

# Changes in Alcohol Use Patterns in the United States During COVID-19 Pandemic

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## ABSTRACT

**Introduction:** The novel coronavirus SARS-CoV-2 (COVID-19) has rapidly emerged as a public health emergency. In the United States, “stay-at-home” orders have led to loss of social routines and the closing of restaurants and bars; as a result, sales of alcohol have increased. The aim of this study was to assess changes in alcohol use patterns as a result of social distancing measures.

**Methods:** A single online survey was sent to a convenience sample of adults through social media. Self-reported demographics and alcohol use patterns before and during social distancing were obtained.

**Results:** Four hundred seventeen subjects completed the survey; 83% were women, 77% were married, 44% were between ages 35 and 44 years. Alcohol Use Disorders Identification Test (AUDIT-C) scores increased from median value of 3 to 4 ( $P < 0.0001$ ); the increase was statistically significant only in women ( $P < 0.0001$ ). Fewer people use alcohol during social distancing; however, in those who use alcohol, the frequency and quantity ingested increased, as well as the frequency of alcohol use prior to 5 PM. Despite these increases, there was an overall reduction in binge drinking pattern. Multivariate analysis identified women, having children at home, and a history of substance abuse to be associated with increase in alcohol use.

**Conclusion:** Among those who continue to drink alcohol, social distancing has led to a significant increase in the amount of alcohol ingested, frequency of alcohol use, and an increase in AUDIT-C scores in women suggesting hazardous alcohol use behaviors. Clinicians should continue to assess patient alcohol use during the pandemic. Further studies will be needed to assess long-term outcomes after the COVID-19 pandemic resolves.

## INTRODUCTION

The novel coronavirus, SARS-CoV-2, and the COroNaVIrus Disease 2019 (COVID-19) have rapidly emerged as a public health emergency, with the World Health Organization (WHO)

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characterizing the outbreak as a pandemic on March 11, 2020. In the United States, at least 43 states implemented social distancing measures such as “stay-at-home” or “shelter-in-place” orders designed to mitigate disease spread and reduce the burden of COVID-19 on the health care system. However, the loss of usual routine and reduced social and physical contact have been demonstrated to have psychological impact leading to boredom, frustration, and a sense of isolation. Additionally, quarantine measures have led to financial difficulty for many families and created socioeconomic distress, which is also considered a risk factor for anger and anxiety in the months after a quarantine.<sup>1</sup>

The initial impact of social distancing on alcohol sales across the United States is apparent. According to Nielsen research firm, alcohol sales increased by 55% the initial week of social distancing (March 21, 2020) compared to the same time last

year.<sup>2</sup> It is unclear if the closure of restaurants and bars has led to more alcohol purchases for home consumption or hoarding rather than overall increased alcohol use. On-demand alcohol delivery app, Drizly, saw a 300% increase in sales in March 2020, largely driven by new customers. According to Doodle, an online scheduling platform, there was a 296% increase in group meetings booked specifically for virtual happy hours and drinking events in March 2020.<sup>2</sup>

While many people consider themselves “social drinkers,” in-person social networks and neighborhoods have been protective against alcohol and drug use. Fewer ties in an in-person social

network produces a small but significant predictor of alcohol consumption.<sup>3-5</sup> Previous world and national disasters leading to a loss of one's social network have been shown to impact alcohol use patterns. Studies completed during SARS epidemic and after Hurricane Katrina and the terrorist attack on 9/11 all cite increased alcohol use and/or abuse.<sup>6-8</sup> Additionally, stress and loneliness have been shown to have a relationship with increased alcohol use.<sup>9,10</sup>

The aim of this study is to assess the impact of social distancing recommendations on alcohol use patterns during the COVID-19 pandemic. A secondary aim of the study was to identify risk factors of alcohol misuse or alcohol use disorder.

