

ORIGINAL RESEARCH



Alcohol consumption and alcohol home delivery laws during the COVID-19 pandemic

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ABSTRACT

Background: Alcohol consumption in the U.S. is a public health problem that has been exacerbated by the COVID-19 pandemic. Relatedly, many states have responded to COVID-19 by relaxing their alcohol laws, making it possible for adults to have alcohol delivered to their homes. This study sought to understand the impact of allowing alcohol home delivery on self-reported adult alcohol consumption in the US. **Methods:** In May 2020, we surveyed a convenience sample of U.S. adults over 21 years of age recruited through social media and listservs. Eight hundred and thirty-two participants completed the online survey: 84% were female, 85% were White, and 72% were between the ages of 26 and 49. **Results:** Twenty-one percent of participants who consumed alcohol in the past month had at least some alcohol delivered, with 60% having it delivered from liquor stores, restaurants, or bars. The remainder of the participants purchased the alcohol in-person or owned it pre-COVID-19. Participants who reported having alcohol delivered also reported consuming more drinks ($\beta = 13.3$; 95% CI [8.2, 18.4]; $p < .000$) and drinking on more days ($\beta = 5.0$; 95% CI [2.9, 7.0]; $p < .000$) over the past month than participants who obtained alcohol through other methods. Participants who had alcohol delivered were nearly two times more likely to report engaging in binge drinking than those who obtained alcohol through other methods ($OR = 1.96$; 95% CI [1.3, 3.1]; $p = .003$). **Conclusions:** Obtaining alcohol through home delivery was associated with greater alcohol consumption including binge drinking. As states consider permanently allowing alcohol home delivery, it is important to consider the potential public health implications.

KEYWORDS

Alcohol; policy; coronavirus; alcohol home delivery

Introduction

Alcohol consumption in the U.S. is a public health problem that has been exacerbated by the COVID-19 pandemic.^{1–3} Alcohol plays a significant role in suicides, homicides, motor vehicle crashes, chronic diseases, cancers, sexually transmitted diseases, and other intentional or accidental injuries or deaths.^{4–9} Prior to the COVID-19 pandemic, excessive alcohol consumption – defined by the Centers for Disease Control and Prevention as including binge drinking, heavy drinking, and any drinking by pregnant women or people under the age of 21 – was responsible for approximately 95,000 deaths annually in the U.S., making it the fourth leading preventable cause of death.^{10,11}

Since the pandemic, many people are purchasing and consuming more alcohol than before. Between March 1, 2020 and April 18, 2020, alcohol sales data show that in-store alcohol purchases (presumably for at-home consumption) were up by 21% compared to sales data from the same time period in 2019 (pre-COVID-19).¹² In one study, 60% of U.S. adults reported increased alcohol consumption in May 2020, compared to before the pandemic.² Another study found that 29% of U.S. respondents reported

consuming more drinks per day and 21% reported binge drinking more often in April 2020 than February 2020.¹ A third study found that alcohol consumption among U.S. adults increased by 14% from 2019 to 2020, with women exhibiting an even greater increase in alcohol consumption (41%) than men (7%) over a 2019 baseline.³

Coinciding with this increase in consumption has been a change in state alcohol laws. Unlike in other high-income countries such as the United Kingdom and Australia, delivery from on-premises outlets, from off-premises outlets, and through third-party delivery services was largely restricted in the United States prior to the pandemic, although these restrictions varied across states. When states did allow alcohol delivery it was most often from off-premises alcohol retailers to the homes of consumers not present at the retail outlet.¹³ Since the pandemic began, states across the country have relaxed their alcohol laws to provide economic support for restaurants, bars, and liquor stores.¹⁴ For example, in many states, adults, for the first time, could have beer, wine, and spirits delivered to their homes from both on-premises and off-premises alcohol outlets.¹⁵ In a review of liquor regulations across several countries, including laws from all 50

states and the District of Columbia, Colbert et al. found that nearly two-thirds of US states had temporarily or permanently relaxed their regulations related to alcohol home delivery during COVID-19, with most of these regulatory relaxations focused on expanding alcohol home delivery from on-premises outlets.¹⁵ It appears that this was associated with a change in some adults' behaviors.² For example, over a third of participants in a study by Grossman et al. reported that they were drinking more because alcohol was now more readily available.²

