Convicted drinking and driving offenders: Comparing alcohol use before and after the pandemic outbreak

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Abstract

Background: Before the COVID-19 pandemic, very little was known about the impact of social isolation on individuals’ alcohol use and misuse. This study examines how socially isolated individuals with a history of heavy drinking used alcohol during the pandemic.

Methods: Data for this study came from an add-on to the Managing Heavy Drinking (MHD) longitudinal study of drivers convicted of DWI that was conducted in Erie County, New York. Pre-COVID information (October 2019–March 2020) was augmented with a COVID-19 questionnaire collected between July and August 2020. A total of 92 participants completed the COVID-19 survey.

Results: The sample of problem drinkers showed a significant increase after the pandemic outbreak in the average number of drinking days from 1.99 to 2.49 per week (p = 0.047), but a significant decrease in the average number of drinks per drinking day, from 3.74 to 2.74 (p = 0.003). The proportion of individuals who drank more frequently was greater among those who, before the outbreak had an Alcohol Use Disorders Identification Test (AUDIT) score <8 (26% increase) compared with those with an AUDIT score of ≥8 (13%). Alcohol treatment was also associated with the frequency of drinking, with individuals who were not in alcohol treatment showing a 16% increase in frequency compared with a 10% increase among those in treatment. Further, individuals who, after the outbreak worried about their health (30%) or finances (37%) reported greater increases in the frequency of drinking than those who did not worry about their health (17%) or finances (10%).

Conclusions: Overall, the individuals in our sample showed small changes in the frequency and heaviness of drinking after the outbreak of COVID-19, effects that oppose in direction from one another and thus resulted in no overall change in drinks consumed. Nonetheless, we identified factors that influenced the effects of the pandemic on drinking behavior among individuals convicted of DWI, which emphasizes the need to individualize these individuals’ treatment, particularly in the context of dramatic environmental change.

Keywords: alcohol consumption, COVID-19, problem drinkers
INTRODUCTION

Large-scale disasters, whether natural or man-made, can have a significant impact on the mental health and substance use behaviors of those who experience the event (Kessler & Wittchen, 2008) (Blendon et al., 2004; DeWolfe et al., 2000). Even before the “severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)” (as the COVID-19 pandemic has been called by the International Committee on Taxonomy of Viruses (ICTV)) (WHO, 2020), research had already shown that individuals facing social isolation tend to display elevated rates of alcohol use and misuse (Niño et al., 2016; Osgood et al., 2014; Williams et al., 2015). The impact of extended isolation periods such as those imposed by the COVID-19 pandemic on alcohol use and misuse is less clear (Clay & Parker, 2020). Rehm and colleagues posited two possible scenarios, one predicting an increase in alcohol consumption for some populations, particularly men, due to the need to cope with the pandemic stress, while others postulated a reduction in drinking based on the decreased physical access to alcohol and financial resources to purchase alcohol (Rehm et al., 2020). A better understanding of this phenomenon is emerging. Data showed that Americans were increasingly buying and consuming alcohol, although not in public settings such as bars and restaurants, as these were shuttered due to the pandemic in many states (Wagner et al., 2020). Recent studies in the United States are showing an increase in alcohol use and abuse among adults since the outbreak (Lechner et al., 2020; Pollard et al., 2020; Thomas et al., 2020), with such behavior increasing with the duration of the isolation policies (Weerakoon et al., 2020).

The impact of the pandemic on people’s mental and physical health varies across population groups according to their occupation (Gupta & Sahoo, 2020; Kumar & Nayar, 2020; Pappa et al., 2020), their age (Armitage & Nellums, 2020; Loades et al., 2020), gender (Dana et al., 2020; Gausman & Langer, 2020), and socioeconomic status (Naylor-Wardle et al., 2021; Thayer & Gildner, 2020). A group that may be facing specific challenges during the pandemic is composed of individuals with alcohol use disorders. These individuals were already facing alcohol-related problems even before the pandemic outbreak. Isolation and anxiety may have exacerbated mental health challenges and affected alcohol use during the pandemic. Some may have been receiving alcohol treatment before the outbreak and possibly at risk of suffering symptoms of withdrawal if they are forced to stop or reduce alcohol consumption (Marsden et al., 2020). Compounding these uncertainties are the individuals’ attitudes and perceptions regarding the medical risks associated with the disease and the necessity of the COVID-19 containment measures, as they could affect their levels of anxiety, stress, depression, and subsequently alcohol use during the pandemic. Currently, there is little or no information on how these individuals manage/cope with their alcohol problems during the pandemic outbreak.

