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Drug Use and Psychological Distress Among UVM College Students During the COVID-19 Pandemic

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Honors College Senior Thesis

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Abstract

Drug and alcohol use among college students is ubiquitous and a serious health and educational risk. This study attempted to understand the relationship between drug use and psychological distress among college students (N = 97) enrolled at the University of Vermont during the COVID-19 pandemic. Volunteers answered the same survey once at the beginning and again at the end of the fall 2020 semester. This study presented usage rates of cigarettes, e-cigarettes, alcohol, and cannabis, as well as examined the change in drug use over the 45-day period separating the first and second waves of data collection. The present study also tested whether drug use and psychological distress differed as a function of the students’ housing conditions (living at home with parents, on-campus, or off-campus). Overall, rates of drug use either remained unchanged or declined slightly from the beginning to the end of the semester, and drug use did not differ as a function of living conditions. Although psychological distress did not change as a function of time or living environment, 30-day marijuana use at the beginning of the semester was positively correlated with psychological distress measured at the end.
Drug Use and Psychological Distress Among UVM College Students During the COVID-19 Pandemic

COVID-19 is a highly contagious acute respiratory virus that emerged in Wuhan, China in 2019 and evolved into a deadly global pandemic (Wu et al., 2020). As of April 19, 2020, COVID-19 has infected 2,345,633 people around the world and caused 161,262 deaths (John Hopkins University [JHU], 2020). After the University of Vermont (UVM) closed its physical campus on March 11, 2020, non-essential workers in the state of Vermont and most of the United States were experiencing government mandated stay-at-home orders to prevent the spread of the virus (Office of Governor Phil Scott, April 17, 2020). Although freedom of movement and gathering restrictions relaxed over the summer and fall, students nonetheless had to change their lifestyles to reduce the threat of becoming infected and, consequently, becoming a source of contagion that may harm others. Social distancing and self-quarantine requirements likely brought about unexpected, disruptive, and stressful changes to students’ daily routines, as the state of being threatened by an existing pandemic that requires social and physical isolation to avoid contagion from a potentially deadly virus is a significant stressor regardless of the environment in which someone is living (Ursin & Eriksen, 2004). This study investigated drug use and psychological distress among UVM undergraduate students over the 2020 fall semester.

Undergraduate Nicotine Use

As cigarette smoking has decreased in popularity among college students, trends in nicotine consumption via e-cigarettes, also referred to as vaping, have been on the rise (Skidmore et al., 2016). As of 2020, it is estimated that 16% of undergraduate students report smoking in the last 12 months, and 7.9% report having smoked in the last 30 days (Sherburne, 2020).
Comparatively, the corresponding 12-month and 30-day prevalence rates for vaping were more than twice that of cigarette smoking, at 35.3% and 22.1%, respectively (Sherburne, 2020). Vaping became popular among college students because it was seen as the “cool” new fad and social norms encouraged it (Fadus et al., 2019). When JUULs, the most popular vape device among college students, first gained popularity in 2017, little medical information was available on the health risks attributed to e-cigarette use (Katz et al., 2020). Although vaping is still largely viewed as harmless, its popularity may have decreased recently as more information about e-cigarette health risks have been verified (Fadus et al., 2019).

As of 2020, 7.9% of American college students reported having smoked a cigarette in the last 30 days yet 22% reported having used an e-cigarette in the same time frame, due largely to vaping holding high popularity among young adults (Sherburne, 2020). There is a strong and significant correlation between reported alcohol use within the past year and cigarette smoking, however alcohol use is significantly more prevalent among college undergraduates than cigarettes (Skidmore et al., 2016). Alternative tobacco product use like hookah and e-cigarettes do not increase the likelihood of smoking cigarettes, although smokers are more likely to try alternative nicotine sources than non-smokers (Skidmore et al., 2016). This inverse effect is likely due to the students who smoke having nicotine addictions and/or viewing nicotine more favorably than non-smokers. Cigarette use has also proved consistent over time, with most students who support smoking as freshmen continuing to smoke cigarettes as seniors. Because vaping emerged so recently as a social trend, there is not yet enough data to measure longitudinal e-cigarette use of college students. Among genders, women are more likely to smoke cigarettes than men but there does not appear to be a difference for vaping (Skidmore et al., 2016). Vaping and nicotine use in general do not appear
to be correlated to levels of stress or mood (Gorukanti et al., 2017).