Although the long-term ramifications of these specific legal changes are not yet known, prior research has consistently concluded that increasing alcohol access and availability leads to or is at least associated with increased alcohol consumption and related consequences. For example, a systematic review conducted by the Community Preventive Services Task Force concluded that increasing the hours a bar or restaurant can sell alcohol by two or more hours increased alcohol consumption and alcohol-related harms such as motor vehicle crashes.¹⁶ A different Community Preventive Services Task Force systematic review found that increasing the number of alcohol outlets in an area was associated with increased alcohol consumption and other harms, such as injuries, crime, and violence.¹⁷ Upon reviewing eight systematic reviews that examined interventions and policies that reduced alcohol availability (e.g., restricted days or hours of sale, reducing alcohol outlet density), Martineau et al. similarly concluded that these types of interventions and policies are consistently supported across the reviews.¹⁸ Allowing alcohol to be delivered to consumers' homes also expands alcohol access and availability. Therefore, alcohol policy experts are concerned that this will lead to the same harmful impacts found when other laws have expanded alcohol access and availability.¹⁹ To date, there has only been one study that has examined home delivery laws. A study from New Zealand found that 40% of participants used online alcohol delivery services with 18% using them for the first time during the COVID-19 pandemic.²⁰ Those who purchased alcohol through a delivery service had 75% higher odds of heavier drinking in the past week than those who purchased in person from supermarkets.

Building on this previous research, we sought to better understand adult alcohol consumption in the U.S. given that states were allowing alcohol to be delivered from alcohol outlets to consumers' homes. We examined how participants obtained their alcohol and compared current alcohol consumption and the prevalence of binge drinking in the past 30 days between participants who reported having at least some of their alcohol delivered versus those who obtained their alcohol through other methods (e.g., purchased it in person).

Method

Overview

In May 2020, we surveyed a convenience sample of U.S. adults over 21 years of age using an online questionnaire to better understand how COVID-19 changed adult alcohol

Table 1. Demographics and methods of obtaining alcohol from alcohol use & COVID-19 survey, 2020 (*N* = 832).

Demographics & methods of obtaining alcohol	Percent (number)
Gender	
Female	84.4% (593)
Male	15.7% (110)
Race / Ethnicity	
White	84.9% (597)
Other race	15.1% (106)
Hispanic/Latinx Ethnicity	6.7% (47)
Age in Years	
21–25	3.5% (24)
26–34	21.2% (147)
35–49	51.1% (355)
50–64	16.0% (111)
65 or older	08.4% (58)
Household Income, USD	
Less than \$39,999	6.8% (47)
\$40,000–\$79,999	16.0% (110)
\$80,000–\$99,999	10.1% (69)
\$100,000–\$149,999	25.1% (172)
\$150,000–\$199,999	18.5% (127)
More than \$200,000	23.4% (160)
Had Children	
Yes	45.1% (361)
No	54.9% (439)
Method of Obtaining Alcohol ^a	
Home delivery	21% (121)
In-person purchase	72% (414)
Already present at home	69% (398)

^aThese do not add up to 100% as participants could choose more than one answer choice.

consumption. The Institutional Review Board (IRB) at a medium-sized public university in the United States reviewed this study and determined that it met the requirements for exemption. Despite this, participants gave informed consent before participating in the study. Those who did not consent or who said they were under the age of 21 years were exited from the online survey.

Participants

A total of 998 participants accessed the online survey. We removed data from participants who did not confirm that they were 21 years of age or older or did not consent to participate. Consistent with recommended practices, we also removed data from participants who reported alcohol consumption greater than 3 standard deviations above the mean as these outliers may have otherwise distorted or biased the analyses.²¹ The final sample included 832 participants. The majority were female (84.4%), White (84.9%), non-Hispanic (93.3%), between the ages of 26 and 49 years (72.3%), and, had household incomes greater than \$100,000 USD (67.0%) (Table 1).

Procedures and survey

Participants were recruited from across the U.S. in May 2020 through social media posts and emails sent via group listservs. Social media recruitment included Facebook (2 posts), Twitter (3 posts) and Instagram (1 post). Two emails were sent through the U.S. Alcohol Policy Alliance listserv and one through the Alcohol, Tobacco, and Other Drug's section of the American Public Health Association listserv.

The social media posts and emails contained a link to complete the online survey. We offered participants the chance to win one of fifteen \$25 Amazon gift cards. The posts and emails were then shared or distributed through snowball sampling.

The online survey consisted of 61 questions – 18 questions that asked about alcohol consumption (14 of which were adapted from the 2018 National Survey on Drug Use and Health); 14 that asked about stress or lifestyle changes during COVID-19 (5 of which were adapted from The Pandemic Stress Index); and 29 demographic questions.

The primary exposure variable was derived from a question asking: “During the last 30 days, how did you obtain the alcohol that you were drinking?” Participants were provided with multiple answer choices and a blank space to add additional answers and told to “Check all that apply.” We collapsed responses into three non-mutually exclusive categories, including the alcohol was delivered; the alcohol was purchased in-person; and the alcohol was already present in the participant’s home. Our three outcome measures included: (1) the number of days in the past 30 days on which alcohol was consumed; (2) the total number of drinks consumed over the past 30 days (calculated by multiplying the first outcome by the average quantity of drinks consumed per day); and (3) whether participants had engaged in binge drinking (i.e., having 4 (for females) or 5 (for males) or more drinks in one sitting at least once over the past 30 days). Participants were also asked “Has your drinking changed due to COVID-19?”. This question had three answer choices: “Not at all”, “My drinking has decreased”, and “My drinking has increased”.