This study adds clarity to this picture by examining whether and how the COVID-19 outbreak induced changes in the drinking patterns in a group of individuals with a history of alcohol problems: Convicted DWI (Driving While Intoxicated) or DWAI (Driving while Ability Impaired) offenders in Erie County, New York. Individuals arrested for a DWI offense are convicted usually because of aggravating circumstances such as a high blood alcohol concentration (BAC) level or being repeated offenders; circumstances that tend to reveal drinking problems (Cavaiola et al., 2003; Fell et al., 2010; Lapham et al., 2012). The characteristics of DWI offenders and the severity of their alcohol problems vary, as DWI enforcement efforts and mandatory remedial programs vary across the country (Downs et al., 2017; Lapham et al., 2004; McCartt et al., 2018; Voas & Fell, 2011). By examining a population of convicted offenders, we aim to assess the behaviors of a group of individuals with a history of heavy drinking and alcohol problems as they transitioned to the constraints on access to alcohol and treatment imposed by the pandemic outbreak.

In conducting this evaluation, this study accounts for elements and factors the literature suggests may have influenced individuals’ drinking during the pandemic, including individuals’ demographics and socioeconomic characteristics, the severity of the alcohol problem, being under alcohol treatment, and individuals’ attitudes and perceptions toward the pandemic risks and its containment policies.

METHODS

Data

Data for this study came from an add-on survey of participants in the Managing Heavy Drinking (MHD) study conducted in Erie County, New York. The MHD is a 3-wave study of drivers convicted of a DWI or DWAI (Driving while ability impaired) with a focus on assessing the behavior of those sentenced to an interlock ignition device (IID) to prevent them from driving after consuming alcohol (Voas et al., 2010; Voas, 2020; Voas et al., 1999). Data collection for the MHD began in 2015 and was completed in March 2020. Participants in the main study responded to fliers specifically targeting DWI offenders. Recruitment fliers were distributed at impaired driving classes, victim impact panels, alcohol IID installation centers, substance abuse treatment facilities, and health centers. Participants were interviewed by trained research assistants at a university research center or in a mobile office, where computer surveys and interviews were completed. Three waves of surveys and interviews were conducted. The first interview was as close to conviction and IID installation as possible (for those who installed an IID), the second wave was approximately 12 months later (IID sentences are 12 months in New York State, although an early removal is possible at 6 months, and those participants were interviewed at removal). The final wave of interviews was collected 6–9 months after the second wave interview. Wave three data collection started in November 2017 and concluded in March 2020 just as New York State was entering into the pandemic lockdown.

After obtaining IRB approval, data for the current effort came from an online survey conducted in July–August 2020 from participants who had previously agreed to be contacted for additional studies. Participants are located in Erie County, New York, which...
experienced initial COVID-19 statewide school closures on March 16, 2020, and on March 20, 2020, nonessential business shutdown with New York State on PAUSE (New_York_State, 2020). By leveraging information already collected by the MHD study before the pandemic outbreak with the additional information collected after the outbreak, this study presents a unique view of the impact of the pandemic on known heavy drinkers. A total of 184 MHD eligible participants were invited to complete a short 15-minute Survey Monkey survey for a $15 Amazon gift code. A total of 92 MHD participants completed a COVID survey. The survey asked participants to report on their experiences from the beginning of the shutdowns (Mid-March 2020) through the time they took the survey (July/August 2020).

Measures

COVID-19 Experience and Attitudes toward COVID-19 containment policies

We asked whether either the participant and/or a friend or family member had experienced the virus, as well as their opinion about the necessity of the following containment policies (the closing of nonessential business, wearing a mask in public, keeping social distance in public). Participants were asked to indicate whether they thought each of these policies was necessary but excessively strict; necessary and fair; neither necessary nor unnecessary; unnecessary because too strict; and completely unnecessary. For analytical purposes, we collapsed the three variables into a single variable denoting whether they believed the three containment policies were “necessary,” or whether at least one of them was too strict or unnecessary.

Concerns about health

Participants were asked whether because of COVID-19, they were concerned about their health, as well as the health of their family or friends. A dichotomous variable was used, indicating whether participants responded “Yes” or “No” to this question.

Concerns about finances

A dichotomous variable denoting whether COVID-19 has increased participants’ concern about their finances.

Working status after the pandemic outbreak

The following questions were used to create this variable: Are you currently working? To those who responded “Yes,” we asked to indicate whether they were working from home; at their regular worksite; at an alternative worksite; at a hospital; at a medical facility; at an essential store (e.g., grocery); or at an essential business. To those who responded “No,” we asked to indicate whether they had been laid off; furloughed; or had not been working even before the stay-at-home order. The answers to these questions were used to create a four-level variable denoting whether the participant: (1) had been unemployed or on disability since before the outbreak; (2) was furloughed or laid off; (3) worked from home; or (4) worked in some other location.

Alcohol use

Both at wave 3 of the MHD and for this study, participants were asked: (a) In the past 30 days, on about how many days did you have a drink containing alcohol? and (b) How many beverages do you have on average on each drinking day? The resulting participants’ mean number of drinking days per week and mean number of drinks per drinking day were multiplied to compute the participants’ mean number of drinks per week.

Drinking location before the outbreak

For those who used to drink at bars, shifting their drinking to at home may have had been more stressful than those who had already been doing most of their drinking at home. To account for this possibility, we created a dichotomous variable indicating whether before the outbreak, most of the participants’ drinking had been done at home or elsewhere.

