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## Lingering Effects of COVID-19 Stressors on Mental Health and Alcohol Use in Middle Aged to Older Adults

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### Abstract

**Background:** Older adults have faced not only health threats but grave mental health challenges since the emergence of the Coronavirus disease 2019 (COVID-19) pandemic. Using factor analysis, this study is the first to identify the underlying dimensions of COVID-19-related stressors, then examine the relationship between these factors and mental health and alcohol use/misuse longitudinally in a middle aged to older adult sample in the United States.

**Methods:** As part of a long-term follow-up study, 921 survey participants completed measures of COVID-related stressors, psychological distress, and alcohol use/misuse in a 2020 survey. An exploratory factor analysis was conducted to examine the dimensionality of COVID-related stress. Regression models were utilized to examine relationships between the extracted factors and depression, anxiety, and alcohol-related outcomes measured approximately one year later, in 2021.

**Results:** Four dimensions of COVID-19 stressors were extracted, including 1) jobs, finances and loss of routine; 2) practical difficulties; 3) social worries and challenges; and 4) supply shortages. Practical difficulties were associated with higher depression at follow-up, while jobs, finances and loss of routine were associated with past 12 month frequency of intoxication at follow-up.

**Conclusions:** Challenges from the pandemic may have longer-term implications for mental health in older adults past the acute phase of the pandemic. It is important to allocate sufficient attention and resources to the prevention of late life depression and mental health as policymakers and health professionals continue to deal with the pandemic and future variants of the virus.

### Keywords

COVID-19; stress; alcohol use; mental health; older adults

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**Tracy W. Lin:** Writing – original draft, Methodology, Formal analysis, Conceptualization. **Judith A. Richman:** Writing – review & editing, Conceptualization. **Timothy P. Johnson:** Writing – review & editing, Data curation. **Kathleen M. Rospenda:** Writing – original draft, Project administration, Methodology, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## 1. Introduction

Coronavirus disease 2019 (COVID-19) has wreaked havoc across the globe since it was declared a pandemic on March 11, 2020 [1]. Older adults face several challenges due to the pandemic, not only in terms of elevated risk for mortality and severe illness, but high mental health and economic costs as well [2,3]. The associated quarantines and social isolation amid the earlier phases of the pandemic resulted in mental distress such as depression and loneliness in older adults [4], while other reported stressors included health threats, job security concerns, financial problems, and disruptions to normal and social routines [5-7]. Several studies also observed an increase in older adults' alcohol use during the pandemic [8,9], with some research finding a more pronounced increase compared to younger adults [10,11], although the opposite observation has been reported as well [12].

Despite the broad literature on the various impacts of COVID-19, relatively limited studies look at the impact of COVID-19 on mental health past the acute phase of pandemic, after vaccines were made available to the public and more restrictions were lifted. Current longitudinal studies mostly examine COVID-19 and mental health from prepandemic or beginning of lockdown to some point during the pandemic in 2020, finding mixed results with decreased depression and anxiety [13], increased depressive symptoms [14] to no mental health changes [15] in older adults. Whether these findings persist beyond the earlier and acute phases of the pandemic remains understudied, while experts have cautioned about potential lingering and long-term effects of the pandemic on mental health, which are not yet fully understood [16,17].

To the best of the authors' knowledge, only one other study has examined the factor structure of different stressors related to the COVID-19 pandemic, focusing on anticipated stressors among college students. In the study, five domains of COVID-19 concerns were identified, including job insecurity, social/relational, financial, illness-related, and school-related stressors [18]. A longitudinal study conducted between September 2020 to August 2021 revealed that young adults reported more symptoms of depression and anxiety in months where stressors were more salient, and social/relational stressors were most strongly associated with mental health indices and alcohol use [19]. Utilizing survey data collected from a sample of middle aged to older US adults from 2020-2022 during the pandemic, the present study conducts an exploratory factor analysis to capture the underlying dimensions of COVID-19-related stressors. Unlike the previous factor analysis study, the present study focuses on actual experiences, instead of anticipated stressors, in an older adult sample. The present study also examines the relationship between these factors and depression and anxiety, as well as alcohol use/misuse outcomes longitudinally over two waves of data.