Data analysis

We conducted *t*-tests and χ^2 tests to determine any demographic differences in methods of obtaining alcohol. We performed two adjusted linear regressions and one adjusted logistical regression to assess whether the primary exposure variable (a binary variable indicated “1” for obtaining at least some of their alcohol via delivery and a “0” for obtaining alcohol through other methods) was associated with the number of days that alcohol was consumed, the total number of drinks consumed over the past 30 days, or the likelihood of engaging in binge drinking. We adjusted the analyses using covariates selected *a priori* based on the literature,^{22–24} including gender, race, ethnicity, age, and household income. As discussed previously, we excluded data from participants whose reported total alcohol drinks consumed was greater than three standard deviations above the mean ($n = 11$). We conducted the analyses using Stata²⁵ with a significance level of .05 and present results in terms of parameter estimates or odds ratios, 95% confidence intervals (CI), and two-sided *p*-values.

Results

Of those who consumed alcohol in the past 30 days, 21% had at least some of their alcohol delivered (Table 1). Sixty

percent had the alcohol delivered from a liquor store, restaurant, or bar. The remaining participants either had it delivered from a grocery store (16%), a third-party delivery service such as Grubhub or Uber Eats (18%), or from alcohol producers (e.g., breweries, wineries, or distilleries), wine clubs, and other places or services. In unadjusted analyses, and although comparable across all other demographics, more women (23%) than men (13%) reported having at least some of their alcohol delivered (χ^2 ($df = 1$, $n = 559$) = 3.81, $p = .051$). There were no other demographic differences between those who obtained some alcohol via delivery versus other methods in unadjusted analyses. Over two-thirds of participants already had at least some of their alcohol at home (69%) or had purchased at least some of it in person (72%).

Participants who had at least some of their alcohol delivered reported consuming alcohol a Mean (standard deviation) of 17.8 (9.9) days and consuming 36.7 (26.3) drinks over the past 30 days. In comparison, participants who obtained alcohol in other ways consumed alcohol on 12.8 (9.7) days and 24.1 (23.8) drinks over the past 30 days. In unadjusted analyses, more participants who had alcohol delivered reported binge drinking (44%) than participants who obtained alcohol through other ways (31%) (χ^2 ($df = 1$, $n = 577$) = 7.38, $p = .007$). Additionally, more participants who reported having at least some of their alcohol delivered also reported that their drinking had increased during COVID-19 (78%) than participants who obtained alcohol through other ways (55%) (χ^2 ($df = 1$, $n = 577$) = 19.73, $p < .000$).

In adjusted analyses, participants who had alcohol delivered reported consuming more drinks ($\beta = 13.3$; CI [8.2, 18.4]; $p < .001$) and drinking on more days ($\beta = 5.0$; CI [2.9, 7.0]; $p < .001$) over the past 30 days than participants who obtained alcohol through other methods. Participants who had alcohol delivered were also nearly two times more likely to report binge drinking than those who obtained alcohol through other methods (OR = 1.96; CI [1.3, 3.1]; $p = .003$).

Discussion

In this cross-sectional study of 832 U.S. adults, 21% of participants who consumed alcohol in the past month reported obtaining at least some of their alcohol via home delivery from alcohol outlets. Those participants also reported consuming significantly more alcohol (on more days and more total drinks) than participants who obtained alcohol through other methods. Participants who had alcohol delivered reported consuming alcohol on an average of 18 days and 37 drinks over the past 30 days with almost half (44%) reporting binge drinking. Participants who had alcohol delivered were also nearly two times more likely to report binge drinking in the past 30 days than participants who obtained alcohol through other methods.

These findings are cause for concern because research shows that excessive alcohol consumption leads to increases in alcohol-related harms.¹¹ These results parallel the only other study that has examined relaxed home delivery laws

during the COVID-19 pandemic. Namely, adult participants in New Zealand who used online alcohol delivery services in April/May 2020 had 75% higher odds of heavier drinking in the past week than those who purchased it in supermarkets.²⁰ Moreover, whereas only 2% of participants purchased alcohol through online delivery in 2015, 40% did so during the COVID-19 pandemic. Huckle et al.²⁰ concluded that the increase of alcohol delivery available online, coupled with a lack of regulatory oversight, required public health policy attention.

In an older (non-COVID-19-related) study, Fletcher et al.²⁶ examined participants who used alcohol home delivery services. The researchers found that problem drinkers were more likely to use alcohol home delivery services than drinkers without a history of alcohol problems. Further research needs to assess characteristics of those having alcohol delivered and other potential consequences of home delivery. For example, initial data suggests there have been increases in domestic violence and child abuse during the COVID-19 pandemic,^{27,28} but the extent to which alcohol has contributed has not been fully assessed.

