



Short Communication

Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings



William V. Lechner^{a,*}, Kimberly R. Laurene^b, Sweta Patel^b, Megan Anderson^b, Chelsea Grega^b,
Deric R. Kenne^b

^a Kent State University, Department of Psychological Sciences, 232 Kent Hall, Kent, OH 44242, USA

^b Kent State University, College of Public Health, Center for Public Policy & Health Division of Mental Health & Substance Use, USA

HIGHLIGHTS

- Alcohol use increased significantly following COVID-19 related campus closure.
- Higher social support was associated with less alcohol use overall.
- Elevated psychological distress was associated with steeper increases in alcohol.
- Social support did not moderate the effect of distress on increasing alcohol use.

ARTICLE INFO

Keywords:
COVID-19
Alcohol use
Depressive symptoms
Anxiety symptoms
Social support

ABSTRACT

Amidst the coronavirus pandemic, universities across the country abruptly closed campuses and transitioned to remote learning. The effects of these unprecedented closures are unknown. The current study examined reported alcohol consumption during the week prior to and after campus closure at a public university in Northeast Ohio. Analysis of data from 1,958 students, who endorsed using alcohol in the past 30 days, demonstrates that alcohol consumption (amount and frequency) increased as time progressed. Those with more symptoms of depression and anxiety reported greater increases in alcohol consumption (assessed via retrospective timeline follow-back) compared to students with fewer symptoms. Furthermore, students with greater perceived social support reported less alcohol consumption. Together, these findings highlight the need for universities to offer services and programs to students that will minimize risk factors and maximize protective factors in order to reduce or prevent alcohol abuse during the coronavirus pandemic.

1. Introduction

In the U.S., there were 24 reported cases of coronavirus disease 2019 (COVID-19) on March 1, 2020, by March 31st, the number increased to 163,539 cases (CDC, 2020). The COVID-19 pandemic has had wide-scale impacts on society in the United States. Across the country many states closed university campuses and businesses, and enacted stay-at-home orders. Adverse consequences of these changes are likely to include increased stress and social isolation (Holmes et al., 2020), as well the potential for increased alcohol consumption (Clay & Parker, 2020; Walsh et al., 2014). The current study aimed to examine how alcohol use has changed over time following the closing of a large public University. Moreover, the study aimed to examine the relationship between psychological distress (symptoms of anxiety and

depression) and social support in relation to changes in alcohol consumption surrounding campus closure.

Prior research has established that psychological distress and problematic alcohol consumption often co-occur (Bott, Meyer, Rumpf, Hapke, & John, 2005; Markman Geisner, Larimer, & Neighbors, 2004; Okoro et al., 2004). The relationship between symptoms of depression and problematic alcohol use appear to be bi-directional in nature; that is, elevated symptoms of depression predict increased likelihood of developing an alcohol-related disorder, and alcohol problems predict future depressive symptoms (Brière, Rohde, Seeley, Klein, & Lewinsohn, 2014). Similarly, individuals with alcohol use problems demonstrate significant, elevated likelihood of co-occurring Generalized Anxiety Disorder (Burns & Teesson, 2002). Investigations of factors driving these relationships have often found that negative reinforcement-based

* Corresponding author.

E-mail address: wlechner@kent.edu (W.V. Lechner).

motives drive the relationship; individuals with symptoms of psychological distress report using alcohol to cope with or dampen their symptoms (Bolton, Cox, Clara, & Sareen, 2006; Grant et al., 2005; Robinson, Sareen, Cox, & Bolton, 2009). Social support has been shown to be protective against psychological distress (Chao, 2011; Hefner & Eisenberg, 2009; Wang & Castañeda-Sound, 2008), and problematic alcohol consumption (Aldridge-Gerry et al., 2011; Menagi, Harrell, & June, 2008; Pauley & Hesse, 2009).