College students responding to a 2019 substance use survey reported biased misperceptions of vaping habits among other people their age corresponding to whether they vape or not (Fadus et al., 2019). The students who vaped tended to believe their peers vaped more than they actually did, and the non-vapers believed their peers vaped less than they actually did. Not only do college students who vape perceive peers to use more than their true levels, they also perceive vaping as cool, fun, low risk, and an interesting new technology (Saddleson et al., 2016). College students with friends who use e-cigarettes are 6 to 9 times more likely to vape than students with friends who do not vape (Windle et al., 2017). Students who vape tend to befriend peers who also use e-cigarettes, which may skew their perceptions of the descriptive vaping norms among their peers. The same applies for non-vapers because those students are more likely to report having no friends who vape and actively befriending non-vapers over e-cigarettes users (Gorukanti et al., 2017). Non-vapers are more likely to look down on their peers who vape, suggesting strong influence from in-group versus out-group bias when non-vapers hold their vaping status as a superior in-group identity (Fadus et al., 2019). The negative attitude non-vapers hold toward vaping may create social norms of nicotine aversion and drive peer pressure among social cliques to avoid vaping due to the group perception of e-cigarettes users as undesirable friends.

Parental opinions of cigarette use and vaping strongly influence young adult nicotine consumption. Families with parents who use nicotine at home have higher incidences of teenagers who vape and/or smoke cigarettes both in and outside the home (Gorukanti et al., 2017). Parental nicotine use creates permissive norms surrounding cigarettes and vaping, increasing the likelihood that college students use nicotine and feel justified in doing so.
College students are twice as likely to use nicotine if their parents have a history of tobacco use than if their parents have never used tobacco (Windle et al., 2017). College students with parents who do not use nicotine tend to view vaping and smoking cigarettes as “not cool” and dangerous, decreasing risk of use and moderating the effects of peer pressure to use nicotine (Fadus et al., 2019; Gorukanti et al., 2017).

**Undergraduate Alcohol Use**

Alcohol is the most frequently consumed substance among college undergraduates. According to a recent report, 77.6% of undergraduates consumed alcohol within the past year and 62.2% consumed alcohol within the past 30 days. Binge drinking is “normative” in college, with over two-thirds of undergraduates reporting being drunk within the past year (Sherburne, 2020) and citing their primary motivation to drink as getting drunk (Wechsler & Nelson, 2008). As many as 1 in 5 college freshmen drink alcohol at levels more than twice as high as the binge drinking threshold of 4+ drinks for women and 5+ drinks for men per drinking episode (Skidmore et al., 2016). Although 31% of college students meet criteria for alcohol abuse diagnosis, most heavy drinking occurs among freshmen and decreases with each subsequent year in college (Skidmore et al., 2016). Heavy drinking peaks among college students aged 18-24, with 33% of college students reporting one or more episodes of binge drinking in the past two weeks, and males reporting significantly more alcohol consumption than females (Lechner et al., 2020; Sherburne, 2020). Although the majority of freshmen who responded to a 2007 drinking behavior survey reported no weekly alcohol consumption, most admitted to binge drinking when they consumed alcohol (Borsari et al., 2007). Research suggests that as college students get older, they use drugs and alcohol less because they adopt healthier alternative coping skills over time (Skidmore et al., 2016).
Among college freshmen, new-found freedoms such as having access to alcohol at parties without parental supervision were the most cited reasons for binge drinking (Borsari et al., 2007; Livingston et al., 2011). Supervision and campus activities decrease the likelihood of college binge drinking among freshmen students (Skidmore et al., 2017). The transition from high school to college is often characterized by engaging in new “adult” behaviors like drinking, and half of all college students who binge drink report having started binge drinking shortly after moving to college (Wechsler & Nelson, 2008). Indeed, living environment is one of the most important social factors in how much alcohol college students drink. Freshmen males who lived with a roommate who drank in high school were more likely to binge drink than those living with non-drinking roommates (Skidmore et al., 2016; Neighbors et al., 2008). Students who live off-campus and in fraternity and sorority houses frequently engage in the highest levels of binge drinking on college campuses, likely because of the permissive norms surrounding drinking in off-campus and Greek life settings (Wechsler & Nelson, 2008). For instance, students living in fraternities tend to organize social interactions centered around heavy drinking, are more likely to perceive their friends as heavy drinkers, and report drinking more heavily than other student groups (Tyler et al., 2018).