Although several studies have shown an overall increase in consumption and binge drinking during the pandemic,¹⁻³ future research is needed that would carefully parse out where participants' have been consuming their alcohol and not just how they have purchased it. For example, this study did not differentiate between those participants who purchased alcohol at a bar or restaurant to consume on the premises versus those who purchased it for takeout or via curbside delivery (i.e., for consumption off the premises), nor did this study ask participants how they obtained their alcohol pre-pandemic. As such, it is important to consider that the closure of licensed premises may have resulted in a shift in where participants consumed alcohol, rather than necessarily an increase in consumption. We do not know whether the participants who had previously engaged in binge drinking in bars all shifted to home delivery when the bars closed. Even though this study reports on a correlational finding between specific variables rather than a causal one, the fact that participants who reported obtaining alcohol through home delivery also reported that their drinking had increased compared to pre-COVID-19 might suggest a relation between increased availability due to home delivery and increased consumption. Still, the cross-sectional design of this study means we cannot tell whether the association between people who get alcohol delivered and the level of consumption has changed since the onset of alcohol home delivery.

Whereas this paper focused on alcohol home delivery from on-premises outlets, off-premises outlets, and through third-party delivery services, it is important to note that online alcohol sales have also been impacted in the US during COVID-19. For example, data between March 1, 2020 and April 18, 2020 show that online alcohol sales were up by 234% compared to the same time period in 2019.¹² Future research should examine whether states changed laws during COVID-19 regarding online alcohol retailers and, if so, what was the impact of these changes. One concern is

whether this will lead to new online-only entrants to the alcohol-retail market, thus impacting alcohol sales and potentially also alcohol consumption.

Although one of the first to assess associations between home delivery and alcohol consumption during the COVID-19 pandemic, this study has limitations. First, this was a convenience sample which limits generalizability of study findings. In addition to being a convenience sample, participants were also mostly well-off, relatively young, white females. Although this is similar to findings from other online surveys,²⁹ it does limit the generalizability of the results. However, there were no demographic differences between these women and the men who participated in the study, which suggests that these findings might also apply to similarly situated white males. Even if not, given that drinking has been increasing among females while it has been decreasing among males,³⁰ and that women are at a greater risk for a variety of alcohol-related health effects compared to men,³¹ this is still an important subgroup to study. Of course, given that women report consuming drinks with higher alcohol content (e.g., wine and liquor) than men,³² future research should examine alcohol-related harms stemming from consumption of alcohol delivered to the home as this may differ by gender.

Second, we recruited participants through social media and listservs. As such, we were not able to document all contacts with potential participants nor were we able to link completed surveys with a specific recruitment method. We also were not able to track how many individuals saw the survey through social media but opted not to participate. All of these are limitations of snowball sampling.³³ Third, our questionnaire contained only one question asking how participants obtained alcohol and participants were able to choose more than one answer. This limited our ability to interpret and analyze the results as the answers from this question were not mutually exclusive. Fourth, although most participants who accessed the survey completed it (83%), there may have been some differences between those who completed it versus those who did not. However, we were not able to assess these differences. Fifth, the data on alcohol consumption are self-reported and may therefore be under- or over-reported estimates. However, research has shown that drinkers often underestimate consumption.³⁴ Sixth, we only assessed adult consumption and drinking behaviors although there is likely a connection between alcohol home delivery and youth consumption.³⁵ Future studies could assess associations between expanded home delivery and underage drinking. Finally, participants' geographic locations were not included in the analyses, and differences in state and local laws regarding alcohol sales and delivery may influence participants' choices on how to obtain alcohol and their overall alcohol consumption. Future research should further study the impact of these state laws on adult decision-making regarding alcohol consumption. Despite these limitations, these data significantly contribute to our knowledge of alcohol consumption during the COVID-19 pandemic.

In sum, this pandemic has led many states to relax their alcohol laws. In response, many states now allow alcohol outlets and third-party delivery services to deliver alcohol to consumers' homes. This study shows that about one-fifth of participants obtained at least some of their alcohol via home delivery and those who did also reported consuming significantly more alcohol than participants who obtained alcohol through other methods. Therefore, as states consider or are pressured to make these changes permanent, it is important to consider not only the financial benefits to restaurants and bars in the short-term, but also the potential harms home delivery may have on public health in the long-term.

Author contributions

EG conceived of and managed the study. EG, SBN, and SS drafted the study protocol, including the survey questions. EG analyzed the survey responses. EG took the lead in writing this manuscript. All authors, EG, SN, and SS, provided critical feedback and contributed to the writing of the manuscript.

Disclosure statement

The authors declare no conflicts of interest.

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