Severity of the alcohol problem before the outbreak

At wave 3 of the MHD study, participants were assessed by the Alcohol Use Disorders Identification Test, or AUDIT (Saunders et al., 1993). As indicated by Saunders and colleagues, scores of 8 and above indicate harmful use. Thus, we operationalized this variable by grouping individuals in two groups: those with a score <8 and with a score of 8+.

Alcohol treatment during the outbreak

A dichotomous variable denoting whether participants were receiving any form of alcohol treatment during the pandemic.

Analyses

We first conducted bivariate analyses comparing the preoutbreak and postoutbreak mean number of drinking days per week; the number of drinks per drinking day; and the number of drinks per
week. We made these comparisons for each of the factors listed above (e.g., sex, age, AUDIT score). Repeated-measures ANOVA was used to assess these comparisons, for this procedure accounts for the repeated measurement of the alcohol measures (i.e., each measure was collected from each participant at two times, before and after outbreak). We also conducted paired t-tests to assess changes in the alcohol measures at each level of the contributing factor. To account for the multiple comparisons, a Bonferroni correction was applied to assess the significance of the resulting p values. Next, we conducted regression analyses (generalized linear model, GLM) to model the contribution of the variables identified by the bivariate analyses as potential contributors to changes in the dependent variables: (1) the number of drinking days, (2) the number of drinks per drinking day, and (3) the total number of drinks per week before and after the pandemic. Each dependent variable in the GLM models was operationalized as a change, obtained by subtracting the value of the variable before the outbreak from the value of the variable after the outbreak. As such, a positive/negative value in the alcohol measure denotes an increase/decrease after the outbreak. Main effects as well as dual interactions were estimated. Main effects included in the model are all factors that tested as significant in the bivariate analyses. The relatively small sample size made it advisable to include all possible dual interactions in each model. Hence, to preserve degrees of freedom, the interactions that were included in the model were selected after running a separate stepwise regression. To assess the relative contribution of each factor and interactions to the dependent variable, we estimated both statistical significance and effect size (partial Eta).

RESULTS

Most participants (78.3%) had no experience with COVID-19 (i.e., no personal experience or knowledge of friends or family having either the symptoms or tested positive for COVID-19). The large majority of participants viewed the COVID-19 isolation policies as necessary (closing of nonessential business, 68.5%; wearing masks in public, 72.8%; social distancing, 80.2%). However, a sizable number of participants considered these three policies as unnecessary (22.8%, 18.5%, and 9.9%, respectively). Participants’ age ranged between 22 years old and 71 years old, with a mean of 38.4 years old. Of the 92 participants, 88 provided information on their sex. Of them, about 49% (N = 43) were female and 51% (N = 45) males. About 23.1% of the sample report being laid off or furloughed after the outbreak; another 25.3% worked from home, and 41.8% had to work outside their homes. These percentages become 25.6%, 28.0%, and 46.3%, if only individuals who were employed at the time the pandemic started were considered. Of the 86 participants who provided information about their race and ethnicity, the large majority (83%, N = 71) reported being White, and the remaining (17%, N = 15) were of different racial/ethnic groups. Approximately half of the participants had earned an associate or bachelor’s degree (N = 46, about 50%). About 79% (N = 70) of the participants were employed for wages before the pandemic outbreak, 9% (N = 8) were self-employed, 6% (N = 5) were unemployed, and 5% (N = 4) were retired or on disability. To assess the representativeness of the sample, we compared these variable distributions with those based on the full sample of the MHD study population and found no significant difference. To further assess the representativeness of the sample, we compared percentage of individuals with an 8+ AUDIT score in the sample and the whole MHD study population and no significant difference was found.

Alcohol use: bivariate analyses

Table 1 shows that for our sample of problem drinkers there was no significant overall change in their drinking after the outbreak, as the average number of drinks per week remains between 9.46 and 9.83 per week, F(1) = 0.23; p = 0.65. However, hidden in this overall finding is that the two components of this measure worked in opposite directions: There was a significant increase in the participants’ average number of drinking days per week after the outbreak, from 1.99 to 2.49, F(1) = 4.06; p = 0.047, but a significant decrease in the average number of drinks on drinking days, from 3.74 to 2.74, F(1) = 9.47; p = 0.003.

The results of the ANOVA analyses show that number of drinking days was not significantly different between males and females, F(1) = 0.5; p = 0.48, with the increase in drinking days being significant for participants of both sexes, F(1) = 4.01; p = 0.048. The ANOVA results also show that compared with females, males had more drinks per drinking day, although this difference was significant only at, F(1) = 3.48; p = 0.066. There was an overall association between participants’ sex and a reduction in drinking days, F(1) = 9.6; p = 0.003, after the outbreak, but this reduction was significant only among males, from 4.36 to 3.07, t(40) = −1.39; p = 0.005, at the Bonferroni-corrected α = 0.01/2 = 0.005. Reflecting once more the opposite direction of the increase in drinking days and the decrease in drinks per drinking day, there was no significant association between the resulting number of drinks per week and participants’ sex.

