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Differential Impacts of Economic and Demographic Variables on Substance Use Patterns During the COVID-19 Pandemic

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Abstract

Background: The COVID-19 pandemic and subsequent economic crisis has provided a unique opportunity to investigate the effects of economic shifts on substance use. Existing literature on this relationship is limited and conflicting, warranting further exploration.

Objective: This study aimed to identify relationships between socioeconomic status (SES), demographic variables, and substance use patterns before and after government-mandated business closures due to COVID-19.

Methods: Participants were recruited based on self-reported substance use through Amazon's Mechanical Turk (MTurk). Qualifying participants (N = 315, 43% female, *mean* age = 35.35) reported their substance use and SES for two-week periods before and after pandemic-related business closures. Regression models analyzed relationships between substance use and study variables.

Results: Regression models found that, during COVID-19 closures, greater financial strain predicted decreased benzodiazepine (β = −1.12) and tobacco (β = 1.59) use. Addionally, certain predictor variables (e.g., participants' age [β = 1.22], race [β = −4.43], psychiatric disorders including ADHD [β = −2.73] and anxiety [β = 1.53], and concomitant substance use [β = 3.38]) predicted changes in substance use patterns; however, the directionality of these associations varied across substances.

Conclusion: Specific substance use patterns were significantly and differentially impacted by economic strain, psychiatric diagnoses, and concomitant substance use. These results can help

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direct harm reduction efforts towards populations at greatest risk of harmful substance use following the pandemic.

1. Introduction

The novel coronavirus (SARS-CoV-2) spurred a deleterious cascade of economic upheaval as exemplified by the largest single-day loss for the Dow Jones Industrial Average on March 16th, 2020 (1). Governments mandated business closures in spring 2020 to mitigate the spread of the virus. Although these closures were necessary to protect public health given our lack of understanding at the time about how the virus is spread, millions became unemployed or underemployed, contributing to severe economic downturn (2). For example, 32% of Americans did not make complete housing payments in July 2020 (3).

Studies assessing substance use patterns during the COVID-19 pandemic have been limited in number and scope. The available data demonstrated increased alcohol consumption among people who display high emotional nonacceptance while under financial strain (4), and broadly among U.S. healthcare workers (5) and Canadian adolescents (6). Similarly, few studies have examined relationships between prior economic shifts and substance use and have yielded conflicting results (7–9). Poverty is generally associated with higher incidence of harmful substance use (9–11). Economic downturns may precipitate greater substance use because individuals seek means to cope with the distress of unemployment, reduced finances, and/or poor job prospects (12). Conversely, financial crises have sometimes correlated with reduced substance use overall, possibly because individuals have less money to spend on substances (7,9). Studies have identified independent demographic and substance-specific effects on substance use during economic downturns. For instance, although economic downturns have been associated with decreased alcohol consumption nationally, alcohol and other substance use can increase concomitantly among vulnerable sub-populations, particularly those already unemployed (8,9). Men may also be especially prone to engage in problematic substance use following financial trouble (7).

The goal of this exploratory study was to further characterize the relationship between economic downturns and substance use in general and identify populations at greatest risk of hazardous substance use during the COVID-19 crisis in particular. To this end, we surveyed US adults regarding their socioeconomic status (SES) and substance use before and during mandatory business closures in 2020. Participants also reported demographic data and mental health diagnoses. Data were collected via Amazon.com's Mechanical Turk (MTurk), a crowdsourcing platform which yields findings in close correspondence with traditional survey samples from substance use research (13–17). MTurk has been increasingly employed for psychological research throughout the past decade, including addiction sciences (17). Crowdsourcing, in the context of this paper, permits presentation of a research opportunity instantaneously to a large online human work force, which can be completed in exchange for compensation. Exact data are not available to the public, but Amazon estimates this work force is comprised of 500,000 worldwide (18). Although the sample is non-random, this platform offers many advantages (17), in particular the ability to conduct this research remotely during the COVID-19 pandemic.