Although leaving home to live independently in college is one of the most influential factors contributing to heavy alcohol use among college freshmen, close relationships between college freshmen and their parents appear to mediate the drinking behavior among college students (Livingston et al., 2011; Skidmore et al., 2016; Reimuller et al., 2011). Young adults internalize their parents’ attitudes toward drinking even when they are no longer under parental guidance, so college students tend to have similar drinking patterns and beliefs surrounding alcohol as their parents even when they are living at school away from family (Livingston et al.,
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2011). Low parental permissiveness of drinking tends to buffer the effects of peer influence and those students are less likely to be influenced by peer pressure (Livingston et al., 2011). When parents have more permissive attitudes or turn a blind eye to their child’s drinking habits, college students are more likely to drink heavily (Reimuller et al., 2011). For example, Livingston et al. (2011) found that freshmen college girls who were allowed to drink at home during their senior year of high school reported the highest levels of binge drinking during their first semester of college.

**Undergraduate Marijuana Use**

College students use marijuana more than any other illicit drug (Hartmann & McLeish, 2020; Sherburne, 2020). Marijuana use has increased steadily since 1999, with 50% of undergraduate students having used marijuana by their freshman year of college and 60% having used marijuana by their sophomore year (Skidmore et al., 2016). The prevalence of marijuana use among college students appears to vary depending on the year surveys are taken and the region of the country the students go to school. According to recent survey by the University of Michigan, 43% of college students have used marijuana within the past 12 months, 26.3% have used marijuana within the past 30 days, and almost 6% use marijuana daily (Sherburne, 2020). Another study found almost 30% of undergraduates used marijuana within the past 30 days (Yi & Guo, 2020). From 2006 to 2014, the proportion of college-aged adults who perceived regular marijuana use to carry “great risk” decreased from 58% to 35% (Pearson et al. 2017) and has continued to fall every year since (Yi & Guo 2020). This change may be due to more states legalizing recreational marijuana each year and marijuana use becoming more mainstream (Yi & Guo, 2020; Mason & Mennis, 2018).
College students’ marijuana use is most strongly influenced by the attitudes towards marijuana in the students’ immediate social group (LaBrie et al., 2011; Neighbors et al., 2008). Students with friends who use marijuana tend to also consume the drug and view its use as positive or without negative consequences. LaBrie et al. (2011) conducted an online study of college student marijuana use, approval of use, and perceived social approval in different reference groups and found that students who report higher levels of marijuana use tend to have higher levels of individual approval and perceived approval from close friends and parents. Neighbors et al., (2008) conducted a similar survey of undergraduate college students to assess how marijuana use is affected by social expectancies and found that college students are more likely to use marijuana the more friends they have who use it too. Pearson et al. (2017) conducted an online survey of over 8,000 undergraduate college students’ marijuana use and beliefs about the drug and found that college students overestimated the amount of marijuana the “typical” undergraduate consumed.

Unlike with alcohol, the transition from high school to college does not appear to cause an increase in marijuana use (White et al., 2006). One study, however, found that college students living in the same dorms may use marijuana similarly even if they do not spend time together (Yi & Guo, 2020). Teenage marijuana use is highest when adolescents live in an urban environment and their social group’s favorite place to socialize is also within an urban setting (Mason & Mennis, 2018). This can be translated to college students living off-campus at universities in urban locales being more likely to consume marijuana than college students at non-urban universities. Urban areas have more stressful visual and auditory stimuli like a lack of green spaces, blaring car horns, people yelling, and construction noises that are not present in non-urban locales; this combination of urban stressors has been shown to correlate with
increased substance use (Mason & Mennis, 2018). Yi & Guo conducted a study measuring the current and past marijuana use of undergraduate college students and their roommates to test the effects of living environment on marijuana use (2020). The study found a significant interaction between participants’ marijuana use and their roommates’ history of marijuana use. Students who used marijuana before college were more likely to use marijuana in college than peers who did not use marijuana in high school. Living with roommates who used marijuana before and during college had the least significant impact on participant’s increase in marijuana use. Participants reported the most significant increase in marijuana use when living with roommates who started using marijuana in college, with “never user” roommates also producing significant effects.