The number of drinking days, drinks per drinking day, and drinks per week did not vary significantly among three age-groups, ages 22–9, ages 30–39, and 40+, F(2) = 0.32, p = 0.69; F(2) = 1.96, p = 0.150; and F(2) = 0.63, p = 0.53, respectively. However, the increase in drinking days was significant only among participants aged 22–29, from 1.89 to 3.11, t(18) = −3.49; p = 0.003, and those aged 30–39, from 1.52 to 2.36, t(4) = −3.06, p = 0.005. Participants aged 40+ showed no significant change in the number of drinking days after the outbreak. Those in the age-group 40+ also showed a significant decrease in the number of drinks per drinking day, from 3.79 to 2.39, t(37) = 2.82; p = 0.008. The resulting number of drinks per week showed no significant change.

Those who used to do most of their drinking at home before the outbreak reported significantly more drinking days (1/2 (2.85 + 3.11) = 2.98) than those who did most of their drinking outside their home (1/2), F(1) = 12.3, p = 0.001. After the outbreak, the
| Factor                          | N   | Outcome                        | Before     | After     | ANOVA    | P-test   |
|--------------------------------|-----|--------------------------------|------------|-----------|----------|----------|
|                                |     |                                | Mean  SD   | Mean  SD  | p value  | p value  | p value  |
| All Participants               | 82  | Drinking Days (week)           | 1.99 1.76  | 2.49 2.35 | 0.0471   |          |          |
|                                |     | Number Drinks (day)            | 3.74 2.81  | 2.74 2.53 | 0.0029   |          |          |
|                                |     | Total Drinks (week)            | 9.46 14.16| 9.83 13.42| 0.6351   |          |          |
| Sex                            |     |                                |            |           |          |          |          |
| Females                        | 41  | Drinking Days (week)           | 2.12 1.97  | 2.63 2.36 | 0.4819   | 0.0485   | 0.1723   |
| Males                          | 41  | Number Drinks (day)            | 1.87 1.54  | 2.34 2.35 | 0.1543   |          |          |
| Females                        | 41  | Total Drinks (week)            | 1.87 1.54  | 2.34 2.35 | 0.1543   |          |          |
| Males                          | 41  |                                | 1.87 1.54  | 2.34 2.35 | 0.1543   |          |          |
| Age                            |     |                                |            |           |          |          |          |
| Age 22–29                      | 15  | Drinking Days (week)           | 1.89 1.33  | 3.11 2.28 | 0.6947   | 0.0075   | 0.0026   |
| Age 30–39                      | 25  | Number Drinks (day)            | 1.52 1.33  | 2.56 2.31 | 0.0054   |          |          |
| Age 40+                        | 38  | Total Drinks (week)            | 2.36 2.11  | 2.13 2.40 | 0.5999   |          |          |
| Age 22–29                      | 15  |                                | 4.42 3.54  | 3.84 2.39 | 0.1480   | 0.0068   | 0.1479   |
| Age 30–39                      | 25  |                                | 3.13 1.73  | 2.44 2.08 | 0.1839   |          |          |
| Age 40+                        | 38  |                                | 3.79 2.93  | 2.39 2.77 | 0.0076   |          |          |
| Age 22–29                      | 15  | Total Drinks (week)            | 10.63 13.84| 12.59 13.68| 0.5351   | 0.3741   | 0.2185   |
| Age 30–39                      | 25  |                                | 6.18 9.79  | 9.44 12.29| 0.0293   |          |          |
| Age 40+                        | 38  |                                | 11.03 16.57| 8.16 14.44| 0.4194   |          |          |
| Before the outbreak: most frequent drinking location | | | | | | |
| Home                           | 36  | Drinking Days (week)           | 2.85 2.05  | 3.11 2.57 | 0.0008   | 0.0603   | 0.5714   |
| Other                          | 45  | Number Drinks (day)            | 1.36 1.12  | 2.04 2.06 | 0.0091   |          |          |
| Home                           | 36  | Total Drinks (week)            | 12.66 17.45| 12.78 17.62| 0.0502   | 0.6502   | 0.8753   |
| Other                          | 45  |                                | 7.08 10.45| 7.69 8.41 | 0.5058   |          |          |