Given the established relationships noted, we hypothesized as a result of the pandemic, depression and anxiety symptoms would be associated with increases in alcohol use (standard drinks consumed, reported retrospectively) following campus closure. Furthermore, we hypothesized that low social support would be associated with an increase in alcohol-use, and that higher social support would moderate the relationships between psychological distress and increasing alcohol use, such that those with high social support would not demonstrate increased drinking as a function of worse mental health. Additionally, we examined these hypotheses in terms of drinking frequency (number of drinking days).

2. Methods

2.1. Participants and procedure

Participants were 1,958 students at a large public University in Northeast Ohio who endorsed alcohol use in the 30 days prior to the study. Participants were recruited through email to participate in the study which consisted of retrospective self-report measures and timeline follow-back assessment of substance use over two-weeks, collected in cross-section. The initial recruitment email was sent on March 26th, 2020 to all students who were currently enrolled in spring semester ($N = 33,280$). A reminder email was sent four days after the initial invitation to those who had not responded; 97.7% of the sample completed the study between March 26th and March 31st. A total of 4,276 participants responded to the survey (response rate = 12.8%). The sample was 79.97% female, 86.41% non-Hispanic white, and the mean age was 24.94 ($SD = 7.65$) years. Participants were told their responses would be confidential and that the purpose of the survey was to present a broad picture of student wellness. The survey included items on substance use, depression, anxiety, and perceived social support as well as resiliency and self-perceived success. As an incentive, after completing the survey, participants were given the opportunity to enter a drawing to win one of six \$20 gift cards.

2.2. Measures

The Timeline Follow-Back Interview (TLFB; (Sobell, Brown, Leo, & Sobell, 1996) a well-validated calendar assisted measure, was administered to document alcohol use in the 2-weeks between March 4th and March 17th. This time period was selected because it represents the week immediately preceding (March 4th - March 10th) and the week succeeding (March 11th–March 17th) the announcement of the closure of campus. The Patient Health Questionnaire-9 (PHQ-9) was used to assess symptoms of depression in the past two weeks (Kroenke, Spitzer, & Williams, 2001). The scale consists of 9 items targeting each of the primary diagnostic criteria for depression. The PHQ-9 was found to have acceptable diagnostic properties for detecting major depressive disorder and has demonstrated excellent reliability as well as criterion, construct, and external validity (α in the current study = 0.90). The maximum score on this scale is 27. Six items from the Generalized Anxiety Disorder 7-item scale (Gad-7) were used to assess symptoms of generalized anxiety in the past two weeks (Spitzer, Kroenke, Williams, & Lowe, 2006). The Gad-7 demonstrates good reliability, as well as criterion and construct validity with independent diagnoses made by mental health professionals and functional status measures such as disability days and health care use (α in the current study = 0.91).

Items 1–6 were included in this survey, the maximum score on this scale is 18. The Multidimensional Scale of Perceived Social Support (MSPSS) subjectively assesses perception of social support from family, friends, and significant other. The MSPSS has good internal reliability and moderate construct validity (Zimet, Dahlem, Zimet, & Farley, 1988). The maximum score on the scale is 84 with larger numbers indicating higher perceived support (α in the current study in the current study = 0.92).

2.3. Analytic strategy

Generalized estimating equations (GEE) were used to examine alcohol consumption reported across a two-week assessment period, with a negative binomial distribution specified for amount of alcohol consumption (standard drinks), binomial distribution (binary logistic) specified for frequency (drinking days), and an exchangeable working correlation matrix. First, main effects and two-way interactions were modeled. Next, an omnibus test of 3-way interactions were examined. Two separate models containing 5 components were tested (labeled below); one model for depression and one for anxiety. Depression and anxiety were modeled separately due to high observed correlation between these constructs ($r = 0.75$), apriori hypotheses regarding their association with the dependent variables, and resulting concerns regarding multicollinearity. The independent variables for the models were (1) psychological distress [PHQ-9 or Gad-7] (2) reported social support [MSPSS], and (3) time [within-subjects effect: 14 time points, coded as week 1 and week 2], as well as (4) the three two-way interactions [psychological distress by time, support by time, psychological distress by support] and (5) the three-way interaction [psychological distress by support by time]. Specifically, the 7 time points reflecting days between March 3 and March 10th were coded as week 1 (0) while the 7 time points reflecting days between March 11th and March 17th were coded as week 2 (1). We predicted a three-way interaction between distress, support, and time; reflecting that individuals with higher psychological distress would demonstrate greater increases in alcohol consumption if they reported having poor social support. Covariates included race: White (0) and Asian, Black, multiracial, Native American, or other (1); grade-level: undergraduate (0), graduate student or medical student (1); and biological sex: female (0) male (1), and a measure accounting for the variability in time between participant's response dates. One additional exploratory post-hoc model (with standard drinks set as the dependent variable) included a covariate of drinking frequency (total number of drinking days) in weeks 1 and 2. A Bonferroni correction was applied to this post-hoc test, with significance set to $p < .025$.