2. Materials and Methods

2.1. Participant Sampling

Participants were sampled from MTurk and had to be US residents with a ≥ 95% approval rating on ≥ 100 previously approved tasks (19). All participants were informed about the study and agreed to participate through an electronic cover letter. To maintain confidentiality, a waiver for documentation of informed consent was obtained. The cover letter and protocol were approved by the University of Kentucky Institutional Review Board (IRB#: 60067).

2.2. Procedures

Participants completed an initial screening questionnaire. To qualify, participants had to 1) be ≥ 21 years old, 2) endorse using at least one substance besides tobacco in the last year, and 3) have practiced social distancing during the COVID-19 pandemic. Qualifying participants who completed the survey received US $4.05. Attention and validity checks were used to identify inconsistent or inattentive respondents. For example, participants reported their demographic information at the beginning and end of the survey, and their responses were checked for consistency. Responses ≥ 4 standard deviations from the mean were considered outliers. Participants' data were excluded from analysis when an attention check was failed or responses on a primary study variable were omitted or deemed outliers. Outliers were removed, as retaining them caused the dataset to violate assumptions of the regression analyses. Many outliers were also likely reporting errors, based on improbable amounts of substance consumption (e.g. 430 doses of amphetamines in a two-week time period). The final sample size was N = 315.

2.3. Measures

2.3.1. Substance Use—Participants completed a Timeline Followback (TLFB) questionnaire (20) for each substance they endorsed using at initial screening, in which they reported the amount consumed per day for two separate two-week periods shortly before and after government-mandated business closures were effected (February 16th-February 29th, 2020 and April 17th-April 30th, 2020). Participants' total consumption and frequency of use of each substance endorsed were derived from these responses. Consumption was quantified as the number of standardized doses a participant endorsed using. For each substance, doses were standardized according to informal units of measure commonly referenced by people who use that substance, in an effort to better capture total use compared to relying on participants to accurately report use in more formal units of measure (e.g., grams). These doses were defined as: (Tobacco) number of cigarettes; use of non-cigarette tobacco products was converted to the approximate equivalent number of cigarettes based on the average amount of nicotine in these products compared to cigarettes (21,22), (Alcohol) number of alcoholic drinks (e.g., 1 drink = 12oz beer, 5oz wine, 1 shot liquor), (Cannabis) number of blunts/joints (reported in ½ joint increments; participants were asked to report smoked/inhaled cannabis use only and were not surveyed about other routes of cannabis or other cannabinoid use), (Cocaine/Crack) number of hits (i.e., one hit = 1 inhalation, 1 injection, 1 line of powder), (Amphetamines, Opioids, and Benzodiazepines) number of hits

(i.e., one hit = 1 inhalation, 1 injection, 1 line of powder, 1 pill). Frequency of use was defined as the number of days when any use occurred within the periods sampled.

2.3.2. SES and Demographics—Participants completed a battery of previously published questionnaires assessing subjective measures of SES for the months of February 2020 ("Before COVID-19") and April 2020 ("During COVID-19"). These questionnaires included: the Economic Strain Questionnaire (23,24), the MacArthur Scale of Subjective Social Status ("MacArthur SSS Scale") (25), and surveys assessing housing affordability (26), how often necessary items were not affordable (27), overall affordability of basic expenses (28), and subjective SES by participants' ability to buy desired items and their general concerns about money (29). Scores varied in scaling and directionality across questionnaires and therefore were treated as separate variables for analysis. Objective measures of SES (e.g., monthly household income and employment status) were also collected. Additionally, participants self-reported demographic information and any current mental health diagnoses.