(Continues)
| Factor | N  | Outcome                      | Before Mean | Before SD | After Mean | After SD | ANOVA Factor p value | ANOVA Before-After p value | ANOVA After p value | t-test Before p value | t-test After p value |
|--------|----|-------------------------------|-------------|-----------|------------|----------|---------------------|--------------------------|--------------------|---------------------|---------------------|
| Before the outbreak: audit score |    |                               |             |           |            |          |                     |                          |                    |                     |                     |
| <8     | 67 | Drinking Days (week)         | 1.75        | 1.59      | 2.30       | 2.20     | 0.0161              | 0.2209                   | 0.0335             |                     |                     |
| 8+     | 15 |                               | 3.10        | 2.09      | 3.33       | 2.85     | 0.7535              |                          |                    |                     |                     |
| <8     | 67 | Number Drinks (day)          | 2.69        | 1.47      | 2.13       | 1.73     | <0.0001             | <0.0001                  | 0.0380             |                     |                     |
| 8+     | 15 |                               | 7.53        | 3.72      | 5.47       | 3.64     | 0.0323              |                          |                    |                     |                     |
| <8     | 67 | Total Drinks (week)          | 5.38        | 5.79      | 7.33       | 8.42     | <0.0001             | 0.3619                   | 0.0240             |                     |                     |
| 8+     | 15 |                               | 26.87       | 23.77     | 21.00      | 23.33    | 0.4150              |                          |                    |                     |                     |
| After the outbreak: in alcohol treatment |    |                               |             |           |            |          |                     |                          |                    |                     |                     |
| Yes    | 10 | Drinking Days (week)         | 3.30        | 3.06      | 1.40       | 2.95     | 0.8351              | 0.1231                   | 0.1468             |                     |                     |
| No     | 72 |                               | 1.81        | 1.44      | 2.64       | 2.23     | <0.0001             |                          |                    |                     |                     |
| Yes    | 10 | Number Drinks (day)          | 4.00        | 3.89      | 1.10       | 2.33     | 0.5261              | 0.0001                   | 0.1259             |                     |                     |
| No     | 72 |                               | 3.56        | 2.69      | 2.97       | 2.49     | 0.0106              |                          |                    |                     |                     |
| Yes    | 10 | Total Drinks (week)          | 21.13       | 28.99     | 7.70       | 16.32    | 0.1690              | 0.0630                   | 0.3607             |                     |                     |
| No     | 72 |                               | 8.14        | 11.04     | 10.13      | 13.08    | 0.0561              |                          |                    |                     |                     |
| After the outbreak: job status | Retired//Unemployed/Dis | Drinking Days (week) | 3.63       | 2.72      | 2.38       | 3.16     | 0.2197              | 0.3617                   | 0.4011             |                     |                     |
|       | 8  |                               | 1.50        | 1.26      | 2.55       | 2.34     | 0.0019              |                          |                    |                     |                     |
|       | 22 |                               |             |           |            |          |                     |                          |                    |                     |                     |
|       | 33 |                               |             |           |            |          |                     |                          |                    |                     |                     |
| Furloughed/Laid off | Retired//Unemployed/Dis | Drinking Days (week) | 4.25       | 2.68      | 1.63       | 2.07     | 0.2510              | 0.0006                   | 0.0480             |                     |                     |
|       | 18 |                               | 2.44        | 1.65      | 3.06       | 2.48     | 0.3313              |                          |                    |                     |                     |
|       | 8  |                               | 2.80        | 1.67      | 2.09       | 1.72     | 0.0750              |                          |                    |                     |                     |
|       | 22 |                               | 3.93        | 2.81      | 3.06       | 2.91     | 0.2897              |                          |                    |                     |                     |
| Furloughed/Laid off | Retired//Unemployed/Dis | Total Drinks (week) | 18.42      | 12.73     | 6.50       | 9.74     | 0.1476              | 0.4854                   | 0.1588             |                     |                     |
|       | 18 |                               | 4.57        | 3.69      | 8.23       | 9.42     | 0.0404              |                          |                    |                     |                     |
|       | 33 |                               | 7.27        | 11.17     | 10.12      | 16.74    | 0.0382              |                          |                    |                     |                     |
|       | 18 |                               | 15.56       | 22.68     | 12.89      | 12.77    | 0.7447              |                          |                    |                     |                     |

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CONVICTED DRINKING AND DRIVING OFFENDERS: COMPARING ALCOHOL USE BEFORE AND AFTER THE PANDEMIC OUTBREAK

| Factor                                                                 | N  | Outcome                  | Before | After | ANOVA | P t-test |
|------------------------------------------------------------------------|----|--------------------------|--------|-------|-------|----------|
| **After the outbreak: perceived need of COVID containment measures**   |    |                          |        |       |       |          |
| Not Necessary                                                         | 15 | Drinking Days (week)     | 1.54   | 1.77  | 1.96  | 0.2212   |
| Necessary                                                              | 77 |                          | 2.10   | 2.62  | 2.46  | 0.0104   |
| Not Necessary                                                         | 15 | Number Drinks (day)      | 3.73   | 2.50  | 3.35  | 0.9174   |
| Necessary                                                              | 77 |                          | 3.54   | 2.65  | 2.50  | 0.0986   |
| Not Necessary                                                         | 15 | Total Drinks (week)      | 6.96   | 6.38  | 9.71  | 0.3759   |
| Necessary                                                              | 77 |                          | 9.85   | 10.12 | 13.56 | 0.6935   |
| **After the outbreak: worried about health**                          |    |                          |        |       |       |          |
| No                                                                    | 48 | Drinking Days (week)     | 1.94   | 2.43  | 2.46  | 0.9378   |
| Yes                                                                   | 44 |                          | 2.10   | 2.56  | 2.37  | 0.3260   |
| No                                                                    | 48 | Number Drinks (day)      | 3.65   | 2.77  | 2.79  | 0.5395   |
| Yes                                                                   | 44 |                          | 3.49   | 2.47  | 2.05  | 0.0287   |
| No                                                                    | 48 | Total Drinks (week)      | 9.86   | 9.78  | 14.80 | 0.6566   |
| Yes                                                                   | 44 |                          | 8.90   | 9.35  | 11.15 | 0.7992   |
| **After the outbreak: worried about finances**                        |    |                          |        |       |       |          |
| No                                                                    | 41 | Drinking Days (week)     | 1.79   | 2.66  | 2.41  | 0.6477   |
| Yes                                                                   | 46 |                          | 2.18   | 2.50  | 2.47  | 0.3892   |
| No                                                                    | 41 | Number Drinks (day)      | 3.61   | 3.00  | 2.93  | 0.5934   |
| Yes                                                                   | 46 |                          | 3.41   | 2.52  | 1.99  | 0.0385   |
| No                                                                    | 41 | Total Drinks (week)      | 9.07   | 10.50 | 15.58 | 0.7936   |
| Yes                                                                   | 46 |                          | 8.36   | 9.65  | 11.25 | 0.2155   |