**Drug Use and Psychological Distress**

Jones et al. conducted a study in 2020 investigating the relationships between e-cigarette use and depression and found the relationships to be bi-directional. In comparison to non-vapers, college students who used e-cigarettes in the past (former users) and current vapers respectively were 1.6 times and 2.1 times more likely to self-report a prior history of depression (Jones et al., 2020). Current severity of depression in young adults can also be used to predict future levels of vaping (Jones et al., 2020).

Marijuana use among college students is negatively correlated with levels of emotional tolerance of sadness (Hartmann & McLeish, 2020). Tolerance of sadness is not the same as feeling sad; tolerance in this study refers to the psychological resilience needed to effectively deal with negative emotions without trying to escape them. According to Hartmann and McLeish, marijuana is often used as a coping mechanism to manage unwanted feelings of sadness, depression, and anxiety (2020). Hartmann and McLeish conducted a study on
undergraduate marijuana use and mood state and found that marijuana use is strongly associated with low tolerance of sadness and moderately associated with anxiety, fear, disgust, and anger (2020). The researchers also found that undergraduates who use marijuana for the purpose of coping with negative emotions are more likely to use more of the drug and develop problematic patterns of use than marijuana users who consume the drug for other reasons. Rumination of problem-focused thoughts is the depressive symptom most strongly correlated with high levels of marijuana use in undergraduate populations when those students have strong motivation to use coping strategies to eliminate the negative thoughts (Bravo et al., 2019).

Much like marijuana, college students drink more alcohol when dealing with negative mood states (Bravo et al., 2019). Many studies have established a positive correlation between heavy alcohol consumption and psychological distress among college students. One such study found that college students most often experience psychological distress in the form of anxiety, heavy stress loads, and/or depression, all of which are positively correlated with high levels of drinking (Lecher et al., 2020). College freshmen are most at risk for heavy drinking in response to psychological distress because they have not yet developed as many healthy coping strategies as older college students (Skidmore et al., 2016). College students with more depressive symptoms are more likely to use alcohol as a coping mechanism, especially when dealing with problematic thoughts and rumination (Bravo et al., 2019). Social support appears to moderate the effects of psychological distress in the short term but does not have an effect on alcohol consumption in distressed individuals over time (Lechner et al., 2020).

The current literature includes very little research on undergraduate substance use after the emergence of COVID-19, with the existing literature focusing solely on alcohol consumption
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(Lechner et al., 2020). The present study aimed to fill the gaps in the literature by measuring rates of marijuana, alcohol, and nicotine use of undergraduate students enrolled at the University of Vermont during the COVID-19 pandemic. There is a lack of current research of the differences in stress levels and substance use between college students living independently versus living with parents during the pandemic, which the present study aimed to measure. It was hypothesized that participants living at home with their families would report the lowest rates of distress and substance use and students living off-campus with peers would report the highest rates of distress and substance use. It was hypothesized that alcohol would be the most used substance among participants, followed by marijuana, vaping, and cigarettes, respectively. Psychological distress reported at the end of the semester was predicted to be positively correlated with past 30-day marijuana and alcohol use in the middle of the semester.

Methods

Participants

97 undergraduate students from the University of Vermont participated in this study in exchange for participation credit in an eligible psychological science course. All participants were college-aged young adults between the ages of 18 and 24 ($M = 19.75$, $SD = 1.182$). Most participants identified as female (82.5%), the largest minority identified as male (14.4%), and all other gender identities were represented at levels of 1% of the sample or less. The participant sample identified as 85.6% White, 6.2% Chinese, 2.1% Black or African American, and 1% or less of all other races. Participants were mostly non-Hispanic (95.9%). Most participants were out-of-state students (70.1%) with lesser numbers of in-state (24.7%) and international students (4.1%). Most participants were pursuing majors related to psychological science (79.4%). The three most common living arrangements reported by
participants were living on campus with roommates (36.1%), off campus with roommates (34%), and living off campus at home with family members (21.6%). Only 7 participants reported living alone (7.2%). 54.6% of participants reported taking classes in person with at least one meeting physically on campus, 18.6% reported in person learning status but all their courses met online, and 26.8% reported fully remote learning status.