## 2. Methods

### 2.1. Participants

Respondents were drawn from a prior survey sample, originally of university employees, in 1996 (N=2492). Information about the original sampling strategy and follow-up surveys has been published elsewhere [20]. In 2020, prior study participants who were not known to

be deceased (n=40), had not requested removal from future surveys (n=62), and for whom we had contact information (n=2387) were resurveyed by web or mail (respondents could choose their preferred response mode to reduce possible barriers to response) between July 2020 – February 2021 (2020 survey) and again about one year later, August 2021-May 2022 (2021 survey). Fig. 1 below depicts a flow chart summarizing the sample exclusion criteria and response for the 2020 and 2021 surveys, including non-respondents. A total of n=921 valid responses were received for the 2020 survey (4 responses were disqualified due to demographic mismatch with sample record; 39.2% reinterview rate excluding known deceased or 38.6% including known deceased [21] - demographics reported in 3.1) and n=780 for the 2021 survey (84.7% retention rate). The study was approved by the University of Illinois Institutional Review Board (protocol 2019-0374).

Attrition analyses comparing study variables for those who completed the 2020 survey but not the 2021 survey indicate that those who did not participate were more likely to be younger ( $p < 0.05$ , t-test).

## 2.2. Measures

**2.2.1. COVID-19 Stressors Scale**—The research team developed 27 items to assess exposure to various stressors associated with the COVID-19 pandemic in the 12 months prior to the first survey. Items were developed based on media reports of COVID-related experiences, personal experiences of the pandemic, experiences expressed by colleagues and personal contacts, a Kaiser Family Foundation poll about the impacts of the pandemic on American life [22], and items from the Life Change Consequences of the Great Recession measure [23] modified to assess stressors associated with COVID rather than the Great Recession. Example items are, “Your living situation or job situation put you at risk for the virus,” “Whether employment will continue,” and “technology problems.” Item wording was reviewed by the research team and 27 items were agreed upon collectively for inclusion in the survey. Items were scored on a yes/no response scale. Twenty of the items were retained for analysis after reviewing the frequency distributions: items with less than 7% variation in the responses were dropped from further analysis (see Table 3 for the final set of 20 items). An overall COVID stress score was also created by summing the 20 items.

### 2.2.2. Outcome variables

**2.2.2.1. Depressive symptoms:** Symptoms of depression in the past 7 days were measured with seven items drawn from the Center for Epidemiologic Studies Depression scale (CES-D;  $\alpha = 0.83$ ), which correlate highly with the full CES-D [24] (e.g., I could not shake off the blues; I had trouble keeping my mind on what I was doing). Items were scored on a scale from 1 (rarely or none of the time – under 1 day) to 4 (most or all of the time – 5-7 days). Higher scores indicate greater symptoms of depression.

**2.2.2.2. Anxiety symptoms:** Symptoms of anxiety in the past 7 days were measured with the 9-item tension-anxiety factor of the Profile of Mood States ( $\alpha = 0.83$ ) [25] (e.g., tense, panicky) rated on a scale of 0 (not at all) to 4 (extremely). Higher scores indicate greater symptoms of anxiety.

**2.2.2.3. Alcohol use and misuse:** “Alcohol consumption patterns were assessed with frequency - quantity - variability of use in the past 30 days [26]. Frequency was measured in terms of number of days alcohol was consumed in the past 30 days (0-30). Usual quantity of alcohol consumed (quantity of use) and greatest amount of alcohol consumed on days when alcohol was consumed (variability of use) were each measured on a scale of 0 - 7 of which 0 represents "never" and 7 represents "5 or more times/week". We also assessed binge drinking (frequency of consuming 6+ drinks on one occasion) and frequency of drinking to intoxication in the past 12 months, each measured on a scale of 0-7 of which 0 represents "never" and 7 represents "5 or more times/week" [27].

Alcohol misuse in the past 12 months was assessed with the 10-item Brief Michigan Alcoholism Screening Test (BMAST), which correlates highly with the full-length MAST [28]. Because our sample was not considered high-risk for alcohol use disorder and the positive predictive value of the BMAST in detecting alcohol use disorder in the general population has been questioned [29], we used the BMAST as a continuously scored instrument to indicate relative degree of alcohol misuse, rather than attempting to classify people as likely having alcohol use disorder.

### 2.3. Statistical Analysis

As COVID-19 was a pandemic that had newly emerged, an exploratory factor analysis was conducted with Promax rotation in Stata 17. Because all 20 items in the survey were binary (0 = No, 1 = Yes), a tetrachoric correlation was utilized. Four factors were extracted following Kaiser's criterion of eigenvalue > 1 [30]. Cronbach's alpha was utilized to measure internal consistency among the 20 items.