Note: "N" shows only participants with full information for the paired analyses (i.e., both before and after the outbreak). ANOVA estimates were based on a repeated observations model, where the repeated measures were those taken before the outbreak and after the outbreak on each participant. Paired t-test (paired within participant) was used to test differences at each factor level. Because paired t-tests were conducted after the repeated-measures ANOVA test, significance of the paired t-test were assessed by comparing the p values in the table with Bonferroni-adjusted significance levels (e.g., by using \( \alpha = 0.05 / 2 \); or \( \alpha = 0.05 / 3 \) rather than \( \alpha = 0.05 \) when comparisons are made within a two-level or three-level factor, respectively).
|                          | Model 1 = Drinking Days |                          |                          | Model 2 = Drinks per Drinking Day |                          |                          | Model 3 = Number of Drinks per Week |                          |                          |
|--------------------------|-------------------------|--------------------------|--------------------------|----------------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|
|                          | Coefficient              | Pr > |t| | Partial Eta-Square | Coefficient              | Pr > |t| | Partial Eta-Square | Coefficient              | Pr > |t| | Partial Eta-Square |
| Main effects             |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| Intercept                | 1.617                   | 0.126                    |                          | -0.363                          | 0.687                    |                          | 2.046                             | 0.705                    |                          |
| Sex: Female              | 0.430                   | 0.403                    | 0.011                    | 1.031                           | 0.024                    | 0.035                    | 2.184                             | 0.408                    | 0.011                    |
| Sex: Male (Ref)          |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| Age: 22–29               | 0.329                   | 0.637                    | 0.014                    | 0.062                           | 0.922                    | 0.056                    | 0.260                             | 0.942                    | 0.005                    |
| Age: 30–39               | 0.511                   | 0.359                    | 0.119                    | 0.119                           | 0.810                    |                          | 1.488                             | 0.596                    |                          |
| Age: 40+ (Ref)           |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| Before the Outbreak: Most drinking at home | 0.007                   | 0.988                    | 0.000                    | 0.382                           | 0.404                    | 0.000                    | 2.318                             | 0.366                    | 0.014                    |
| Before the Outbreak: Most drinking outside home (ref)  |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| Before the Outbreak: AUDIT Score 8+  | 0.584                   | 0.376                    | 0.012                    | -0.465                          | 0.422                    | 0.001                    | 1.983                             | 0.554                    | 0.010                    |
| Before the Outbreak: AUDIT Score <8 (ref)  |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| After the outbreak: in alcohol treatment  | -2.503                  | 0.009                    | 0.105                    | -1.745                          | 0.076                    | 0.010                    | -4.263                            | 0.438                    | 0.000                    |
| After the Outbreak: Not in Alcohol Treatment (Ref)  |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| After the Outbreak: COVID Containment Policies Unnecessary  | -0.037                  | 0.961                    | 0.000                    | -0.101                          | 0.878                    | 0.004                    | -0.444                            | 0.908                    | 0.120                    |
| After the Outbreak: COVID Containment Policies: Necessary (Ref)  |                         |                          |                          |                                  |                         |                          |                                  |                         |                          |
| After the Outbreak: Unemployed (Since Before the Outbreak)  | -2.199                  | 0.022                    | 0.108                    | -1.650                          | 0.077                    | 0.079                    | -13.080                           | 0.015                    | 0.281                    |
| After the Outbreak: Work (from home)  | -0.375                  | 0.609                    | 0.341                    | 0.335                           | 0.928                    |                          |                                  |                         |                          |
| After the Outbreak: Work (outside home)  | -1.178                  | 0.089                    | 0.761                    | -1.186                          | 0.735                    |                          |                                  |                         |                          |
| After the Outbreak: Furloughed/laid off (Ref)  | .                       |                          |                          |                                  |                         |                          |                                  |                         |                          |
| After the Outbreak: Worried about Finances  | -0.520                  | 0.271                    | 0.19                     | -0.308                          | 0.477                    | 0.170                    | -1.138                            | 0.638                    | 0.004                    |
| After the Outbreak: Not worried about Finances (Ref)  | .                       |                          |                          |                                  |                         |                          |                                  |                         |                          |
| After the Outbreak: Worried about Health  | -0.337                  | 0.500                    | 0.007                    | -0.278                          | 0.542                    | 0.039                    | 0.064                             | 0.980                    | 0.000                    |

(Continues)
number of drinking days increased only for those who used to drink outside their homes, from 1.36 to 2.04, t(44) = −2.73, p = 0.009, likely because those who before the outbreak did most of their drinking at home were already drinking more days a week than those who used to drink outside the home.

