series of Hierarchical regressions. For the first model, financial hardship added significantly to the prediction of depression. When entered in the second step of a Hierarchical Multiple Regression with perceived stress, financial hardship still explained 13% of the variance in depression scores. Taken

together, the level of financial hardship and perceived stress level predicted significantly higher scores on the depression measure, $R^2 = .24$, $f^2(3, 136) = 22.00$, $p < .001$.

Financial hardship also added significantly to the prediction of anxiety. When entered in the second step of a Hierarchical Multiple Regression with perceived stress, financial hardship still explained 19% of the variance in anxiety scores. Taken together, the level of financial hardship and perceived stress level significantly predicted increased levels of anxiety, $R^2 = .23$, $f^2(3, 136) = 20.83$, $p < .001$. Although the set of variables significantly predicted anxiety, not all variables contributed to the prediction. Higher perceived stress levels predicted higher levels of anxiety, but financial hardship did not significantly predict anxiety.

Financial hardship also added significantly to the prediction of boredom proneness. When entered in the second step of a Hierarchical Multiple Regression with perceived stress, financial hardship still explained 24% of the variance in boredom proneness. Taken together, the level of financial hardship and perceived stress level significantly predicted higher levels of boredom proneness, $R^2 = .32$, $f^2(3, 136) = 32.33$, $p < .001$. Although the set of variables significantly predicted boredom proneness, not all variables contributed to the prediction of the final model. Higher perceived stress levels predicted higher levels of boredom proneness, but financial hardship did not significantly predict boredom proneness in the final model.

Financial hardship did not add significantly to the prediction of feelings of isolation. Taken together, the level of financial hardship and perceived stress level significantly predicted increased feelings of isolation, $R^2 = .28$, $f^2(3, 136) = 26.42$, $p <$

.001. Higher perceived stress levels predicted increased feelings of isolation, but financial hardship did not predict feelings of isolation. Finally, neither model of the Hierarchical regression significantly predicted substance use during the stay-at-home order.

I also investigated possible differences for participants who reported there being a stay-at-home order in their area (n = 53) versus participants who reported there was no stay-at-home order in their area (n = 86) on substance use during the stay-at-home order using a Welch's two sample t-test. Substance use during the stay-at-home order for those who reported still having a mandated stay-at-home order (M = 2.40, SD = 2.84) was not significantly different from the reported substance use of those who reported not having a mandated stay-at-home order (M = 1.80, SD = 2.77), $t(108.08) = 1.21$, p = .23, d = 0.21.

Following this, the major study variables were compared across the different living situations that the participants reported using a Tukey test, with no significant differences found. Individual substances were then explored using a simple regression model using the specific substance as a predictor of other major study variables. Two significant findings came out of this exploration: Increased nicotine use was found to be a significant predictor of depression, R^2 = .03, $f^2(1, 137) = 4.02$, p = .05, and increased nicotine use was found to be a significant predictor of feelings of isolation, R^2 = .03, $f^2(1, 137) = 4.86$, p = .03. This indicates that participants who reported higher levels of depression or feelings of isolation also reported higher levels of nicotine use in the past week.

Discussion

The COVID-19 pandemic has been hard on everyone around the world. Young adult college students have had an especially hard time since they are at a point in their life where they have very little money saved up which causes additional pandemic related stress and in turn worsening mental health for many. The restrictions that were put in place to slow the virus not only caused many of these students to have their hours cut or jobs lost completely, but also meant that many of the activities normally available to them were closed until states reopened. For young adult college students who are accustomed to an active lifestyle of socialization, partying, and events this can lead to unusually high levels of boredom. To compensate for the under stimulation some have turned to substance use to help resolve these feelings of boredom, stress, isolation, depression, and anxiety. This study sought to identify the extent to which young adult college students' mental health worsened and substance use increased. Four main hypotheses were tested to evaluate this: (1) substance use would significantly increase during the stay-at-home order when compared to prior to the stay-at-home order, (2) feelings of isolation and poorer mental health symptoms would be positively related to greater use of non-stimulant substances, (3) boredom proneness would moderate the relationship between substance use prior to the stay-at-home order and substance use during the stay-at-home order, and (4) an increase in feelings of isolation and higher reported adherence to the stay-at-home order would be negatively correlated with the use of stimulant substances.