2.4. Data analysis

Descriptive statistics were first calculated for demographic, SES, and substance use variables. Then, for each substance, the number of days ("Frequency") and amount ("Total") a participant used throughout each two-week time period were calculated. Paired samples t-tests were conducted to assess mean differences in participants' reported amount and frequency of substance use before and during mandatory business closures due to COVID-19. Likewise, changes in participants' objective and subjective measures of SES following business closures were evaluated using paired samples t-tests. Adjustments for multiple comparisons were not performed. Then, backwards stepwise regression techniques, utilizing AIC as the variable inclusion criteria, were used to develop a best-fitting model to identify variables that predicted the amount and frequency of substance use during COVID-19. Variables were either added or removed from the models to bring AIC to a minimum. These models were applied to substances which showed significant changes in consumption before and during COVID-19, as determined by the aforementioned t-tests. These models also controlled for the amount and frequency of substance use before COVID-19 and demographic variables such as age, sex, race, and employment status. All tests were conducted at the $\alpha = 0.05$ significance level.

3. Results

3.1. Demographics

Participant demographics and characteristics are shown in Table 1. Participants were 35 years old, on average, with the majority being male (57%), white (66%), and college educated (77%).

3.2. Socioeconomic Status

Paired t-tests revealed a significant negative impact of COVID-19 on several SES measures. These measures included: monthly income ($p < 0.0001$), Economic Strain ($p < 0.0001$), MacArthur SSS Scale ($p = 0.0016$), difficulty affording housing ($p < 0.0001$), difficulty

affording the basics ($p < 0.0001$), frequency that necessary goods were unaffordable ($p < 0.0001$), and the general subjective SES measure ($p < 0.0001$).

3.3. Non-Significant Changes in Substance Use

Paired t-tests did not reveal significant differences in the total amount or frequency of some surveyed substances consumed before and during COVID-19, specifically alcohol ($p = 0.38$), cannabis ($p = 0.07$), cocaine ($p = 0.06$), and amphetamines ($p = 0.08$). Therefore, these substances were excluded from further analyses by regression models.

3.4. Tobacco/nicotine

3.4.1. Paired t-tests—Paired t-tests revealed a significant decrease in the total amount (mean ± SD) of tobacco/nicotine products consumed during COVID-19 (91.01 ± 97.43) relative to before COVID-19 (110.3 ± 95.05); $t(169) = 3.67$, $p < 0.001$. Frequency of tobacco/nicotine products used also decreased significantly during COVID-19 (11.45 ± 4.76) relative to before COVID-19 (12.6 ± 3.44); $t(169) = 4.68$, $p < 0.0001$. (Table 2)

3.4.2. Predictive Models—Table 2 shows the estimated coefficients for predictors of change in total amount and frequency of tobacco/nicotine consumption, controlling for demographic variables. Results indicate while tobacco use reduced in aggregate, participant age, better affordability of housing, and alcohol use during COVID-19 were significant predictors of increased tobacco use during COVID-19. Conversely, current ADHD diagnosis and identifying as East-Southeast Asian were significant predictors of reduced tobacco use. There was also a consistent, significant positive relationship between tobacco/nicotine use before COVID-19 and after COVID-19.

3.5. Opioids

3.5.1. Paired t-tests—Paired t-tests revealed frequency of opioid consumption decreased significantly during COVID-19 (9.86 ± 5.50) relative to before COVID-19 (10.48 ± 4.96); $t(76) = 2.21$, $p = 0.03$, whereas total use did not change appreciably ($p = 0.27$; Table 2).

3.5.2. Predictive Models—A fitted model revealed frequency of opioid consumption during COVID-19 was significantly predicted by opiate consumption before COVID-19. No other socio-economic or demographic variables were significant in this model.

3.6. Benzodiazepines

3.6.1. Paired t-tests—Paired t-tests revealed frequency of benzodiazepine use decreased significantly during COVID-19 (9.62 ± 5.54) relative to before COVID-19 (10.25 ± 5.10); $t(76) = 2.14$, $p = 0.036$, whereas total consumption did not change significantly ($p = 0.15$; Table 2)

3.6.2. Predictive Models—A fitted model revealed unemployment and more difficulty affording the basics during COVID-19 were significant predictors of reduced frequency of benzodiazepine consumption during COVID-19 (Table 2). The model also showed current anxiety diagnosis and identifying as either West Asian or of African descent were significant

predictors of increased frequency of benzodiazepine use during COVID-19. Frequency of benzodiazepine use during COVID-19 was also significantly predicted by consumption before COVID-19.