Compared with those who scored 8 or less in the AUDIT assessment, those who scored 8+ reported more drinking days, 3.22 vs. 2.02, F(1) = 6.04, p = 0.02, more drinks per drinking day, 6.50 vs. 2.41, F(1) = 56.3, p < 0.001, and more drinks per week, 23.93 vs. 6.35, F(1) = 37.7, p < 0.001. Although both groups showed a reduction in the number of drinks per drinking day (p < 0.001), those with an AUDIT score less than 8 showed a larger increase in drinking days after the outbreak, from 1.75 to 2.30, t(66) = −2.17, p = 0.035, although the difference was not significant after the Bonferroni correction (corrected α = 0.05/2 = 0.025).

Only 12% of participants (N = 10) were in alcohol treatment after the outbreak. Before the outbreak and compared with those who were not in treatment, those in alcohol treatment had a larger number of drinking days (3.30 vs. 1.81), drinks per drinking day (4.00 vs 3.56), and number of drinks per week (21.13 vs. 8.14). After the outbreak however, the direction of these comparisons reversed, with those in treatment showing fewer drinking days (2.30 vs. 3.33),

| Significant Interactions                          | Coefficient | Pr > |t| | Partial Eta-Square |
|--------------------------------------------------|-------------|------|   |                     |
| Age: 22–29 * Work (from home)                     | 4.034       | 0.040|   |                     |
| Age: 22–29 * Work (outside home)                  | 3.809       | 0.010| 0.241 |                     |
| Age: 30–39 * Work (from home)                     | 4.928       | <0.0001|   |                     |
| Age: 30–39 * Working (outside home)               | 2.790       | 0.031|   |                     |
| Worried about Finances * Unemployed (Since Before the Outbreak) | -5.078       | 0.003|   |                     |
| Worried about Finances * Work (from home)        | -4.848      | <0.0001| 0.282 |                     |
| Worried about Finances * Work (outside home)     | -4.503      | <0.0001|   |                     |
| Worried about Healthcare* Before the Outbreak: Most drinking at home | -12.893      | 0.009| 0.112 |                     |

Note: Main effects and interactions were estimated in separate models (a model with only main effects, another with main effects and interactions). Only significant interactions are shown. The term (ref) denotes the reference level. Partial Eta square indicates the effect size associated with each factor.

ANOVA also shows that overall, participants’ job status after the outbreak was not significantly associated with changes in the number of drinking days, F(1) = 0.84, p = 0.36) or number of drinks per week, F(1) = 0.49, p = 0.48).

Most participants (N = 77, 84%) viewed the pandemic containment and mitigation policies as necessary. About 16% (N = 15) viewed them as unnecessary or too strict. Those who viewed these policies as necessary showed a steeper decrease in the number of drinking days after the outbreak, from 3.54 to 2.65, t(68) = 2.66,
Changes in alcohol use: multivariate regression

Table 2 shows the outcome of the regression modeling changes in drinking days, in the number of drinks per drinking day, and in the number of drinks per week from before the outbreak to after the outbreak.

Individuals in alcohol treatment were less likely to increase the number of drinking days (\( p = 0.009 \)) after the outbreak. Changes in the number of drinks per drinking day after the outbreak were not significant. Compared with participants with were furloughed or laid off after the outbreak, those who had been unemployed or retired since before the outbreak showed a reduced number of drinking days (\( p = 0.02 \)) and number of drinks per week (\( p = 0.015 \)) than after the outbreak.

Females who were worried about finances were more likely to increase the number of drinks per drinking day after the outbreak than males who did not worry about finances (\( p < 0.001 \)). Those who were laid off and worried about finances were more likely to increase the number of drinks per drinking day after the outbreak than individuals who were worried by their finances but had been unemployed or retired before the outbreak (\( p = 0.003 \), Bonferroni-corrected \( \alpha = 0.025 \)), compared with from 2.18 to 2.50, \( t(41) = -0.87, p = 0.39 \).

Finally, by estimating variables’ effect size, the partial \( \eta^2 \) statistic helps identify the main factors behind the observed changes in the alcohol measure. The variables identifying participants’ job status and participants worried about their finances showed the largest effect size. The interaction between participants’ job status and participants’ age showed the largest effect size (\( \eta^2 = 0.24 \)) among the factors explaining the number of drinking days. Job status showed the largest effect size (\( \eta^2 = 0.28 \)) among the factors explaining the number of drinks per week.