No support for the first hypothesis was found since there was not a significant difference was found between reported substance use prior to the stay-at-home order and substance use during the stay-at-home order. One possible explanation is that the time point selected as "prior to the stay-at-home order" was at the beginning of the Fall 2020 semester. One issue with this is that the first week of the Fall 2020 semester differs between schools (e.g. schools on semester versus quarter system) and may have not been truly outside of a mandated stay-at-home order for all participants. For example, California (21% of participants who chose to disclose their school's name) was under the initial stay-at-home order from March 19th to August 28th versus Texas (11% of participants who chose to disclose their school's name) who was under the stay-at-home order from April 2nd to April 30th. Additionally, participants were asked to retrospectively recall their average substance use during the first week of the fall semester which could have been anywhere from 4 to 6 months prior. This was deemed favorable over asking participants to recall back to February of 2020, which would have been nearly a year prior. Participants may have already fallen into a pattern of substance use since the beginning of the stay-at-home order back in March 2020 when the initial increase in substance use would have occurred. In turn, participants' substance use may not have fluctuated significantly as stay-at-home orders were implemented and rescinded multiple times.

No support was found for hypothesis two, since feelings of isolation and poorer mental health symptoms were not significantly related to non-stimulant substance use, I found no evidence in support of the self-medication hypothesis. Similarly, for hypothesis

three, boredom proneness was not found to significantly moderate the relationship between substance use prior to the stay-at-home order and substance use during the stay-at-home order, which indicates that there was no evidence in support of the attentional theory of boredom proneness. Since the substance use prior to the stay at home order variable was highly correlated with the substance use during the stay-at-home order variable, it was extremely unlikely to be able to find a moderating effect between the two time points. Perhaps if the data were collected closer to the beginning of the pandemic there would have been more of a noticeable difference in substance usage as indicated in other studies done closer to the beginning (Chodkiewicz et al., 2020; dos Santos et al., 2020; Koob et al., 2020; Lázaro-Pérez et al., 2020). It is worth mentioning that despite not finding support that boredom proneness moderated the relationship between substance use before and during the stay-at-home order, boredom proneness was found to be positively correlated with worsening mental health symptoms. This should in turn suggest partial support of the attentional theory of boredom proneness and may further give evidence that the substance use measure was not sensitive enough to changes in substance use due to the timing of data collection. Possibly with a larger sample size there would have been more power to detect an effect in this population's substance use.

Regarding my fourth hypothesis that increased feelings of isolation and higher reported adherence to the stay-at-home order would be negatively correlated with the use of stimulant substances, I found no support. This was based on the belief that most stimulant substance are used as a social drug, so the less socially connected the participants were, the less they would use these drugs. Only 18 participants who reported

stimulant use in the past week also reported a stay-at-home order in their area. One possible explanation is that most of the sample reported having never in their lives used stimulant substances: 69% of participants had never used Nicotine, 85% of participants had never used Adderall, 86% of participants had never used Cocaine, and 88% of participants had never used MDMA. The 2019 National Survey on Drug Use and Mental Health found that 17.5% of young adults ages 18-25 had used cigarettes in the past month compared to the 19.4% of participants who had reported nicotine use in the past seven days in the current study (Substance Abuse and Mental Health Administration, 2019). A study published in January 2021 found that the lifetime prevalence of non-prescription use of prescription stimulants (Adderall) in college students was 18.9% which is similar to the lifetime prevalence of Adderall use found in my study of 15% (Cook et al., 2021). The 2019 National Survey on Drug Use and Health found that 5.3% of young adults ages 18-25 had used cocaine in the past month compared to the 2.9% of participants who had reported cocaine use in the past seven days in the current study (Substance Abuse and Mental Health Administration, 2019). It is a possibility that the workers on CloudResearch are too homogeneous and do not use substance quite at the same rate as national averages. With such a small portion of the sample population having ever used these substances it is hard to draw definite conclusion as to whether their use had changed. With a larger sample size there may have been enough power to detect an effect despite the number of participants who reported never using these stimulant substances.