4. Discussion

The present study sought to identify differential impacts of SES and other demographic variables on substance use patterns in response to events surrounding the COVID-19 pandemic. Although most measures of economic stability reduced in our sample overall, changes in substance use patterns were not consistent and depended on participants' socioeconomic and demographic status, as well as which substance(s) they used.

Contrary to observations during the 2008 recession, aggregate tobacco consumption decreased in our sample during COVID-19, but higher SES predicted increased consumption. Stress can promote the use of tobacco; therefore, it is plausible consumption could increase during a global pandemic and ensuing economic crisis (30). One possibility is participants with higher SES could more easily afford cigarettes, whereas the remainder of the sample reduced their use due to general concerns over affordability. However, this does not account for the reversal in overall trends between the present and previous downturns. There were also differences in sampling interval and geography between the present study and observations during the 2008 recession that complicate direct comparisons (31). Further considerations of differences in these trends are addressed in the following paragraph below. Other measures not directly related to SES also predicted changes in tobacco use. For instance, participants who identified as East-Southeast Asian were more likely to reduce their use during COVID-19. Current ADHD diagnosis also predicted reduced frequency of tobacco use, contrary to established correlations between ADHD symptomology and tobacco use (32). Interpretation of these findings are limited due to the small sample size. Only 3% of our sample (n = 10) reported an ADHD diagnosis, which is similar to current estimates of the prevalence of adult ADHD (2.8%) (33). On the other hand, our models showed participants who were older and/or reported concomitant alcohol use tended to increase their tobacco use during the lockdown. While recent surveys have not shown a consistent pattern between aging and increased tobacco use, our results are consistent with observations that concurrent alcohol use precipitates greater tobacco consumption (34). Other surveyed substances displayed different patterns of use compared to tobacco. For example, total frequency of opioid consumption decreased during COVID-19 (though no predictors of changes in use were identified), which is contrary to previous findings that opioid use increased as economic stability waned (35). This incongruity cannot be adequately explained by the present study and warrants further investigation. We also observed decreased frequency of benzodiazepine use on average across our sample during COVID-19, but increased frequency among specific sub-groups. Participants who endorsed current diagnosis of an anxiety disorder, or identified West Asian or of African descent were more likely to use non-prescribed benzodiazepines more often. Of note, it is possible increased use of anti-anxiety drugs among these racial groups might be connected, at least in part, to the recent spike in the incidence of hate crimes against minorities (36).

Discrepancies between the present findings and previous studies may be influenced by the unique factors underlying each financial crisis. That is, the factors driving a given economic shift (e.g., a housing market crash versus global pandemic) may impact substance use independently of the economic shift itself. Critically, previously studied economic crises were not characterized by simultaneous and compulsory restrictions on social interaction. Both social interaction and isolation have been shown to influence substance use, though the characteristics of a person's social structure and the context in which substances are used must also be considered (37,38). Isolation, as measured by low social integration, has been linked to greater risk of engaging in heavy substance use (39). On the other hand, isolation limits substance use that would normally occur in social contexts. Given that tobacco use has been found to increase in group settings, social isolation could have contributed to the overall reduction in tobacco use observed in this study (40). Social distancing measures restricted in-person interaction (for those who were compliant) to coworkers and cohabitants. It is possible people in turn spent more time at home with family or other contexts that discouraged substance use during COVID-19 than with the social circle(s) in which they typically used drugs, thereby reducing their substance use (37). Another possibility is those who cohabitated with other substance users or individuals permissive of use might have increased their use during COVID-19 (41). Moreover, conflict can serve as a substance use trigger, so the interpersonal dynamics within a given housing situation or work environment during the lockdown could have further altered the relationship with substance use (41). Consistent with the notion that these factors could yield substantial variability in changes in substance use during COVID-19, the IQR for change in total consumption of all substances surveyed encompassed both reduced and increased use. We collected data on the number of people with whom participants cohabitated, but not the qualitative aspects of these relationships, nor did we ask participants about relationships they maintained remotely. Social distancing measures could have also inadvertently attenuated use of illegal substances use by disrupting in-person transactions, but this was not addressed in our study. Similarly, we did not inquire about participants' local policies regarding social distancing, including closure of liquor stores or medicinal/recreational cannabis dispenseries. Future studies should more thoroughly explore the contributions of these factors.