**Materials**

*Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011)*

The AAQ-II is a 7-item measure of psychological inflexibility. The items are scored on a 7-point Likert scale (1-7) pertaining to how true the participant feels each item statement to be. The items in the AAQ-II relate to concepts of lack of emotional control, inability to deal with negative emotions, and anxiety related to feeling negative emotions. The scores in the AAQ-II were summed to find participant totals for each wave of the study, with a maximum score of 49 indicating the highest level of psychological inflexibility. Ruiz et al. (2013) reported high internal consistency for the AAQ-II, which discriminated between clinical and non-clinical groups and correlated substantively and in the expected direction with various measures of psychological symptoms and distress. Internal consistency in the present study was excellent at $\alpha = .92$.

*K-6 Distress Scale (K-6; Kessler et al., 2003)*

The K-6 is an externally validated 6-question measure of psychological distress. Question 1 contained 6 sub-items pertaining to components of psychological distress: nervousness, hopelessness, restlessness, depression, exhaustion, and worthlessness. The items are reverse-scored on a 5-point Likert type scale (1-5) indicating how much of the time the participant experiences the negative emotional states in the past 30 days. Question 2 asked
participants to rate how often they felt the distress indicated in question 1 compared to their usual mood on a 7-point Likert type scale (1-7) ranging from “a lot more often than usual” to “a lot less often than usual.” Questions 3 through 5 asked participants to record how many out of the past 30 days the distress indicated in question 1 impeded their ability to carry out daily functions (questions 3 and 4) and caused them to see a health professional (question 5). Question 6 asked participants to indicate how often their physical health caused the distress on the same 5-point Likert type scale used in the first question. Internal consistency in the present study was excellent at $\alpha = .88$.

**Substance Use**

The survey asked respondents to indicate whether they had ever smoked cigarettes, vaped, used alcohol or used marijuana, as well as whether they had done so in the last 12 months and the last 30 days. In addition, participants were asked to indicate how many times they had been drunk in the last 30 days, the average number of drinks they usually consumed per drinking episode, and whether they had engaged in binge-drinking in the last 2 weeks. Participants who indicated past 30-day marijuana use also reported the most common method they used to consume that marijuana.

**Procedure**

All data in this study were collected in a Qualtrics online survey posted to the University of Vermont’s SONA system, a web-based platform in which students enrolled in psychology courses can volunteer to participate in research studies. Data collection was divided into two waves. The first wave lasted between October 26 and November 4, 2020 and the second wave lasted from November 26 to December 8, 2020. The time lapse between the first and second administration was between 30 and 34 days. Participants received 1 hour of
credit for each of the two data wave collections. All data collection was conducted remotely and in compliance with the university’s COVID-19 safety protocols.

**Data Analysis**

The data in this study was analyzed through SPSS-v27 software. Descriptive statistics were gathered for the prevalence and frequency of participant marijuana, alcohol, cigarette, and e-cigarette use. Differences in 30-day use rates between the first and second wave were compared for each substance using the Chi-square statistic. In addition, a multiple regression analysis was conducted to prospectively predict psychological distress reported at the second wave from living arrangement, psychological inflexibility, past 30-day marijuana use, and past 30-day alcohol use during the first wave.

**Results**

**Descriptive Statistics**

**Lifetime Use Prevalence and 12-month Use Incidence**

More participants reported consuming alcohol at least once in their lifetime (89.7%, n = 87) than ever consuming marijuana (69.1%, n = 67), ever vaping (67%, n = 65), or ever smoking a cigarette (49.5%, n = 48). Similarly, twelve-month use rates were highest for alcohol (87.6%, n = 85), followed by marijuana (60.8%; n = 59), vaping (45.5%, n = 44), and cigarette smoking (39.2%, n = 38).

**Nicotine History**

In the first wave of the study only 17 participants (17.5%) reported past 30-day cigarette use and in the second round only 7 participants (7.2%) reported past 30-day cigarette use. Similar results were obtained for vaping, as 28 participants (28.9%) reported past 30-day vaping in the first wave of the study and only 15 reported past 30-day vaping in the second
wave of the study.