The exploratory analyses indicated some interesting significant results. Financial hardship was found to have a significant positive relationship with perceived stress level,

anxiety, depression, and boredom proneness. It was not surprising to see that financial hardship was related to perceived stress level, anxiety, and depression because facing money trouble can lead to uncertainty and negative mental health outcomes (Godinic et al., 2020). What I found particularly interesting was the positive relationship between financial hardship and boredom proneness which may have been a result of a lost job and having an additional 4-8 hours of free time each day. This means that the more financial hardship one is facing, the more likely they are to be boredom prone. Another possible explanation for this is that those suffering from more financial hardship do not have the resources to pay for things to keep them entertained. Many young adult college students have recently moved out from their family's home and may not already own things to keep them entertained. The usual form of entertainment for college students consists of social events whether it be parties, clubs, sports games, or school events. During the COVID-19 pandemic things closed very abruptly, and many personal entertainment items quickly went out of stock for those who could afford them. Many students may have had to stay home, do their homework, and entertain themselves online or with things they already had in their house.

One null result from the exploratory analysis that was notable was that there were no significant differences in the variables of interest across different living situations. This is interesting because college students that were living alone did not report feeling more isolated because of the stay-at-home order. This could be explained by the various forms of technology that we have at our disposal to keep us connected even from a far. Despite having this technology with the vastness of the internet, looking at the same

screen for hours each day can quickly become monotonous leading to further boredom. Young adult college students are also some of the most adept at using these technologies and had been using them before the pandemic had even began, unlike many older adults who may have been unfamiliar with things like video calls. This could be interesting to further explore by looking at generational differences of feelings of isolation during the COVID-19 pandemic. Additionally, one would want to account for how isolated the participant was feeling prior to the pandemic compared to how they felt during the pandemic.

I also discovered that young adult college students in this sample who reported higher levels of nicotine use also reported either higher levels of depressive symptoms or increased feelings of isolation. This result is interesting because similar studies measuring the correlation of substance use with health risk behavior found that increased nicotine use was not associated with more depressive symptoms (Lanza et al., 2020; Spindle et al., 2017). Both studies sampled young adult college students; however, both were collected prior to the COVID-19 pandemic which could be indicative of the different findings. Conversely, the correlation between increased nicotine use and worse mental health symptoms is consistent with the self-medication hypothesis as described in Khantzan (1997), who cites studies that found an association between nicotine dependence and major depression, neuroticism, negative affect, hopelessness, and general emotional distress (Weiss et al., 1992; Breslau et al., 1993). The difference between the findings in these studies could be the degree of stress and uncertainty that is associated with the current pandemic. Due to the nature of the current study being purely correlational, it is

impossible to determine whether nicotine use led to increased feeling of depression or isolation, or vice versa. However, it does indicate the relationship was present during a period of enhanced stress for young adult college students whereas recent studies failed to find this relationship when young adult college students were not subjected to the conditions they are currently facing.

Future Directions

Additional research needs to be conducted regarding the lasting effects of the COVID-19 pandemic well past the end of the restrictions. A large scale longitudinal study could be taken on to monitor the behaviors of young adults following the end of the pandemic. One of the key variables of interest would be future college enrollment to see if trends increase or decrease. If the rate of college attendance decreases, it could be because those students that were in high school or middle school when the pandemic hit realized that life could change or end overnight. These students were going to school one day and the next day schools were shut down with all learning being done remotely. Many of these students probably knew or knew of someone who died from COVID-19 which may have activated their mortality salience. If this is the case, then young adults may see college as an unnecessary waste of four or more extra years of their lives. Another variable that would be of interest is to look at young adult attendance at large social gathering events like parties, concerts, bars, clubs, and festivals. This could be tracked by the amount of money spent on these types of entertainment each year or asking organizers the attendance demographics and comparing to years prior. If the rate of partying and large social events goes up directly following the lifting of all restrictions

and drops off after a year or two; it could be hypothesized that young adults are compensating for time they may feel was taken away from them because of the pandemic. For studies of this nature, it would be necessary to enroll participants in their senior year of high school. One way to do this may be to target students from random school districts around the country using cluster sampling. To reduce the effects of attrition respondents would be compensated for their first response a $25 amazon gift card and a $50 amazon gift card for each additional annual response.