Most measures of SES decreased across the two timepoints in our sample overall, which is notable considering 91.75% of participants remained employed in some capacity during the periods sampled, suggestive of underemployment. It is therefore unlikely unemployment payments and the accompanying $600 increase to payments for US adults substantially affected our results, though this remains a possibility. However, given nearly the entire sample was employed, our results are not necessarily applicable to substance use among individuals who were unemployed during the pandemic. Future studies are needed to properly assess this population. This study sample was also characterized by demographics that resembled a W.E.I.R.D. population (Western, Educated, Industrialized, Rich, and Democratic) (42,43). People who use substances are diverse and were not fully represented here, which limits generalization of these findings. Nevertheless, we found belonging to certain minority groups predicted significantly more frequent tobacco and benzodiazepine use despite deriving these findings from a non-representative sample. These results suggest the extent to which marginalized groups have been vulnerable to substance use during

COVID-19 has likely been greater than we observed, highlighting the need for future research in these communities. Consider also the time periods within which participants reported their substance use. Given the sudden onset of the COVID-19 economic crisis, we surmised that surveying two-week periods before and shortly after business closures would adequately capture acute changes in substance use patterns. However, previous research has often sampled over longer periods, such as the annual estimates produced by the National Survey on Drug Use and Health (NSDUH) (44). Particularly germane is a recent finding demonstrating an association between subjective financial strain and problematic alcohol use during the COVID-19 pandemic, when measured across a longer time frame (4). The present study is distinct from this previous research because change in alcohol use was assessed using self-reported consumption during the two-week time periods assessed. Since this recent finding assessed problematic alcohol use using a continuous index, these differing methods may explain these inconsistent results. Collectively, these variables provide possible explanations for why significant changes in alcohol, amphetamine, cocaine and cannabis consumption were not observed, despite increases in the use of those substances being observed during the current and previous financial crises (5,6,45).

Substance use patterns during economic downturns remain understudied. The present results from this exploratory study add to the existing literature and illustrate the need to further characterize how macroeconomic shifts affect substance use patterns and how the factors undergirding these downturns contribute uniquely to these behaviors. Our results also emphasize the need to further examine if substance use intensifies in certain vulnerable groups during these economic downturns regardless of the causes of the crises, which could assist in directing public health responses to economic hardship.

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Table 1.

Demographics, Socioeconomic Status, and Reported Substance Use.