Eight ordinary least squares (OLS) regression models were subsequently performed to examine the relationship between the factors derived from the 2020 survey data and depression, anxiety, and various alcohol outcomes at follow-up. The alcohol outcomes included: BMAST score (continuous), how often respondents had six or more drinks in the last 12 months (alc6 - continuous), the greatest amount drunk in a single day in the last 30 days (almost - continuous), the number of days drank alcohol in the last 30 days (alcdays - continuous), usual drinks per day when drinking in the last 30 days (alcpd - continuous), and how often respondents became drunk in the past 12 months (alcdrnk - continuous). Covariates included race, age, sex, Hispanic ethnicity, life stressors, work stress, income, and levels of each outcome variable in the 2020 survey. Race was controlled for via dummy variables for Black, Asian, Multiracial and Other, with White as the reference group. Life stressors were measured by the List of Threatening Experiences (LTE-Q), a summed checklist of 12 stressful life events (yes/no), reflecting highly stressful experiences reported in a general population sample (e.g., serious problem with a close friend, neighbor, or relative; fired from a job; break off of a steady relationship) [31]. Work stressors were measured by the Psychological Demands (5 items), Decision Authority (3 items) and Skill Discretion (6 items) scales of the Job Content Questionnaire [32] to assess psychological workload and sense of control over one's work.

### 3. Results

#### 3.1. Descriptive statistics

The sample manifested a mean age of 63 years ( $SD=10.41$ ) at the time of the 2020 survey (range 45-109, 58.2% 60 years and older), 58.7% female, and majority 66.1% White (Black 20.9%; Asian 10.4%; Multiracial or Other 2.6%). 6.29% of the sample was of Hispanic ethnicity. The mean overall COVID stress for the 2020 survey was 7.61 ( $SD=3.47$ ); the COVID-19 Stress Scale had acceptable internal consistency with a Cronbach's alpha of 0.73. Tables 1 and 2 depict sample demographics and summary statistics for the study variables at followup.

#### 3.2. Factor Analysis

The factor analysis results are shown in Table 3. The eight items loading on Factor 1 (F1) relate to concerns regarding job and finances, as well as a loss of usual routine ( $\alpha=0.65$ ). Hence, this factor was labeled "jobs, finances and loss of routine". For Factor 2, boredom was eliminated due to insufficient factor loading ( $CITC < 0.3$ ; Cronbach's alpha remained at 0.73 for the COVID stress scale after removal of the item boredom). While the remaining items loading on Factor 2 (F2) are varied, the majority relate to difficulties or being unable to carry out certain activities as a result of the pandemic ( $\alpha=0.38$ ). We named this factor "practical difficulties" accordingly. Factor 3 (F3) comprises five items mostly indicating concerns about friends and family due to COVID-19 and was labeled "social worries and challenges" ( $\alpha=0.54$ ). Lastly, Factor 4 (F4) consists of two items, both representing the inability to find essential items ( $\alpha=0.63$ ). This factor was labeled "supply shortages".

#### 3.3. Associations between extracted factors and outcomes

Table 4 below denotes the associations between the four extracted factors from the 2020 survey and outcomes at follow-up, while controlling for outcomes measured in the 2020 survey. In these regression models, F2 was significantly associated with higher depression (as measured by CES-D) at follow-up in 2021 ( $B=2.90$ ,  $p=0.009$ ). F1 was associated with a 1.45 percentage point increase in frequency of intoxication in the past 12 months ( $p=0.004$ ) at follow-up.

### 4. Discussion

While the study's findings are consistent with other research demonstrating that the COVID-19 pandemic has been associated with increased depression and alcohol use in older adults, the authors were able to utilize longitudinal data to examine outcomes more than two years into the pandemic. Our research also adds to the literature by analyzing the underlying dimensions of COVID-related stressors based on real life experiences and by examining which factors were associated with depression and alcohol use past the acute phase of the pandemic and vaccine uptake. Factor 1, "jobs, finances and loss of routine" was associated with frequency of intoxication in the past 12 months at follow-up. In several samples where an increase in drinking and alcohol-reported problems were observed during the pandemic, financial stress, job loss and changes to routine were reported as significant predictors [12,33,34]. Factor 2, "practical difficulties" was correlated with higher symptoms

of depression at follow-up. This is unsurprising, given the disruptions to daily life the pandemic caused not only in terms of health threats and job and financial issues, but also the interference in normal and social routines and day to day operations as well. The relationship between life event changes and distress is well-documented prior to and during the pandemic [6,35]. As part of practical difficulties, the authors note that “trouble voting or accessing a polling place” was the highest loading item on F1. As the first survey reported here was conducted in 2020, it is possible this was due to the anxiety and uncertainty surrounding the 2020 U.S. presidential election process and outcome, which was at the forefront of people’s minds at the time [36].