Implications

These findings can be useful to institutions across the United States to help support their student's wellbeing until the very end of the COVID-19 pandemic and possibly for the wellbeing of their students well after the end of the pandemic. Young adult college students who are facing increased levels of pandemic-related stress or financial hardship are experiencing worsening mental health outcomes. Institutions should focus on ways to help alleviate the stress and financial hardship that their students are experiencing. With many campuses planning for a return to in-person classes for the Fall 2021 semester, some of the stressors like online learning, living at home, or need for a job may subside. It would behoove institutions to continue or begin to monitor the substance use levels within their students. Though they can do little to prevent substance use on college campuses, monitoring use levels could help them make informed decisions on resource allocations. With better resource allocations to campus general health resources, mental health resources, and campus sponsored activities it could promote a happier and healthier student body. Additionally, as students return to campus this

coming fall social life will return possibly stronger than ever with students trying to make up for lost time. Finally, with the return to in-person classes some students may display symptoms of new stressors like social anxiety from not being around many people in such a long time. It is imperative that multiple forms of resources are available on college campuses to help students reintegrate back into in person classes. This could take multiple forms like having enough counselors or therapists on campus for the student body's need, since the need for mental health counseling has been significantly increasing over the past few years (Watkins et al., 2012). Another option would be for organized daily or weekly activities that are free and do not need unit enrollment to participants like group led nature walks/hikes, meditations, or mindfulness trainings which can help reduce psychological distress (Marselle et al., 2019) and perceived stress (Zollars et al., 2019).

Limitations

This research was not without its limitations. As was mentioned earlier in the discussion section, the timing of the distribution of the survey and the time points used were not ideal since they were so late into the stay-at-home order. Additionally, not as many participants were able to be recruited as I would have hoped leading to the possibility that more of the findings could have been statistically significant if enough power were obtained. The participants that were obtained from this study were from convenience sampling which is not truly random so participants may have been too homogeneous. Participants were also skewed heavily female which hurts the overall generalizability of the study. Since this study was a single time point survey, all findings

are purely correlational and do not give any evidence of directionality. Additionally, the correlations that were found useds many separate multiple regressions which increased the possibility of a type 1 error (which is when you find a significant result when there actually is not one).

Conclusions

In conclusion, young adult college student's mental health has been significantly impacted by the COVID-19 stay-at-home orders. Further research is needed to determine how lasting these effects will be. I recommend that educational institutions continue to check in on their student's mental health in the coming semesters or even years. Despite the null findings on the substance use variables within the current study, larger scale studies performed during the pandemic have recorded significant increases in substance usage. These findings should be reviewed and considered by institutions when making future decisions regarding substance abuse resources on campus. Though we can only hope that young adult college students are resilient enough to bounce back from the COVID-19 pandemic, it is the responsibility of the institutions to be there for their students and give them support in this difficult time. Ideally institutions will devote additional resources and ensure that students are aware of the resources available to them and how to access those resources. Whether the resources be for mental health services or substance abuse support which could be as simple as giving on campus spaces for groups like Addicts Anonymous.

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Appendices

Appendix A: Survey Questions

How old are you (must be between 18-25 to participate in this survey)?

If you are currently 21, did you turn 21 since the beginning of the Fall 2020 semester? Yes, No, or Does not apply

Do you have a diagnosed history of psychotic disorders? Yes or No

Do you have a diagnosed history of substance abuse? Yes or No

What College or University are you currently enrolled in (including Fall 2020 graduates)?

What class level were you in for the Fall 2020 semester?

Fresh person, Sophomore, Junior, Senior, or Graduate Student

What is your current living situation?

Alone, With roommates that you are not friends with, With roommates that you are friends with, With parents, or With family

What gender do you identify with? Female, Male, Non-binary/Non-conforming, or Not listed (please specify)

What ethnicity do you most closely identify with?