	Mean / % Endorsed	IQR	Before-COVID Mean	Before-COVID IQR	During-COVID Mean	During-COVID IQR	Mean Δ	IQR Δ
Demographics[a]								
Age	35.35	28.25–41						
Female	43%							
White	66%							
Hispanic	16.51%							
African Descent	14.65%							
East-Southeast Asian	5.1%							
West Asian	1.24%							
Other	3.05%							
College Degree (Associates or Higher)	77%							
Current Diagnosis of:								
Anxiety	18%							
Depression	20%							
Bipolar Disorder	5%							
Schizophrenia	1%							
ADHD	3%							
PTSD	5%							
Socioeconomic Status[b]								
Lost Job Due to COVID-19 Related Business Closures	10%							
Employed Full-Time During COVID-19	68%							
Unemployed During COVID-19	8.25%							
Household Monthly Income (US Dollars)			13899	2500 – 10500	7709	1800 – 6000	−7116***	−2550 – 0
Questionnaires:								
Financial Strain Score (Scale: 8–24) (↑Score = ↓SES)			12.13	8 – 16	13.35	8 – 16.75	1.22***	0 – 2
MacArthur SSS Scale (Scale: 1–10) (↑Score = ↓SES)			5.32	4 – 7	5.6	4 – 7	0.27***	0 – 1
Difficulty Affording Housing (Scale: 0–1) (↑Score = ↑SES)			0.6	0 – 1	0.46	0 – 1	−0.131***	0 – 0
Difficulty Affording the Basics (Scale: 0–1) (↑Score = ↑SES)			0.66	0 – 1	0.51	0 – 1	−0.13***	0 – 0
Frequency Could Not Afford Necessary Goods (Scale: 1–4) (↑Score = ↓SES)			1.943	1 – 3	2.422	1 – 3	0.48***	0 – 1

	Mean / % Endorsed	IQR	Before-COVID Mean	Before-COVID IQR	During-COVID Mean	During-COVID IQR	Mean Δ	IQR Δ
Used Less Medication Due to Cost (Scale: 1–4) (↑Score = ↓SES)			1.717	1 – 2	1.689	1 – 2	−0.03	0 – 1
Subjective Socioeconomic Status (Scale: 1–9) (↑Score = ↑SES)			6.27	5 – 8	5.47	3.33 – 7.33	−0.796***	−2.67 – 1.33
Substance Use[c]								
Tobacco Use in Past Year	55%							
Started Using Tobacco During COVID-19	1.80%							
Stopped Using Tobacco During COVID-19	7.10%							
Tobacco Use (Total Products Consumed)			110.3	36 – 152	91.01	18 – 140	−19.25***	−28.75 – 3.75
Tobacco Use (Frequency of Use)			12.6	14 – 14	11.45	12 – 14	−1.153***	−0.750 – 0
Alcohol Use in Past Year	95.50%							
Started Using Alcohol During COVID-19	3.40%							
Stopped Using Alcohol During COVID-19	7.90%							
Alcohol Use (Total)			27.79	5.75 – 33	26.78	4 – 36.25	−1.01	−5.25 – 3
Alcohol Use (Frequency)			7.247	3 – 13	7.329	2 – 14	0.08219	−1 – 1
Cannabis Use in Past Year	49.70%							
Started Using Cannabis During COVID-19	3.20%							
Stopped Using Cannabis During COVID-19	4.50%							
Cannabis Use (Total)			25.205	4.785 – 32.750	25.71	3.50 – 36.38	0.5032	−3.125 – 3
Cannabis Use (Frequency)			10.1	5.75 – 14	9.731	5 – 14	−0.3718	0 – 0
Cocaine Use in Past Year	21.70%							
Started Using Cocaine During COVID-19	0%							
Stopped Using Cocaine During COVID-19	4.50%							
Cocaine Use (Total)			70.41	9.25 – 113.5	74.27	5.25 – 120.25	3.864	−7.750 – 6.5
Cocaine Use (Frequency)			10.62	7.25 – 14	10.15	5 – 14	−0.4697	0 – 0
Amphetamine Use in Past Year	19.43%							
Started Using Amphetamines During COVID-19	0%							
Stopped Using Amphetamines During COVID-19	5%							