Only factors 1 and 2 were observed to have a longer-term impact on outcomes. Job and financial situations and practical difficulties that take time to address may change less quickly than situations based on government mandates and levels of virus risk such as social isolation. For example, in studies citing increased depression in older adults during the pandemic, COVID restrictions’ shielding effect and less family gatherings were found to be risk factors [37,38]. During the time of the 2020 survey, the U.S. was only a few months past widespread stay-at-home orders imposed by states, and panic buying and stockpiling were widespread contributing to supply shortages [39,40]. In contrast, by follow-up in 2021, vaccine uptake was prevalent in the country, booster vaccines were made available to the public, more restrictions had been lifted, and masking guidelines were relaxed [39]. Results from this study suggest that COVID-19 may have lingering and longer-term effects on mental health and alcohol use beyond the acute phase of the pandemic.

Because one goal of this study was exploring the factor structure of a measure of COVID-19 related stressors, we did not have explicit hypotheses about how extracted factors would relate to outcomes. It’s possible that Factor 3, related to social worries and challenges was not associated with greater drinking two years later because drinking tends to be a social activity, and those with greater social worries may have been more likely to cut down on social activities and associated drinking activities. Factor 4, related to transitory supply shortages, involved more time-limited stressful experiences compared to the other extracted factors, and thus much less likely to have lingering effects on mental health and drinking behavior.

These findings are important because they demonstrate that certain COVID-related stressors involving employment and finances (Factor 1) and practical difficulties that may have heightened feelings of social and health-related disenfranchisement (Factor 2, e.g., not being able to vote; technology problems possibly preventing maintenance of social obligations remotely; being unable to go to the doctor or dentist) are potentially more impactful to longer-term mental and behavioral health than other COVID-related experiences. Health and mental health care providers who are aware of patients who experienced these types of stressors during the height of the pandemic may want to more thoroughly assess these patients for depression and misuse of alcohol. These findings also highlight the general importance of screening patients for exposure to stressors that are known to be associated with negative outcomes as part of treatment planning. The findings require replication in larger, more representative samples, as well as future research into the potential moderating effects of age, sex, and race/ethnicity. However, findings suggest that assessing stressors

related to patients' employment and financial situation, and disenfranchisement may be particularly important currently as we continue to emerge from the COVID-19 pandemic, as well as during future public health emergencies, in order to address any emergent or lingering mental or behavioral health sequelae.

There are several limitations to this study. First, as all COVID items were binary (yes/no), we were unable to measure the relative degree to which survey participants experienced each stressor, which may also have contributed to less-than ideal reliability for Factors 2 and 3. As such, results for these factors should be treated as tentative. Psychometric properties of these factors may also be improved through the addition of related items to improve reliability. Confirmatory factor analysis should also be performed in future studies to test the measure's factor structure. Despite deficits in reliability for two of the subscales, the overall reliability of the scale was good, making the measure a good option for researchers who are most interested in overall levels of COVID-related stress. It should also be noted there may be other unmeasured factors connected to poor mental health during the pandemic which were not captured by the COVID-related stressor items, despite the authors' thorough review of academic and non-academic literatures for item development.

Another limitation is that the study utilized self-reported data, which is subject to recall bias and did not rely on diagnostic interviews to determine major depression, generalized anxiety disorder, or alcohol use disorders. Additionally, attrition analyses indicated that younger persons were under-represented in the final 2021 sample. As such, the findings on the associations between COVID stress factors and binge drinking and depressive symptoms could be considered as conservative tests of these associations, given that those with higher levels of these variables were somewhat less likely to remain in the study. Finally, survey participants had a mean age of 63 at the time of the 2020 survey, further suggesting that results from our study may not be generalizable to younger samples.

Despite these study limitations, it is the first to the authors' knowledge to develop and examine the dimensionality of a measure of COVID-related stressors in a racially and ethnically diverse middle aged to older sample. We demonstrated that there are meaningfully different dimensions of stressful experiences related to the pandemic, then examine the relationship between these factors and mental health and alcohol use/misuse longitudinally more than two years into the pandemic. We hope that other researchers will be encouraged to use and further test our measure in different samples, and with different health-related outcomes, past the time frame in our study.