## METHODS

An anonymous online survey was distributed to a convenience sample via private groups on Facebook, a social media platform, to participants who were older than 18 years of age and had access to social media. The demographics of this convenience sample were based largely on interest groups within the authors' geographic location and previous membership. The survey was approved by the Medical College of Wisconsin's Institutional Review Board. It was distributed on April 5, 2020 in English only and remained active for 7 days. Baseline demographic information was obtained, along with measures of alcohol use before and after initiation of social distancing. For the purpose of the study, March 15, 2020 was identified as the date prior to social distancing because start dates of stay-at-home orders ranged from March 19 to March 25, 2020, depending on location in the United States. Population density was calculated based on respondent ZIP code and was considered low (<10,000 people/m<sup>2</sup>), medium (10,000-50,000 people/m<sup>2</sup>), and high (>50,000 people/m<sup>2</sup>).

## Measures

Alcohol use was measured using the Alcohol Use Disorders Identification Test (AUDIT-C)—a previously validated tool to used identify persons who are hazardous drinkers or have alcohol use disorder.<sup>11</sup> The AUDIT-C is scored from 0 to 12 with a score of  $\geq 3$  in females and score of  $\geq 4$  in males indicating potential high-risk alcohol use behaviors. A higher score indicates that a patient's drinking may be affecting their safety. If the points from AUDIT-C are obtained from frequency of alcohol use—the first item on the questionnaire—it is recommended that the respondent be reevaluated longitudinally to assess for other signs of alcohol misuse or use disorder.

## Statistical Analysis

Descriptive analysis was performed on respondent's demographic information. Predictor variables included self-reported ZIP code, education level, race/ethnicity, age, sex, marital status, children at home, household income, social distancing practices, and use of social media, along with mental health and substance abuse history. Chi-square test was used to compare the ordinal result of fre-

**Table 1.** Baseline Demographic Information

Demographics	N (%)
<b>Age (n=407)</b>	
18-24 years old	7 (1.71%)
25-34 years old	83 (20.29%)
35-44 years old	180 (44.01%)
45-54 years old	78 (19.07%)
55-64 years old	26 (6.35%)
> 65 years old	33 (7.99%)
<b>Sex (n=405)</b>	
Male	66 (16.30%)
Female	338 (83.45%)
Prefer not to answer	1 (0.25%)
<b>Population density (n=390)</b>	
Low population density (<10,000)	16 (4.10%)
Medium population density (10,000-50,000)	317 (81.28%)
Large population density (50,000)	57 (14.62%)
<b>Highest level of education (n=408)</b>	
High school	10 (2.45%)
Some college	28 (6.86%)
College	155 (37.99%)
Graduate school	215 (52.70%)
<b>Marital status (n=408)</b>	
Single	62 (15.20%)
Married	316 (77.45%)
Divorced	30 (7.35%)
<b>If married, is spouse working from home (N=316)</b>	
Yes	210 (66.46%)
No	106 (33.54%)
<b>Children (n=404)</b>	
Yes	303 (75%)
No	101 (25%)
<b>If children, are they home from school (n=302)</b>	
Yes	242 (80.13%)
No	60 (19.87%)
<b>Annual household income (n=401)</b>	
< \$69,999	49 (12.22%)
\$70,000-\$99,999	51 (12.72%)
\$100,000-\$149,999	83 (20.70%)
>\$150,000	218 (54.36%)
<b>Previous mental health disorder (n=408)</b>	
Yes	155 (38%)
No	249 (61.02%)
Prefer not to answer	4 (0.98%)
<b>Previous substance abuse hx (n=408)</b>	
Yes	15 (3.68%)
No	389 (95.34%)
Prefer not to answer	4 (0.98%)
<b>Race/ethnicity (n=408)</b>	
White	374 (91.67%)
Black	1 (0.25%)
American Indian/Alaska Native	0 (0%)
Asian	21 (5.15%)
Native Hawaiian or Pacific Islander	0 (0%)
Hispanic	3 (0.73%)
Other	9 (2.20%)
<b>Are you working from home (n=402)</b>	
Yes	247 (61.44%)
No	155 (38.56%)
<b>Social distancing (n=408)</b>	
Yes	404 (99.02%)
No	4 (0.98%)
<b>Social platform interaction (n=408)</b>	
Yes	378 (92.65%)
No	30 (7.35%)

**Figure.** Subject Responses to Alcohol Use Questions From the Survey



quency, quantity, and early time of alcohol use between “prior to” and “during” social isolation. McNemar test was used to compare paired binary variables. The paired *t* test was used to compare the change of AUDIT-C scores. Additional univariate and multivariable analyses were performed to assess the relationship among demographic variables and the change of AUDIT-C scores prior to and during social isolation. *P* value of <0.05 was considered statistically significant.