3. Results

Participants consumed a range of 0 to 63 standard drinks ($M = 3.48$, $SD = 5.45$) and a range of 0 to 7 drinking days ($M = 1.36$, $SD = 1.55$) in the first week of the assessment period and a range of 0 to 98 standard drinks ($M = 5.01$, $SD = 6.86$) and a range of 0 to 7 drinking days ($M = 1.94$, $SD = 1.84$) in the second week. The mean score on the PHQ-9 was 9.44 ($SD = 6.82$), and the mean score on the GAD-7 8.25 ($SD = 5.21$). The mean score on the Multidimensional Support Scale was 66.2 ($SD = 12.33$).

First, we examined main effects and two-way interactions between (1) symptoms of psychological distress and social support (respectively), and (2) time on alcohol consumption over the two-week observation period. A significant main effect for time indicated that alcohol consumption increased as time progressed, $b = 0.369$, 95% CI = 0.316, 0.423, $p < .001$. Significant main effects for symptoms of depression ($b = 0.027$, 95% CI = 0.017, 0.037, $p < .001$), and anxiety ($b = 0.026$, 95% CI = 0.014, 0.038, $p < .001$), indicated that higher psychological distress was associated with higher alcohol consumption overall. Social support demonstrated a significant negative

Table 1

Associations of time and psychological distress interactions with standard drinks.

Parameter	b	Std. Error	Lower (95% Wald CI)	Upper (95% Wald CI)	p
Intercept	-0.684	0.115	-0.911	-0.457	0.000
Time since self-reported use	0.017	0.013	-0.009	0.042	0.198
Student Class (undergraduate)	-0.053	0.058	-0.168	0.063	0.370
Biological Sex (female)	-0.495	0.070	-0.633	-0.356	< 0.001
Race (white)	0.174	0.082	0.012	-0.336	0.035
Time (week)	0.266	0.048	0.172	0.360	< 0.001
PHQ-9 (depressive symptoms)	0.021	0.005	0.009	0.032	< 0.001
Time by PHQ-9	0.012	0.002	0.006	0.017	0.011
Parameter	b	Std. Error	Lower (95% Wald CI)	Upper (95% Wald CI)	p
Intercept	-0.646	0.117	-0.876	-0.416	< 0.001
Time since self-reported use	0.017	0.013	-0.009	0.043	0.197
Student Class (undergraduate)	0.004	0.059	-0.112	0.120	0.943
Biological Sex (female)	-0.511	0.072	-0.654	-0.368	< 0.001
Race (white)	0.153	0.084	-0.012	0.317	0.069
Time (week)	0.252	0.049	0.155	0.349	< 0.001
GAD-7 (anxiety symptoms)	0.017	0.007	0.004	0.031	0.012
Time by GAD-7	0.013	0.005	0.004	0.023	0.004

Dependent Variable = Standard Drinks.