	Mean / % Endorsed	IQR	Before-COVID Mean	Before-COVID IQR	During-COVID Mean	During-COVID IQR	Mean Δ	IQR Δ
Amphetamine Use (Total)			66.68	13.25 – 108.25	76.8	9.75 – 119.75	10.12	−4.25 – 26
Amphetamine Use (Frequency)			10.87	8.75 – 14	10.58	8.25 – 14	−0.2833	0 – 0
Opioid Use in Past Year	25%							
Started Using Opioids During COVID-19	1%							
Stopped Using Opioids During COVID-19	7.8%							
Opioid Use (Total)			66.84	9 – 106	63.17	6 – 112	−3.675	−8 – 5
Opioid Use (Frequency)			10.48	7 – 14	9.857	5 – 14	−0.6234***	−1 – 0
Benzodiazepine Use in Past Year	25%							
Started Using Benzodiazepines During COVID-19	1.30%							
Stopped Using Benzodiazepines During COVID-19	6.50%							
Benzodiazepine Use (Total)			63.88	8 – 109	58.86	6–98	−5.026	−10 – 2
Benzodiazepine Use (Frequency)			10.25	6 – 14	9.623	5 – 14	−0.6234***	0 – 0

For variables shown in Table 1, “Mean/% Endorsed” = the mean value or the percent of qualifying participants who endorsed that variable, “IQR” = Inter Quartile Range, “Before COVID-19” = data pertaining to conditions or behaviors before COVID-19 related business closures, “During COVID-19” = data pertaining to conditions or behaviors after COVD-19 related business closures, “Mean Δ” = the mean of the differences between During COVID-19 – Before COVID-19 values, and “IQR Δ” = The Inter Quartile Range of these measures.

[A] *Demographics*. Qualifying participants reported their status across a wide range of demographic variables. A subset of those data are shown here.

[B] *Socioeconomic Status*. Participants reported several aspects of their job status and household income, and also completed a battery of surveys to assess their SES before and during COVID-19. A subset of those data are shown here. For each questionnaire, score scales and directionality of those scales are shown. Significant changes in scores or values over time, as assessed by paired t-tests, are denoted by (***, $p \leq 0.05$).

[C] *Substance Use*. For each substance investigated, we report first the percent of qualifying participants who endorsed any use within 365 days (i.e., “Use in Past Year”). Subsequent measures for each substance were derived from Timeline Followback responses made by participants who endorsed use. “Started Using” refers to participants who endorsed using a substance during but not before COVID-19, whereas “Stopped Using” refers to participants who endorsed using a substance before but not during COVID-19. “Total” use refers to the aggregate amount of substance consumed during each of the time periods surveyed. “Frequency” of use was defined as the number of days when any use occurred within the sampling period. Significant changes in total or frequency of use over time, as assessed by paired t-tests, are denoted by (***, $p \leq 0.05$).

Table 2.

Predictive Models.