## RESULTS

### Study Population

The study population was a convenience sample of a total of 417 people who consented to participate in the questionnaire. Nine respondents were excluded due to incomplete survey data, leaving 408 subjects for analysis. The majority were from Wisconsin and Illinois (57%), 44% were between the ages of 35 and 44 years old, 83% were female, and 53% had completed graduate school. Most respondents (77%) were married and had an annual household income >\$150,000. Eighty percent of respondents had children who were home from school, 38% reported a previous mental health diagnosis, and 3.7% had a previous substance abuse history. Most respondents were white (Table 1).

### Questionnaire Responses

Questionnaire responses regarding alcohol use were evaluated for the periods both prior to and during social distancing (Figure). Respondents who reported complete abstinence from alcohol increased from 6.1% prior to social distancing to 12.5% after initiation of social distancing (*P*=0.002). Additionally, those who reported any binge-pattern drinking (>6 drinks) reduced from 45% to 29.7% after social distancing initiation (*P*=<0.0001).

For those respondents who report drinking alcohol, there was a significant increase in frequency of alcohol use (*P*<0.0001), the quantity of alcohol consumed per day (*P*=0.05), and the frequency of alcohol ingestion prior to 5 PM (*P*<0.0001) (Figure).

Overall AUDIT-C scores increased from a median of 3 to 4 (*P*<0.0001) (Table 2). When controlled for sex, the increase score was statistically significant in women (median 3 vs 4, *P*<0.0001) but not men (median 4 vs 4, *P*=0.7). Using AUDIT-C scores of ≥3 for women and ≥4 for men to identify individuals at risk for alcohol abuse/dependency, there was no statistically significant difference in the overall number of men or women screening positive for alcohol abuse/dependency prior to social isolation versus during social isolation (*P*=0.15 and 0.14 for males and females, respectively). However, as some respondents had improvement

Pre-Social Distancing	Range	Median Value (25%-75%)	Social Distancing	Range (25%-75%)	Median Value	P value
AUDIT C score	0-11	3 (2-4)	AUDIT-C score	0-12	4 (2-5)	<0.0001
Men		4 (3-7)	Men		4 (3-7)	0.7
Women		3 (2-4)	Women		4 (2-5)	<0.0001
How often do you drink alcohol?	0-4	2 (2-3)	How often do you drink alcohol?	0-4	3 (2-3)	<0.0001
Men		3 (2-4)	Men		3 (2-4)	0.6
Women		2 (2-3)	Women		2 (2-4)	<0.0001
Positive AUDIT-C	256		Positive AUDIT-C	260		

Abbreviation: AUDIT-C, alcohol use disorders identification test.

in scores during social distancing (positive AUDIT-C to negative AUDIT-C during social distancing) and some had worsening scores (negative AUDIT-C to positive AUDIT-C during social distancing), it is important to note that women were more likely than men to develop high-risk behaviors during social distancing (63% vs 25%,  $P=0.03$ ). There was a significant increase in the number of people who had a score of 3 for women based solely on the first question of the AUDIT-C questionnaire related to frequency of alcohol intake per week (29% pre vs 45% during social distancing).

Univariate analysis demonstrated sex (0.4 female vs -0.1 male,  $P=0.03$ ), having children at home (0.47 home vs 0.1 not,  $P=0.01$ ), high education level (0.4 graduate school vs 0.2 other,  $P=0.07$ ), and substance abuse history (0.3 no history v 1.1 positive or prefer not to answer,  $P=0.03$ ) to be statistically significant or have a trend toward statistical significance associated with a change in AUDIT-C score. In a multivariable analysis, sex ( $P=0.03$ ), having children at home ( $P=0.01$ ), and no history of substance abuse ( $P=0.02$ ) remained significant. (Table 3)