effect, indicating that those with more social support, consumed less alcohol overall $b = -0.009$, 95% CI = $-0.015, -0.002$, $p = .013$. Time by psychological distress interactions (Table 1) indicated that individuals experiencing higher levels of symptoms of depression and anxiety reported greater increases in alcohol consumption over time as compared to individuals with fewer symptoms ($b = 0.012$, 95% CI = $0.006, 0.017$, $p = .011$; $b = 0.013$, 95% CI = $0.004, 0.023$, $p = .004$, respectively). The interaction between social support and time was not significant. Next, we conducted an omnibus test for the three-way interactions (psychological distress by social support by time) for both anxiety and depression. Neither three-way interaction was significant, indicating that hypothesized benefits of social support do not moderate the relationship between symptoms of psychological distress and increasing alcohol use over time. Exploratory analyses tested the same set of hypotheses to determine if any differences would emerge between relationships examining frequency (number of drinking days) set as the dependent variable. Supplementary Table 1 demonstrates that the same pattern of results indicated for alcohol consumption, was observed for alcohol use frequency (number of drinking days). Lastly, number of drinking days in week 1 and 2 was included as a covariate in the model with amount of alcohol consumption set as the dependent variable. The two-way interactions between depression and time ($b = 0.010$, 95% CI = $0.002, 0.010$, $p = .016$), and anxiety and time ($b = 0.015$, 95% CI = $0.005, 0.026$, $p = .004$) remained significant.

4. Discussion

The current study took place amidst a pandemic which brought with it profound and unprecedented effects. To better understand these consequences, consumption of alcohol, immediately prior to and after the announcement of the closing of a large public university was assessed. An increase in alcohol consumption was observed following the announcement of campus closing. Furthermore, as hypothesized and consistent with past research, students with higher levels of depression and anxiety reported greater increases in alcohol use over time as compared to those with lower levels of distress. Perceived social support was associated with lower alcohol use overall. However, social support did not moderate the effects of psychological distress on increasing alcohol use as time progressed. The same pattern of results was observed for both alcohol consumption (standard drinks) and frequency of alcohol use (drinking days). Additionally, in order to better understand if the observed increases in reported alcohol use over time was driven by alcohol use frequency, a model examining alcohol consumption, covarying for number of drinking days was constructed. Results demonstrated that the relationships between psychological

distress and time remained significant. Taken together, this set of results indicates that participants reported both increased alcohol consumption on drinking occasions, and more drinking occasions overall.

These results highlight the potential for universities to intervene during this period of closure to possibly reduce or prevent alcohol abuse. Although the current environment is unparalleled, past research has found multicomponent and virtual approaches to be effective for college student alcohol prevention. Internet-based interventions can be effective in curbing problem drinking and are both cost-effective and scalable (Riper et al., 2011). Programs that can be offered remotely and target at-risk students to reduce drinking include eCHUG (Walters, Vader, & Harris, 2007) and AlcholEdu (Paschall, Antin, Ringwalt, & Saltz, 2011). Additionally, research has demonstrated promising results regarding the benefits of using online interventions for the treatment of depression in young people (Rice et al., 2014) and the benefits of using social media as a modernized medium for social support (Cole, Nick, Zelkowitz, Roeder, & Spinelli, 2017). Increasing awareness of helplines, such as Substance Abuse and Mental Health Services Administration's free helpline for individuals and families facing mental and/or substance use disorders, can potentially be beneficial.

It is unknown to what degree the present findings generalize to other populations and events. Data for the current study was collected from university students, soon after the COVID-19 pandemic was starting to significantly impact day-to-day routines in the US. Different populations, as well events that are different from the COVID-19 pandemic but are also stress inducing and socially isolating (e.g., moving to a new city by yourself), may produce different results. Additionally, the cross-sectional nature of the current data precludes causal interpretation of relationships. Furthermore, variability in overlap between the timeline follow-back alcohol use data and reporting of psychological symptoms existed between participants. Although a covariate accounting for this variance was included in current analyses, longitudinal designs are needed to confirm the relationships observed. An additional variable that would provide important information is an assessment of how participants' living situations changed as the result of the pandemic, and how that might affect alcohol use in conjunction with mental health. The response rate (12.9%) and high percentage of female students, limits the generalizability of these results, despite covariation for biological sex. Future research is needed to continue to track and monitor alcohol use as the pandemic progresses as well as examine the utility of remote technologies to reduce social isolation and increase social support.