	Total Tobacco Use			Frequency Tobacco Use			Frequency Opioid Use			Frequency Benzodiazepine Use	
	Beta Coefficient (β)	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**
Total Tobacco Use Before COVID-19	0.72***	(0.61, 0.83)	**Frequency Tobacco Use Before COVID-19**	0.99***	(0.82, 1.17)	**Frequency Opioid Use Before COVID-19**	0.99***	(0.83, 1.15)	**Frequency Benzodiazepine Use Before COVID-19**	0.82***	(0.72, 0.92)
Demographics			**Demographics**			**Demographics**			**Demographics**		
Age	1.22***	(0.07, 2.36)	Age	−0.01	(−0.06, 0.05)	Age	−0.04	(−0.10, 0.03)	Age	−0.02	(−0.7, 0.02)
Female	13.98	(−9.2, 37.16)	Female	0.04	(−1.08, 1.15)	Female	1.14	(−0.36, 2.64)	Female	0.45	(−0.55, 1.46)
Concomitant Alcohol Use	47.21	(−8.61, 103.03)	Concomitant Alcohol Use	3.38***	(0.72, 6.05)	Number of People in House During COVID-19	0.33	(−0.17, 0.84)	Current Anxiety Diagnosis	1.53***	(0.26, 2.79)
		Current ADHD Diagnosis	−2.73***	(−5.15, −0.31)							
Race/Ethnicity			**Race/Ethnicity**			**Race/Ethnicity**			**Race/Ethnicity**		
White vs. African Descent	−5.87	(−38.03, 26.3)	White vs. African Descent	0.12	(−1.42, 1.66)	White vs. African Descent	1.31	(−0.37, 2.99)	White vs. African Descent	1.96***	(0.76, 3.17)
White vs. East/ Southeast Asian	−13.28	(−84.04, 57.49)	White vs. East/ Southeast Asian	−4.43***	(−7.81, −1.06)	White vs. East/ Southeast Asian	1.45	(−3.91, 6.81)	White vs. East/ Southeast Asian	1.17	(−2.62, 4.96)
White vs. West Asian	4.25	(−71.57, 80.06)	White vs. West Asian	0.86	(−2.77, 4.48)	White vs. West Asian	3.36	(−2.45, 1.45)	White vs. West Asian	4.13***	(0.24, 8.04)
White vs. Hispanic	−4.24	(−44.31, 35.83)	White vs. Hispanic	0.24	(−1.68, 2.16)	White vs. Hispanic	−0.5	(−2.45, 1.45)	White vs. Hispanic	1.13	(−0.17, 2.43)
White vs. Other	−10.94	(−56.59, 34.72)	White vs. Other	−1.02	(−3.20, 1.16)	White vs. Other	1.07	(−2.76, 4.89)	White vs. Other	1.42	(−1.31, 4.15)
White vs. Prefer Not to Say	7.82	(−68.60, 84.23)	White vs. Prefer Not to Say	1.19	(−2.45, 4.85)	White vs. Prefer Not to Say	0.68	(−3.13, 4.49)	White vs. Prefer Not to Say	1.02	(−1.75, 3.79)
Socioeconomic Status			**Socioeconomic Status**			**Socioeconomic Status**			**Socioeconomic Status**		

	Total Tobacco Use			Frequency Tobacco Use			Frequency Opioid Use			Frequency Benzodiazepine Use	
	Beta Coefficient (β)	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**		**Beta Coefficient (β)**	**95% Confidence Interval**
Difficulty Affording Housing	37.69***	(15.94, 59.43)	Difficulty Affording Housing	1.59***	(0.51, 2.66)				Difficulty Affording Basics	−1.12***	(−1.74, −0.50)
			Frequency Could Not Afford Necessary Goods	0.58	(−0.01, 1.18)						
Employment Status			**Employment Status**			**Employment Status**			**Employment Status**		
Full Time vs. Part Time	0.88	(−25.95, 27.71)	Full Time vs. Part Time	−0.28	(−1.59, 1.04)	Full Time vs. Part Time	0.63	(−0.99, 2.25)	Full Time vs. Part Time	−0.53	(−1.68, 0.62)
Full Time vs. Student	15.59	(−82.57, 113.75)	Full Time vs. Student	3.26	(−1.79, 8.31)	Full Time vs. Student	0.31	(−6.53, 7.15)	Full Time vs. Student	−1.61	(−6.61, 3.39)
Full Time vs. Homemaker	0.027	(−130.17, 130.23)	Full Time vs. Homemaker	0.27	(−5.94, 6.47)	Full Time vs. Homemaker	1.48	(−1.46, 4.42)	Full Time vs. Unemployed	−6.59***	(−8.47, −4.72)
Full Time vs. Unemployed	9.21	(−32.68, 51.09)	Full Time vs. Unemployed	−1.56	(−3.63, 0.50)	Full Time vs. Unemployed	5.72	(−0.04, 11.49)			

For those substances which showed significant changes in total or frequency of consumption, as determined by paired t-tests, significant predictors of changes in substance use were explored using backwards stepwise regression techniques (β, *** = significant at $\alpha = 0.05$). Selection criteria for potential predictor variables were twofold. Variables were included in these best-fitting models if they minimized AIC criterion or if they were necessary to control for demographic or socioeconomic comparisons. If a control comparison is not shown for a particular substance, then no participants belonging to that category endorsed using that substance.