White, Hispanic or Latino, Black or African American, Native American or American Indian, Asian/Pacific Islander, Middle Eastern, Indian, or Not listed (please specify)

Did you need to use any mental health resources since the beginning of the semester? (Counselors, Psychiatrists, Therapists, Rehabilitation Clinics...) Yes or No

Needing to use mental health resources negatively impacted my academic performance this semester.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

Is there currently a stay-at-home order in your local area? Yes or No

How well are you adhering to the stay-at-home order?

Not at all, Rarely, Sometimes, Most of the time, or I only go out when absolutely necessary

During the first week of the Fall 2020 semester (prior to the second stay at home order), what was your typical usage in a 7 day period of each of these substances:

Nicotine use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Adderall (non-prescription use) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Xanax (non-prescription use) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Cocaine use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Marijuana use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Lysergic Acid Diethylamide (LSD) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Psilocybin Mushrooms (Magic Mushrooms) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Opiates (non-prescription use) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Nadropax use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Alcohol use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

MDMA (Molly, M, Ecstasy, XTC, X) use prior to the stay-at-home order

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Nicotine

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Adderall (non-prescription use)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Xanax (non-prescription use)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Cocaine

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Marijuana

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Lysergic Acid Diethylamide (LSD)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Psilocybin Mushrooms (Magic Mushrooms)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Opiates (non-prescription use)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Nadropax

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Alcohol

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

MDMA (Molly, M, Ecstasy, XTC, X)

Not in the past 7 days, Once in the past 7 days, 2-9 times in the past 7 days, 10-19 times in the past 7 days, 20+ times in the past 7 days, or I have never used this substance

Indicate the statement that best describes the way you have been feeling during the past two weeks:

Sadness

I do not feel sad, I feel sad much of the time, I am sad all the time, or I am so sad or unhappy I can’t stand it

Pessimism

I am not discouraged about my future, I feel more discouraged about my future than I used to, I do not expect things to work out for me, or I feel my future is hopeless and will only get worse

Failure

I do not feel like a failure, I have failed more than I should have, As I look back, I see a lot of failures, or I feel I am a total failure as a person

Loss of Pleasure

I get as much pleasure as I ever did from the things I enjoy, I don't enjoy things as much as I used to, I get very little pleasure from the things I used to enjoy, or I can't get any pleasure from the things I used to enjoy

Guilty Feelings

I don't feel particularly guilty, I feel guilty over many things I have done or should have done, I feel quite guilty most of the time, or I feel guilty all of the time

Self-Dislike

I feel the same about myself as ever, I have lost confidence in myself, I am disappointed in myself, or I dislike myself

Suicidal Thoughts or Wishes

I don't have any thoughts of killing myself, I have thoughts of killing myself, but I would not carry them out, I would like to kill myself, or I would kill myself if I had the chance

Loss of Interest

I have not lost interest in other people or activities, I am less interested in other people or things than before, I have lost most of my interest in other people or things, or It's hard to get interested in anything

Indecisiveness

I make decisions about as well as ever, I find it more difficult to make decisions than usual, I have much greater difficulty in making decisions than I used to, or I have trouble making any decisions

Worthlessness

I do not feel I am worthless, I don't consider myself as worthwhile and useful as I used to, I feel more worthless as compared to others, or I feel utterly worthless

Concentration Difficulty

I can concentrate as well as ever, I can't concentrate as well as usual, It's hard to keep my mind on anything for very long, or I find I can't concentrate on anything

Tiredness or Fatigue

I am no more tired or fatigued than usual, I get more tired or fatigued more easily than usual, I am too tired or fatigued to do a lot of the things I used to do, or I am too tired or fatigued to do most of the things I used to do

Changes in Appetite

I have not experienced any changes in my appetite, My appetite is somewhat less than usual, My appetite is somewhat greater than usual, My appetite is much less than before, My appetite is much greater than usual, I have no appetite at all, or I crave food all the time

Indicate how much you have been bothered by each symptom during the past month, including today:

I felt dizzy, lightheaded, or faint, when I read or listened to news about the COVID-19.

Not at all, Rare-less than a day or two, Several days, More than 7 days, or Nearly everyday over the last 2 weeks

I had trouble falling asleep or staying asleep because I was thinking about COVID-19.