## DISCUSSION

To our knowledge, our study is the first of its kind to investigate patterns of alcohol use prior to and after implementation of social distancing as it relates to the COVID-19 pandemic. The timely nature of the questionnaire allows for immediate recall of alcohol use. Additionally, the AUDIT-C scoring system has validity and reliability regarding our variable of interest. Alcohol use was common among respondents at baseline, with 93.2% reporting some alcohol use vs 86.9% after social distance initiation. While the overall number of people using alcohol decreased, the frequency and amount of alcohol ingested increased significantly in those who continued to drink alcohol. There was an overall reduction in those who drank alcohol in binge manner with >6 drinks per sitting. There was also a trend for higher alcohol abuse based on AUDIT-C scoring during social distancing, with the most new cases of alcohol abuse noted in women.

Most people reported drinking 1 to 2 drinks per sitting (78%) or 3 to 4 drinks (18%) before social distancing. This remained largely unchanged at 72% and 21%, respectively, during social distancing; but those who reported drinking 5 to 6 drinks daily

increased significantly (2.0% to 5.5%). Similar increases in alcohol use after tragedy or disasters are seen in other studies following 9/11 and Hurricane Katrina.<sup>12</sup> Additionally, alcohol use prior to 5 PM occurring more than monthly increased from 3% prior to social distancing to 15% after social distancing.

A previous diagnosis of a mental health disorder, such as anxiety or depression, did not correlate with a change in alcohol use—similar to previous studies on alcohol use related to 9/11.<sup>13</sup> However, a previous history of substance abuse did correlate with an increase in alcohol use, which is also similar to other studies.<sup>7</sup>

The majority of our study population was comprised of white women of high socioeconomic status and may not be generalizable to the entire population; however, the findings of increased alcohol frequency in women is notable. Similarly, after 9/11, Richman et al found an increase in alcohol use among women but not men.<sup>14</sup> This is of particular concern since prior to the COVID-19 pandemic, alcohol use rates were already increasing globally and in the US—particularly in women. The National Epidemiologic Survey on Alcohol and Related Conditions showed alcohol use rose from 65% to 72% between 2001 and 2012 in the US, and the increase was more evident in women.<sup>15</sup> Women also had an 80% increase in alcohol use disorder (AUD) over a 10-year time period.<sup>15</sup> The prevalence of alcoholic cirrhosis is also increasing. The cirrhosis prevalence among a privately insured population in the United States increased by 43% over a 7-year time period, including a 50% increase in women compared with 30% in men.<sup>16</sup> Moreover, one study demonstrated that women had an increased risk for cirrhosis at the same level of alcohol when compared to men.<sup>17</sup>

Several factors may contribute to increased and high-risk alcohol use as evidenced by the increase in AUDIT-C scores in women versus men during the COVID-19 pandemic. The threshold for high-risk alcohol use in women requires lower amounts of alcohol than in men. While most respondents are drinking less than 4 drinks per day, greater than 2 drinks per day is potentially harmful drinking for a woman. Additionally, women are now a larger portion of the workforce, with married women being employed in 55.6% of families.<sup>18</sup> Among married-couple families with children, 63% had both parents employed. Our study found that parents with children at home due to school and daycare closings

were more likely to have an increase in their AUDIT-C score than those who do not have children or their children are living on their own. During the COVID-19 pandemic, 35% of respondents in a Pew Research study report childcare issues have been very or somewhat difficult for them.<sup>19</sup> While men have increased the amount of time spent on child-care in recent years, working women still spend more time on childcare (18 hours per week for women vs 8 for men), perhaps because women feel more pressure to be involved as a parent (77% vs 49%).<sup>18</sup> The added pressure may be heightened disproportionately in women with children who are homeschooling while simultaneously working from home, placing them at greater risk for high-risk drinking, as demonstrated in this study.