**Alcohol History**

In the first round of the study, 80.4% of participants reported past 30-day alcohol use (n = 78). In those 30 days, 18.6% of participants reported drinking 1 or 2 times, 22.7% drank between 3 and 5 times, 21.6% drank between 6 and 9 times, 13.4% drank between 10 and 19 times, and 20.6% drank 20 or more times. Of the participants who reported past 30-day alcohol use, 18.6% reported never being drunk within those 30 days (n = 18), 26.8% reported being drunk once or twice (n = 26), 18.6% reported being drunk 3-5 times (n = 18), 11.3% reported being drunk 6-9 times (n = 11), and 2.1% reported being drunk 10 to 19 times (n = 2).

Participants reported drinking an average of 3.35 drinks per sitting (SD = 1.712). alarmingly, almost half of the participants who reported drinking (42.5%, n = 32) consumed 4 or more standard drinks every time they drank alcohol, which meets the threshold for binge drinking. 52.5% of participants (n = 51) reported binge drinking within the past 2 weeks, with 44.3% of participants (n = 43) reported binge drinking once or twice and 8.2% (n = 8) reported binge drinking between 3 or more times.

In the second round of the study, 56.7% of participants reported past 30-day alcohol use (n = 55). 13.4% of those participants reported drinking 1 or 2 times in the past 30 days (n = 13), 15.5% reported drinking between 3 and 5 times (n = 15), 16.5% reported drinking between 6 and 9 times (n = 16), and 10.3% reported drinking 10 or more times (n = 10). 42 participants did not respond. Of the participants who reported past 30-day drinking, 20.6% reported never being drunk (n = 20), 15.5% reported being drunk once or twice (n = 15), 12.4% reported being drunk between 3 and 5 times (n = 12), 6.2% reported being drunk 6 to 9 times (n = 6), and 1 participant reported being drunk more than 10 times (1%). Participants
reported drinking an average of 3.09 drinks per sitting \((SD = 1.58)\), but 17 participants (17.6%) reported drinking 4 or more drinks every time they drank, meeting the binge drinking threshold. 35% of participants \((n = 34)\) reported binge drinking within the past 2 weeks, with 29.9% of participants \((n = 29)\) binge drinking once or twice and 5.1% \((n = 5)\) reported binge drinking 3 or more times.

**Marijuana History**

In the first round of the study, 46.5% of participants \((n = 45)\) reported past 30-day marijuana use. In those 30 days, 7.2% of participants \((n = 7)\) reported using marijuana once or twice, 5.2% \((n = 5)\) reported using 3 to 5 times, 8.2% \((n = 8)\) reported using 6 to 9 times, 9.3% \((n = 9)\) reported using 10-19 times, and 15.4% reported using 20 or more times \((n = 15)\). On the days participants used marijuana, they reported consuming it on average 1.47 times per day \((SD = 1.315)\), with 15 participants \((15.4\%)\) using marijuana more than once per day. Smoking is the most common way participants consume marijuana \((36.1\%, n = 35)\), with eating edibles \((5.2\%, n = 5)\) and using wax dabs \((5.2\%, n = 5)\) reported as less popular options.

In the second round of the study, 30.9% of participants \((n = 30)\) reported past 30-day marijuana use. In that 30-day period 6.2% \((n = 6)\) participants reported using once or twice, 5.2% \((n = 5)\) reported using 3 to 5 times, 3.1% \((n = 3)\) reported using 6 to 9 times, 7.2% \((n = 7)\) reported using 10 to 19 times, and 9.3% \((n = 9)\) reported using 20 or more times. On the days participants used marijuana, they consumed it an average of 1.67 times per day \((SD = 2.183)\). 14 participants \((14.4\%)\) reported consuming marijuana more than once on the days they used it. Of the participants who reported past 30-day marijuana use in the second round of the study, 80% \((n = 24)\) indicated smoking as the most common way they consumed marijuana and 20% \((n = 6)\) reported using other methods such as wax, dabs, and edibles.
Chi-Square Analyses Table 1

Chi-Square Results Comparing 30-Day Drug Use Incidence for Smoking, Vaping, Alcohol Use, and Marijuana Use