## 5. Conclusion

In conclusion, this study found that specific dimensions of COVID-19 stress are associated with negative mental health and changes in alcohol consumption over time, and that challenges from the COVID-19 pandemic and possible future pandemics may have longer-term implications for mental health in middle aged and older adults past the acute phase of the pandemic. Although the study was initially drawn from a university-employed sample and the results may not be generalized to the general population, it nonetheless emphasizes the importance of promoting healthy aging within year 3 of the pandemic and beyond.

Allocating sufficient attention and resources to the prevention of late life depression and mental health as policymakers and health professionals deal with the lingering impact of the pandemic and future variants of the virus is crucial.

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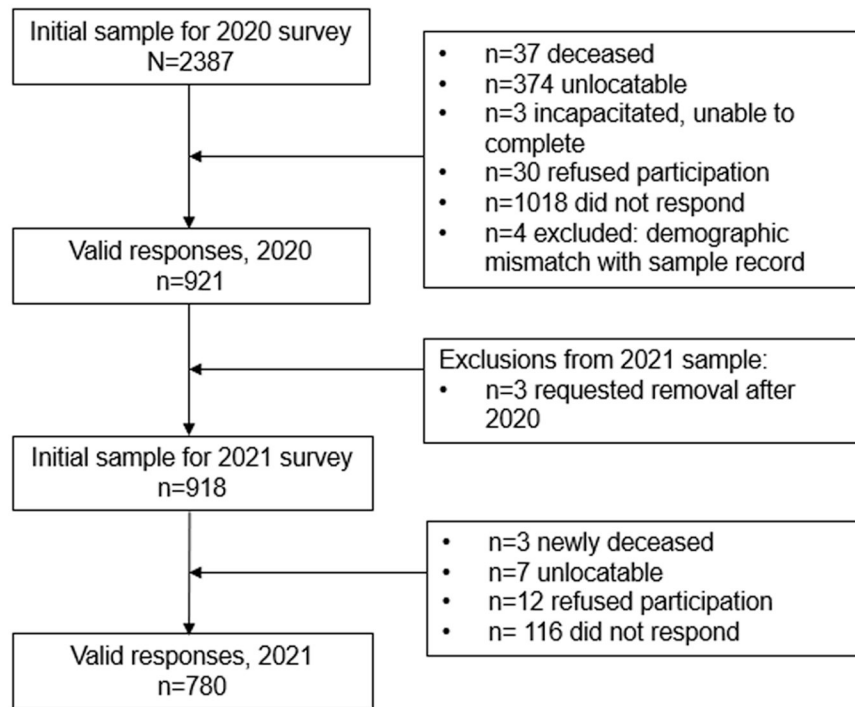
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**Fig. 1.** Flow Chart Depicting Exclusion Criteria Across the 2020 and 2021 Surveys

**Table 1**

## Sample Demographics from the 2020 Survey

Sample Demographics	2020 (n=921) (%)
Gender	
Male	41.3%
Female	58.7%
Age	
Under 60 years	41.8%
60 years and older	58.2%
Race	
White	66.1%
Black	20.9%
Asian	10.4%
Multiracial/Other	2.6%
Hispanic Ethnicity	
Yes	6.3%
No	93.7%

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**Table 2**

## Summary Statistics at Follow-up in 2021

Study Variables	2021 (n=780)	
	Mean	SD
Anxiety	6.57	4.76
CES-D	3.18	3.67
BMAST	0.40	1.25
How often had six or more drinks in the last 12 months (binge drinking)	0.57	1.37
Greatest amount drank in a single day in the last 30 days	2.65	1.54
How often became drunk in the past 12 months	0.75	1.39
Number of days drank alcohol in the last 30 days	9.57	9.92
Usual drinks per day when drinking in the last 30 days	1.69	1.03