DISCUSSION

To our knowledge, this is one of the first studies that looks at the impact of the COVID-19 pandemic on the use of alcohol by a group of individuals who have already shown problems associated with alcohol use. Furthermore, this study is the first to assess how the pandemic has impacted the alcohol use of individuals arrested and convicted for DWI. As such, the population under study is a sample similar to the more than 1.4 million Americans (based on 2010 data) who are arrested annually for DWI/DUI in the United States (Chambers et al., 2017).

Recent reports are showing that due to the stress caused by the pandemic risks and the isolation policies, many Americans have increased their consumption of alcohol after the pandemic outbreak (Lechner et al., 2020; Pollard et al., 2020; Thomas et al., 2020; Wagner et al., 2020; Weerakoon et al., 2020). One of the main findings of this study is that our sample of problem drinkers did not alter the number of drinks they consumed each week after the outbreak. They kept drinking an average of between 9.46 drinks/week and 9.83 drinks/week. Hidden behind this, overall results are variations in patterns of alcohol use; although the mean number of drinks per week remained unchanged, participants increased the number of days they drank, but drank less per drinking day. The reasons for these behaviors are unclear. The increase in drinking days after the outbreak could be related to participants spending more time at home, with less need to drive, and the stress associated with social isolation (Niño et al., 2016; Osgood et al., 2014; Williams et al., 2015), but it is unclear why the number of drinks per drinking day decreased after the outbreak.

It is possible that the noted decrease in the number of drinks per drinking day relates to financial hardship, with participants rationing their beverages over an extended number of days. This possibility however is highly speculative and in need of examination. Our analyses showed that worries about finances and job status after the outbreak are two of the variables explaining most of the changes in the number of drinks per drinking day. The interaction between these two factors had the largest effect size in our models. Based on these findings, we speculate that for our sample of individuals with a history of problem drinking, the stress caused by the pandemic and isolation induced them to augment the number of days they drink, but the stress caused by the financial hardships after the outbreak limited their access to alcohol or ability to increase the amount of alcohol purchased. This resulted in our sample of problem drinkers...
continuing to consume the same amount of alcohol weekly as they were consuming before the outbreak.

Also hidden in this global result is that there are variations in patterns of alcohol use among study participants. Our sample of problem drinkers is not homogeneous in their responses to the stress caused by the pandemic. One of the main findings of this study is that being in alcohol treatment ameliorates the influence that the pandemic outbreak may have on increasing alcohol use. This finding is particularly interesting given the characteristics of the population under study. Because they have experienced a DWI-related arrest, the population under study not only has demonstrated having alcohol-related problems, but also has experienced some of the consequences caused by their alcohol use. For many, being arrested and convicted of a DWI offense triggers a positive response per se, inducing an immediate reduction in alcohol use after the arrest and conviction (Voas et al., 2020). The effectiveness of this phenomenon (i.e., the reduction in alcohol use caused by the DWI arrest and conviction) however, does not apply equally to all DWI offenders. For many, such a decrease in alcohol use after the arrest does not occur. Most individuals in the sample were subject to other alcohol interventions after the arrest, including the imposition of an IID. Although on average, IID interventions do not alter the users’ amount of drinking (Marques et al., 2010; Voas, 2014), some IID users do reduce their drinking while under IID-imposed restricted driving (Scherer et al., 2020). Furthermore, some convicted DWI offenders were also mandated (or decided) to enroll in some form of alcohol treatment while on an IID, with some of such treatments proven effective to reduce DWI recidivism even after the IID is removed (Voas et al., 2016). Thus, our finding that those in alcohol treatment were the most likely to avoid increases in alcohol use after the outbreak emphasizes the importance for this group of problem drinkers to receive proper treatment for their addiction. This is highly relevant to ongoing debates about the need for developing and implementing effective telehealth approaches that could be delivered under severe restrictions such as those imposed by the COVID-19 pandemic, as well as in situations in which those in need of treatment face extreme access impediments.

Despite being informative and novel, this study faces several limitations. Data were collected electronically under prevailing social distance containment protocols. The impact of this approach on the veracity of the data collected is unclear. All information was self-reported. It is possible that some participants were not truthful or had recollection errors in their responses. However, all participants had previously participated in several waves of the MHD study and had already experienced and received assurances of privacy and confidentiality of their data, which we believe should have induced participants to be truthful in their responses.

Another limitation of this study is its generalizability, in particular regarding the validity of the study findings to other types of problem drinkers than the group of DWI offenders that we analyzed. At a minimum however, the findings of this study should be useful for researchers and policy makers interested in increasing the effectiveness of interventions directed to DWI offenders in general, and in particular for situations in which access to those interventions is difficult. Similarly, this study focuses on the events that occurred during the initial and crucial stages of the COVID-19 pandemic, and therefore, the results may not be generalizable to other situations. The findings of this study however would not only be relevant to any future pandemic occurrence, but also to situations in which a group of heavy drinkers find restrictions in their access to proper treatment.

CONFLICT OF INTEREST
The authors have no conflicts of interest.

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