There are several limitations to this study. Primarily, the study is optional and self-reported, creating the possibility of both response bias and reporting bias. The questionnaire was a convenience sample of a somewhat homogeneous population, which may impact results. The responses were anonymous to attempt to reduce reporting bias. Respondents had a notable lack of diversity in race and socioeconomic status, which may limit generalizability. This is noteworthy as minorities and those earning <\$19,999 also have been shown to have increased rates of high-risk drinking.<sup>15</sup> These findings are not reflected in our study results, likely due to small sample size. Additionally, our study looks at short-term changes in alcohol use during an ongoing pandemic. The AUDIT-C is a screening tool designed to identify those with high-risk drinking behaviors and does not diagnose alcohol use disorder. AUDIT-C was not validated for use in a quarantine setting and should be evaluated longitudinally. We used this tool to assess change in alcohol use patterns.

Overall, in this population, social distancing and the COVID-19 pandemic have led to an increase in the frequency and amount of alcohol consumed, as well as an earlier start to drinking during the day in those people who continue to use alcohol. Despite more frequent use and higher quantities, there was a reduction in individuals drinking alcohol in a binge manner of >6 drinks per sitting. Continued increased use of alcohol may place people at risk for alcohol-related disorders, such as alcohol-related liver disease and acute alcoholic hepatitis. Previous studies of alcohol use after the traumatic event of 9/11 found that while there was an immediate increase in alcohol use, the long-term increase in alcohol consumption was negligible.<sup>20</sup> The COVID-19 pandemic and the required duration and effects of social isolation are currently unknown as opposed to an isolated event such as 9/11 or Hurricane Katrina. While there is a clear increase in frequency of use, the quantity of alcohol per session of drinking has not changed drastically for most people. It is unclear how more frequent drinking of alcoholic beverages may be harmful to one's health in the short term. In these situations, it is imperative to reassess individuals longitudinally to evaluate for alcohol dependency. Providers should be

**Table 3.** Univariate and Multivariate Analysis

Predictors of Change in AUDIT-C Score During Social Distancing vs Pre-social Distancing		
Univariate	Change in Score	P value
Age		0.35
18-24	-0.3	
25-34	0.17	
35-44	0.51	
45-54	0.18	
55-64	0.11	
>65	0.21	
Sex		0.03
Male	-0.1	
Female	0.4	
Population density		0.41
1	0.44	
2	0.34	
3	0.14	
Education		0.07
Graduate Degree	0.4	
Other	0.2	
Marital status		0.85
Single	0.26	
Married	0.33	
Divorced	0.18	
If married, is spouse working from home		0.48
Yes	0.37	
No	0.24	
Income		0.63
<\$34,999	-0.42	
\$35,000-69,999	0.22	
\$70,000-99,999	0.23	
\$100,000-149,999	0.46	
>\$150,000	0.34	
Do you have children		0.19
Yes	0.38	
No	0.14	
Are there children at home		0.02
Yes	0.47	
No	0.09	
Mental health history		0.44
Yes	0.42	
No	0.23	
Prefer not to answer	0.75	
Substance abuse history		0.03
Positive history	1.1	
Negative history	0.3	
Race/ethnicity		0.76
Caucasian	0.31	
Black/African American	0	
Asian	0.25	
Hispanic	-0.67	
Other	0.75	
Working from home		0.84
Yes	0.3	
No	0.34	
Practice social distancing		0.81
Yes	0.31	
No	0.5	
Social platforms		0.27
Yes	0.28	
No	0.62	
Multivariate	Regression Coefficient	P value
Children at home	0.4	0.017
Sex (Female)	0.5	0.03
Lack of substance abuse history	-0.9	0.02

aware of the importance of addressing substance use during and after the pandemic, particularly if the timeframe of social isolation is prolonged.

## CONCLUSION

The COVID-19 pandemic is an unprecedented event in the lives of Americans. Stay-at-home orders, school cancellations, and financial instability have led to increased stresses in our lives. This study demonstrates that while there is a higher proportion of total alcohol abstinence, in those who continued to consume alcohol, social distancing has led to increased alcohol use frequency and amount, as well as an earlier start time for drinking during the day. The increased alcohol use appears to be most prominent in women, parents with children at home, and those with previous history of substance abuse. Additional studies should be performed on a larger, nationally representative sample to confirm these findings. Longitudinal studies are needed to determine the impact of increased alcohol use should it persist.

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