Not at all, Rare-less than a day or two, Several days, More than 7 days, or Nearly everyday over the last 2 weeks

I felt paralyzed or frozen when I thought about or was exposed to information about COVID-19.

Not at all, Rare-less than a day or two, Several days, More than 7 days, or Nearly everyday over the last 2 weeks

I lost interest in eating when I thought about or was exposed to information about COVID-19.

Not at all, Rare-less than a day or two, Several days, More than 7 days, or Nearly everyday over the last 2 weeks

I felt nauseous or had stomach problems when I thought about or was exposed to information about COVID-19.

Not at all, Rare-less than a day or two, Several days, More than 7 days, or Nearly everyday over the last 2 weeks

In the last month, how often have you tied your shoes using chopsticks?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

Indicate the option that best describes you:

You feel that the virus (COVID-19) makes it difficult to visit family and friends

Not at all, A little bit, Some of the time, Occasionally, Frequently, or Very much

You feel that the virus (COVID-19) makes it difficult to receive visits from family and friends

Not at all, A little bit, Some of the time, Occasionally, Frequently, or Very much

You feel that the virus (COVID-19) makes it difficult to participate in social events

Not at all, A little bit, Some of the time, Occasionally, Frequently, or Very much

You feel that the virus (COVID-19) makes it difficult to go on holiday (vacation) with family and friends

Not at all, A little bit, Some of the time, Occasionally, Frequently, or Very much

The COVID-19 pandemic has caused me to experience financial hardship

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

How often have you been upset because of the COVID-19 pandemic?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

How often have you felt that you were unable to control the important things in your life due to the COVID-19 pandemic?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

How often have you felt nervous and stressed because of the COVID-19 pandemic?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

How often have you found that you could not cope with all the things that you had to do due to the COVID-19 pandemic?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

How often have you felt difficulties were piling up so high that you could not overcome them due to the COVID-19 pandemic?

Never, Almost Never, Sometimes, Fairly Often, or Very Often

I often find myself at "loose ends," not knowing what to do.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

I find it hard to entertain myself.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

Many things I have to do are repetitive and monotonous.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

It takes more stimulation to get me going than most people.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

I don't feel motivated by most things that I do.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

In most situations, it is hard for me to find something to do or see to keep me interested.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

Much of the time, I just sit around doing nothing.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

Unless I am doing something exciting, even dangerous, I feel half-dead and dull.

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

I put my pants on head first:

Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree

Appendix B: Table and figure

Table 1.

*M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates p < .05. ** indicates p < .01.*

Variable	*M*	*SD*	1	2	3	4	5	6
1. Substance Use Prior	2.09	2.78						
2. Substance Use During	2.03	2.81	.91** [.88, .94]					
3. Depression	24.34	8.60	.22* [.05, .37]	.19* [.02, .34]				
4. Anxiety	6.54	2.90	.17* [.00, .33]	.13 [-.04, .29]	.29** [.13, .44]			
5. Isolation	18.61	5.72	-.05 [-.22, .11]	-.01 [-.18, .15]	.18* [.01, .33]	.22* [.05, .37]		
6. Boredom	24.43	6.38	.12 [-.05, .28]	.10 [-.07, .26]	.66** [.56, .75]	.33** [.17, .47]	.17* [.01, .33]	
7. Perceived Stress	15.61	5.31	.11 [-.06, .27]	.10 [-.07, .26]	.47** [.33, .59]	.48** [.35, .60]	.53** [.39, .64]	.56** [.44, .67]

Table 2

*Model df (2, 136). * p < .05, ** p < .01, *** p < .001.*

	Depression	Anxiety	Isolation	Boredom	Substance use During Stay-At-Home
	β	*β*	*β*	*β*	*β*
Financial Hardship	.33***	.20*	.16	.29***	.16
R^2 Change	.11***	.04*	.03	.08***	.03
Financial Hardship	.18*	.01	-.06	.08	.15
Perceived Stress	.40***	.48***	.55***	.53***	.04
R^2 Change	.13***	.19***	.25***	.24***	.00
R^2 Model	.24***	.23***	.28***	.32***	.03

Figure 3.
Visualization of Hypothesis 3