SD=standard deviation

CES-D: Center for Epidemiologic Studies Depression scale

BMAST: Brief Michigan Alcoholism Screening Test

\*

All outcome variables are continuous

**Table 3**

## Pro-max Rotated Factor Coefficients

	<b>Factor 1 (Jobs, Finances &amp; Loss of Routine)</b>	<b>Factor 2 (Practical Difficulties)</b>	<b>Factor 3 (Social Worries &amp; Challenges)</b>	<b>Factor 4 Supply Shortages)</b>
Increase in workload at job	0.75 <sup>*</sup>	-0.05	-0.03	-0.07
Hours or pay were cut, or lost business	0.70 <sup>*</sup>	-0.29	-0.09	0.33
Trouble balancing work and family responsibilities	0.64 <sup>*</sup>	0.37	0.05	-0.16
Whether employment will continue	0.54 <sup>*</sup>	0.09	0.03	-0.11
Living or job situation at risk for virus	0.53 <sup>*</sup>	-0.11	0.06	0.21
Difficulties or stress from loss of usual routine	0.52 <sup>*</sup>	0.49	0.05	-0.05
Investments/Saving negatively Impacted	0.43 <sup>*</sup>	0.22	0.01	0.06
Cancel travel plans	0.32 <sup>*</sup>	0.30	-0.20	0.16
Trouble voting or accessing a polling place	-0.16	0.88 <sup>*</sup>	0.07	0.15
Technology problems	0.05	0.52 <sup>*</sup>	0.09	0.09
Unable to do usual forms of exercise	0.10	0.35 <sup>*</sup>	0.10	0.02
Not going to doctor or dentist	0.07	0.35 <sup>*</sup>	0.26	0.01
Boredom <sup>†</sup>	-0.04	0.29 <sup>*</sup>	0.06	0.22
Close friend or relative died from COVID-19	-0.08	-0.08	0.76 <sup>*</sup>	0.02
COVID restrictions regarding sick visitations and funerals	-0.05	0.03	0.72 <sup>*</sup>	0.06
Close friend or relative tested positive for COVID-19	0.11	-0.09	0.67 <sup>*</sup>	-0.02
Worry about close friend or relative at risk for virus	0.35	0.11	0.43 <sup>*</sup>	0.01
Difficulty practicing religion	-0.09	0.26	0.35 <sup>*</sup>	0.07
Could not find cleaning supplies and/or masks	0.07	0.15	0.05	0.76 <sup>*</sup>
Needed groceries not in stock	-0.03	0.24	0.05	0.64 <sup>*</sup>
Variance	3.55	3.03	2.68	2.00
Proportion	0.32	0.28	0.24	0.18

\* Factor coefficients indicate the primary factor loading. N=894

<sup>†</sup> Eliminated due to insufficient factor loading.

**Table 4**  
Associations Between Extracted Factors from the 2020 Survey and Outcomes at Follow-up in 2021

	CES-D (n=302)			Anxiety (n=306)			BMAST (n=301)			alc6 (n= 244)		
	B	SE	P	B	SE	P	B	SE	P	B	SE	P
Factor 1	-0.68	0.97	0.484	-0.40	1.22	0.742	0.20	0.21	0.351	0.61	0.39	0.115
Factor 2	2.90	1.10	0.009**	2.43	1.53	0.115	-0.09	0.25	0.728	-0.19	0.39	0.629
Factor 3	-1.06	0.87	0.223	-2.31	1.18	0.051	-0.29	0.26	0.274	-0.21	0.28	0.449
Factor 4	-0.62	0.62	0.318	-0.12	0.75	0.872	-0.00	0.16	0.981	0.02	0.21	0.925
R <sup>2</sup>	0.092		0.093		0.079		0.067					

	alcmost (n=189)			alcpd (n=199)			alcdrnk (n=247)					
	B	SE	P	B	SE	P	B	SE	P			
Factor 1	0.50	0.51	0.328	-0.22	2.45	0.930	0.38	0.36	0.297	1.45	0.50	0.004**
Factor 2	-0.18	0.62	0.770	-4.26	2.91	1.245	0.33	0.52	0.530	-0.46	0.43	0.283
Factor 3	-0.57	0.48	0.237	-2.22	2.26	0.326	-0.56	0.32	0.080	-0.60	0.33	0.074
Factor 4	-0.37	0.33	0.266	-2.10	1.74	0.228	0.01	0.22	0.974	-0.19	0.25	0.453
R <sup>2</sup>	0.108		0.117		0.048							

\* p<0.05

\*\* p<0.01

\*\*\* p<0.001

SE: standard error

CES-D: Center for Epidemiologic Studies Depression scale

BMAST: Brief Michigan Alcoholism Screening Test

alc6: How often had six or more drinks in the last 12 months (binge drinking); alcmost: Greatest amount drunk in a single day in the last 30 days alcdays: Number of days drank alcohol in the last 30 days; alcpd: Usual drinks per day when drinking in the last 30 days; alcdrnk: How often became drunk in the past 12 months All models were adjusted for race (Black, Asian, Multiracial and Other with White as reference group), age, Hispanic ethnicity, life stressors, work stress, income, and levels of each outcome variable from the 2020 survey. All outcome variables are continuous.