<table>
<thead>
<tr>
<th></th>
<th>Wave 1</th>
<th>Wave 2</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smokers</td>
<td>17.5%</td>
<td>7.2%</td>
<td>5.88*</td>
</tr>
<tr>
<td>Vapers</td>
<td>28.9%</td>
<td>15.6%</td>
<td>5.14*</td>
</tr>
<tr>
<td>Alcohol Users</td>
<td>80.4%</td>
<td>56.7%</td>
<td>5.80*</td>
</tr>
<tr>
<td>Marijuana Users</td>
<td>46.5%</td>
<td>30.9%</td>
<td>5.00*</td>
</tr>
</tbody>
</table>

Note: Critical value for 1 df = 3.83 (*all statistics significant at the $p < .05$)

Four Chi-square tests compared use rates between the first and second wave administrations. These tests revealed that students reported less use rates for each of four substances the during the second round of data collection (see Table 1).

Multiple Regression Analyses

A multiple regression analysis prospectively predicted psychological distress using living arrangement, psychological inflexibility scores, past 30-day marijuana use, and past 30-day alcohol use reported during the first wave of the study. Participants’ current living arrangement at the time of data collection was dichotomized as living with family (Home) and living on their own either in the dorms or by themselves (Own) and dummy coded as living at Home (0) on their Own (1). Similarly, past 30-day marijuana and alcohol use were dichotomized, and dummy coded as non-User (0) and User (1). The variables were entered in three blocks to examine the added variance explained at each block. In the first block is living
arrangement, which was not predictive of psychological distress ($R^2 = .01; p = .43$).

Inflexibility reported in wave one was then added to the model. Inflexibility contributed significantly and added substantive change to the model ($R^2 = .34; p < .001$). Finally, marijuana and alcohol were entered together, and they also significantly improved the model ($R^2 = .09; p = .01$). The results, with all the variables simultaneously competing to predict psychological distress, revealed that only psychological inflexibility ($B = .58, t = 5.88, p < .001$) and marijuana use ($B = .28, t = 2.92, p < .005$) at time 1 were significant predictors of psychological distress at the second wave (time 2).

**Discussion**

The current study aimed to measure the differences in substance use and psychological distress among undergraduate UVM students living in different environments during the COVID-19 pandemic. This study found alcohol to be the most consumed substance and marijuana to be the second most consumed substance measured as student lifetime use, past 12-month use, and past 30-day use in both rounds of data collection. These findings support those of other researchers identifying alcohol and marijuana as the most used substances on college campuses (Skidmore et al., 2016; Windle et al., 2017). Marijuana and alcohol use rates declined over time. Lifetime use rates were the highest for all substances measured, and past 30-day use rates reported in both waves of the study were lower than past 12-month and lifetime use. Cigarette and e-cigarette use were less prevalent than alcohol and marijuana use across all living environments in this study, with cigarettes used the least frequently. The findings in this study support the hypothesis that alcohol would be the most consumed substance, followed by marijuana, e-cigarettes, and cigarettes, respectively. Participants reported significantly lower rates of use for every substance measured during the second round
of data collection, as shown in Table 1. This significant decrease in substance use may be due to the timing of the second wave of data collection coinciding within two weeks before the fall semester’s final exam period. Although increased levels of stress and anxiety are normally correlated with higher levels of substance use, college students tend to cut back on alcohol and marijuana use in the weeks leading up to final exams (Noel & Cohen, 1997).

Lifetime and past 12-month rates of cigarette use in this study were higher than those found in other studies of undergraduate substance use, but past 30-day rates of cigarette use in this study are closer to those estimated by current research (Sherburne, 2020; Skidmore et al., 2016). This may be due to the fact that women are more likely to smoke cigarettes than men (Skidmore et al., 2016), and the sample in this study is comprised of roughly 83% women. Although more participants in this study reported vaping than smoking cigarettes, the lifetime, past 12-month, and past 30-day levels of vaping reported in this study were lower than those reported by other researchers (Sherburne, 2020). It is unclear whether this finding is unique to our sample, but the pattern found of vaping being more popular than smoking among this population coincides with recent trends found among young populations (Jones et al., 2021).