Author contributions

William Lechner wrote the manuscript and contributed to analyses.

Kimberly Laurene contributed to the design of the study and writing the manuscript. Sweta Patel contributed to analyses. Megan Anderson and Chelsea Grega contributed to writing. Deric Kenne designed the study, wrote the protocol, and contributed to writing and revisions.

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.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2020.106527>.

References

- Aldridge-Gerry, A. A., Roesch, S. C., Villodas, F., McCabe, C., Leung, Q. K., & Costa, M. D. (2011). Daily stress and alcohol consumption: Modeling between-person and within-person ethnic variation in coping behavior. *Journal of Studies on Alcohol and Drugs*, 72(1), 125–134. <https://doi.org/10.15288/jsad.2011.72.125>.
- Bolton, J., Cox, B., Clara, I., & Sareen, J. (2006). Use of alcohol and drugs to self-medicate anxiety disorders in a nationally representative sample. *The Journal of Nervous and Mental Disease*, 194(11), 818–825. <https://doi.org/10.1097/01.nmd.0000244481.63148.98>.
- Bott, K., Meyer, C., Rumpf, H.-J., Hapke, U., & John, U. (2005). Psychiatric disorders among at-risk consumers of alcohol in the general population. *Journal of Studies on Alcohol*, 66(2), 246–253. <https://doi.org/10.15288/jsa.2005.66.246>.
- Brière, F. N., Rohde, P., Seely, J. R., Klein, D., & Lewinsohn, P. M. (2014). Comorbidity between major depression and alcohol use disorder from adolescence to adulthood. *Comprehensive Psychiatry*, 55(3), 526–533. <https://doi.org/10.1016/j.comppsych.2013.10.007>.
- Burns, L., & Teesson, M. (2002). Alcohol use disorders comorbid with anxiety, depression and drug use disorders. Findings from the Australian National Survey of Mental Health and Well Being. *Drug and Alcohol Dependence*, 68(3), 299–307. [https://doi.org/10.1016/s0376-8716\(02\)00220-x](https://doi.org/10.1016/s0376-8716(02)00220-x).
- CDC. (2020). Previous COVID-19 Case Data, <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/previouscases.html>.
- Chao, R.-C.-L. (2011). Managing stress and maintaining well-being: Social support, problem-focused coping, and avoidant coping. *Journal of Counseling & Development*, 89(3), 338–348. <https://doi.org/10.1002/j.1556-6678.2011.tb00098.x>.
- Clay, J. M., & Parker, M. O. (2020). Alcohol use and misuse during the COVID-19 pandemic: A potential public health crisis? e259 *The Lancet Public Health*, 5(5), [https://doi.org/10.1016/S2468-2667\(20\)30088-8](https://doi.org/10.1016/S2468-2667(20)30088-8).
- Cole, D. A., Nick, E. A., Zelkowitz, R. L., Roeder, K. M., & Spinelli, T. (2017). Online social support for young people: Does it recapitulate in-person social support; can it help? *Computers in Human Behavior*, 68, 456–464. <https://doi.org/10.1016/j.chb.2016.11.058>.
- Grant, B. F., Hasin, D. S., Stinson, F. S., Dawson, D. A., June Ruan, W., Goldstein, R. B., ... Huang, B. (2005). Prevalence, correlates, co-morbidity, and comparative disability of DSM-IV generalized anxiety disorder in the USA: Results from the national epidemiologic survey on alcohol and related conditions. *Psychological Medicine*, 35(12), 1747–1759. <https://doi.org/10.1017/s0033291705006069>.
- Hefner, J., & Eisenberg, D. (2009). Social support and mental health among college students. *American Journal of Orthopsychiatry*, 79(4), 491–499. <https://doi.org/10.1037/a0016918>.
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., ... Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *Lancet Psychiatry*, 7(6), 547–560. [https://doi.org/10.1016/s2215-0366\(20\)30168-1](https://doi.org/10.1016/s2215-0366(20)30168-1).