Alcohol was the most used substance in this study, with lifetime, past 12-month, and past 30-day rates of use comparable to those found in other studies (Lechner et al., 2020; Tyler et al., 2018). Although current research suggests a positive correlation between psychological distress and alcohol consumption in undergraduate students (Lechner et al., 2020), 30-day alcohol use was not prospectively predictive of psychological distress in the present study. The hypothesis of a positive correlation between 30-day alcohol use and psychological distress was not supported by the data in this study. Rates of alcohol use were very high throughout both
waves of data collection, so the lack of correlation between alcohol use and future psychological distress is not surprising. Students already consuming high amounts of alcohol may have increased their marijuana use in response to increased psychological distress, indicated by the results of the multiple regression analysis. There was some overlap between past 30-day marijuana and alcohol use, however there were much higher levels of past 30-day alcohol use in both rounds of the study so it cannot be assumed that all alcohol users consumed or increased use of marijuana. This study could not determine whether student substance use was affected by the pandemic because data was not collected for substance use prior to the emergence of COVID-19. COVID-19 emerged within the 12 months prior to both rounds of data collection, so it is unclear whether past 12-month use rates are reflective of pre-pandemic substance use.

Current estimates of undergraduate lifetime and past 12-month marijuana use vary, but the levels of use found in this study are considerably higher than the highest estimates suggested by other recent studies (Sherburne, 2020; Skidmore et al., 2016). The rates of past 30-day marijuana use in this sample were almost twice those found in other studies (Hartmann & McLeish, 2020), even after considering the significant decrease in use between the first and second round of data collection. Marijuana use may be more prevalent among the sample in the present study because the student cultural norms at UVM may be more permissive of marijuana use than those at other universities. The high levels of marijuana use may also be due to recreational marijuana being legal in the state of Vermont. Marijuana use is on the rise among college students, especially within states which have legalized the use of recreational marijuana (Yi & Guo, 2020). College students experienced higher levels of anxiety and depression symptoms following pandemic-related campus closures and stay-at-home orders.
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(Lechner et al., 2020), which may be another contributing factor to the unusually high rates of marijuana use observed in this study. Results from the multiple regression analysis supported the hypothesis that past 30-day marijuana use was positively correlated with impending psychological distress. There were no significant associations between psychological distress and living situation in this sample, thus the hypothesis was not supported. Levels of substance use were higher among participants living with peers on or off campus than living at home with family, however the differences were not statistically significant, so the hypothesis was not supported. Unfortunately, there is no recent comparative data from similar samples conducted prior to the emergence of COVID-19.

Limitations

This study faced multiple limitations, one of which being that it was retrospective. Participants were asked to recall past substance use, which may be less accurate than if they had recorded weekly totals over time to measure changes in use. Although this study established significant correlations between past 30-day marijuana use, psychological inflexibility, and future psychological distress, causality cannot be established because this study was not a true experiment. The sample for this study did not contain 30 or more participants in each living situation, past 30-day cigarette smokers, or past 30-day vapers. Neither past 30-day cigarette use, nor past 30-day vaping could not be included in the multiple regression analysis due to those insufficient sample sizes. Chi-square statistics also could not be reliably determined for past 30-day substance use among participants living alone on or off campus because too few participants reported living in either situation. The participant sample was mostly comprised of white women, so the results of the study are not highly generalizable to the American undergraduate population. As prior research indicates, men and women
typically show different patterns of substance use, with male undergraduates consuming more alcohol and marijuana than their female peers (Tyler et al., 2018). A sample with an even gender distribution may provide a more comprehensive study of the differences in substance use between living environments. The participants in this study also were mostly psychology majors, which may have yielded different results than if the sample had included participants from a more diverse array of majors and minors. The introductory psychology courses at UVM discuss the effects of substance use and abuse on the brain, so the students in this sample may be more aware of the dangers of substance use than the typical UVM student.

Future Research

It is recommended that this study be replicated with a larger and more diverse group of participants to increase the generalizability of the results. A larger sample size may also allow future researchers to determine any differences in undergraduate smoking and vaping behavior between living environments. It is advised that replications of this study begin measuring student drug use early, midway, and at the end of the semester to better understand how substance use and psychological distress correlate over time. Future iterations of this study may benefit from measuring frequency of substance use on a continuous scale, versus in groups (1-2 times, 3-5 times, etc.). Replication of this study is also recommended to be conducted in a state before and after the legalization of recreational marijuana to determine if legalization has an effect on the popularity of marijuana use. Future research is also needed to determine the effects of stress caused by the COVID-19 pandemic on undergraduate substance use, as this was not an aim of the present study.
References


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