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>.
- Markman Geisner, I., Larimer, M. E., & Neighbors, C. (2004). The relationship among alcohol use, related problems, and symptoms of psychological distress: Gender as a moderator in a college sample. *Addictive Behaviors*, 29(5), 843–848. <https://doi.org/10.1016/j.addbeh.2004.02.024>.
- Menagi, F. S., Harrell, Z. A. T., & June, L. N. (2008). Religiousness and college student alcohol use: Examining the role of social support. *Journal of Religion and Health*, 47(2), 217–226. <https://doi.org/10.1007/s10943-008-9164-3>.
- Okoro, C. A., Brewer, R. D., Naimi, T. S., Moriarty, D. G., Giles, W. H., & Mokdad, A. H. (2004). Binge drinking and health-related quality of life: Do popular perceptions match reality? *American Journal of Preventive Medicine*, 26(3), 230–233. <https://doi.org/10.1016/j.amepre.2003.10.022>.
- Paschall, M. J., Antin, T., Ringwalt, C. L., & Saltz, R. F. (2011). Effects of AlcoholEdu for college on alcohol-related problems among freshmen: A randomized multicampus trial. *Journal of Studies on Alcohol and Drugs*, 72(4), 642–650. <https://doi.org/10.15288/jasad.2011.72.642>.
- Pauley, P. M., & Hesse, C. (2009). The effects of social support, depression, and stress on drinking behaviors in a college student sample. *Communication Studies*, 60(5), 493–508. <https://doi.org/10.1080/10510970903260335>.
- Rice, S. M., Goodall, J., Hetrick, S. E., Parker, A. G., Gilbertson, T., Amminger, G. P., ... Alvarez-Jimenez, M. (2014). Online and social networking interventions for the treatment of depression in young people: A systematic review. *Journal of Medical Internet Research*, 16(9), e206. <https://doi.org/10.2196/jmir.3304>.
- Riper, H., Spek, V., Boon, B., Conijn, B., Kramer, J., Martin-Abello, K., & Smit, F. (2011). Effectiveness of E-self-help interventions for curbing adult problem drinking: A meta-analysis. e42 e42 *Journal of Medical Internet Research*, 13(2), <https://doi.org/10.2196/jmir.1691>.
- Robinson, J., Sareen, J., Cox, B. J., & Bolton, J. (2009). Self-medication of anxiety disorders with alcohol and drugs: Results from a nationally representative sample. *Journal of Anxiety Disorders*, 23(1), 38–45. <https://doi.org/10.1016/j.janxdis.2008.03.013>.
- Sobell, L. C., Brown, J., Leo, G. I., & Sobell, M. B. (1996). The reliability of the Alcohol Timeline Followback when administered by telephone and by computer. Retrieved from *Drug and Alcohol Dependence*, 42(1), 49–54. <http://www.ncbi.nlm.nih.gov/pubmed/8889403>.
- Spitzer, R. L., Kroenke, K., Williams, J. B., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>.
- Walsh, K., Elliott, J. C., Shmulewitz, D., Aharonovich, E., Strous, R., Frisch, A., ... Hasin, D. (2014). Trauma exposure, posttraumatic stress disorder and risk for alcohol, nicotine, and marijuana dependence in Israel. *Comprehensive Psychiatry*, 55(3), 621–630. <https://doi.org/10.1016/j.comppsych.2013.11.016>.
- Walters, S. T., Vader, A. M., & Harris, T. R. (2007). A controlled trial of web-based feedback for heavy drinking college students. *Prevention Science*, 8(1), 83–88. <https://doi.org/10.1007/s11121-006-0059-9>.
- Wang, C.-C.-D., & Castañeda-Sound, C. (2008). The role of generational status, self-esteem, academic self-efficacy, and perceived social support in college students' psychological well-being. *Journal of College Counseling*, 11(2), 101–118. <https://doi.org/10.1002/j.2161-1882.2008.tb00028.x>.
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, 52(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2.