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Short Communication

Binge drinking before and after a COVID-19 campus closure among first-year college students

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A B S T R A C T

Purpose: The COVID-19 pandemic is associated with reports of increased substance use. College students are a population of concern for high risk binge drinking and their behavior may be particularly impacted by COVID-19 campus closures. Therefore, we examine first-year college students' binge drinking soon after their university's pandemic-related suspension of in-person operations.

Methods: Students from a single campus ($N = 741$; age: $M = 18.05$, $SD = 0.22$) completed one assessment in April-May 2020 post-campus closure (March 2020) including theoretically-informed measures (e.g., drinking motives, norms) and two items of self-reported pre- and post-closure binge drinking frequency, the focus of these analyses.

Results: About half of students consistently reported not binge drinking pre- and post-closure; 6.75% reported a consistent frequency of binge drinking pre- and post-closure. Many (39.41%) reported lower 30-day binge drinking post-campus closure compared to their pre-closure reports; few (4.18%) reported higher 30-day binge drinking frequency post-campus closure. Students reporting lower binge drinking post-closure showed differences in coping, social, and enhancement drinking motives and isolation. Students reporting greater post-closure binge drinking reported higher perceived drinking norms and were more likely to be in Greek life.

Conclusion: This study demonstrates self-reported patterns in binge drinking among first-year college students at the point of COVID-19 campus closures. Pandemic-related college closures may have been a temporary environmental intervention on this high-risk behavior for some students. Although many students were not binge drinking, some continued binge drinking after closure and may benefit from preventive interventions.

1. Introduction

High-risk (i.e., binge) drinking among college students remains a public health concern given that about 35% report past two-week binge drinking, which is associated with deleterious consequences (Jennison, 2004; Kuntsche, Kuntsche, Thrul, & Gmel, 2017; Schulenberg et al., 2020). High-risk drinking in the first year of college often increases in early fall, decreases during exams, and increases over scheduled breaks (Borsari, Murphy, & Barnett, 2007), such as spring break. However, in March 2020 (i.e., spring break month), the COVID-19 pandemic disrupted the spring semester at college campuses with policies involving stay-at-home orders, campus closures, and remote instruction. Many students relocated from college residences to their parents' homes (Cohen, Hoyt, & Dull, 2020). In this context, the social and psychological impact of the pandemic during early campus closures could have

influenced students' drinking behavior.

Generally, U.S. studies are lacking pertaining to college students' substance use at COVID-19 onset; however, a multi-campus student survey identified that the prevalence of past two-week binge drinking was lower soon after COVID-19 onset as compared to the prior fall semester (Martinez & Nguyen, 2020). A U.S. study of students with past 30-day drinking from a single campus found that, based on retrospective recall, alcohol use quantity was greater in the week before campus shutdown compared to the week after (Lechner et al., 2020). This sample's psychological distress was positively associated with drinking during the recall period. Further, international and non-college data document COVID-19-related shifts in drinking behaviors (Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020; Dumas, Ellis, & Litt, 2020; Gritsenko et al., 2020; Koopmann, Georgiadou, Kiefer, & Hillemacher, 2020; Neill, Meyer, Toh, van Rheenen, Phillipou, Tan, &

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Rossell, 2020; Sun et al., 2020); although long-term data on students' alcohol consumption patterns over the course of the pandemic (including closures, re-openings, semester breaks) is also needed.

For young adults, several psychosocial variables have well-documented associations with alcohol consumption (Krieger, Young, Anthenien, & Neighbors, 2018; Kuntsche, Knibbe, Gmel, & Engels, 2005), including peer norms and drinking motives which have not yet been examined in relation to college drinking and the onset of the COVID-19 pandemic. With regard to peer norms, perceptions that others in a student's campus network are drinking excessively are associated with greater personal consumption (Borsari & Carey, 2001). However, COVID-19 resulted in students leaving campuses, surrounding communities closing bars and restaurants, and/or stay-at-home orders and gathering restrictions potentially altering student parties. Thus, it is unclear how perceptions of other students' drinking at the onset of a pandemic relate to post-campus closure binge drinking.

With regard to motives, coping motives (i.e., drinking to regulate negative affect) are often associated with problematic drinking whereas motives regarding positive affect (e.g., enhancement, social motives) are typically related to moderate-to-high drinking levels (Kuntsche et al., 2005). In relation to COVID-19, an early report identified that about 25% of young adults initiated or increased substance use to cope with the pandemic's stressful emotional toll (Czeisler, Lane, Petrosky, Wiley, Christensen, Njai, Weaver, Robbins, Facer-Childs, Barger, Czeisler, Howard, & Rajaratnam, 2020). Similarly, a cannabis-focused study of young adults found a positive relationship between coping motives for cannabis use and greater cannabis consumption early in pandemic (Bartel, Sherry, & Stewart, 2020). In addition, among adults, COVID-related psychological distress has been positively associated with several drinking indices (Rodriguez, Litt, & Stewart, 2020).

Taken together, studies suggest pandemic-related changes in alcohol consumption, with data varying across samples. Data on binge drinking at the time of COVID-19-related campus closures among U.S. college students are needed to understand the epidemiology of risky drinking at this critical juncture and to inform services provided to students. Further, such examinations should extend beyond prevalence rates to examine potential psychosocial correlates related to drinking at the onset of the pandemic. To this end, using data from a single campus, we examined self-reported binge drinking among first-year students (30 days pre- and post-COVID-19 campus closure), and differences in demographic, psychosocial (drinking motives, norms), and COVID-19-related variables among students.

2. Method

2.1. Procedures

Study procedures were approved by an Institutional Review Board. In August 2019, incoming first-year students ($N = 1500$) at a Mid-western university were invited to participate in a trial of adaptive prevention interventions for alcohol use. Fifty-nine percent ($N = 891$) enrolled and were randomized to intervention conditions [see detailed protocol (Patrick et al., 2020)] which concluded in December 2019 (prior to the collection of data used in the current paper). Data for the present analyses were from a single follow-up assessment in April/May 2020. At this campus, spring break (March 9–13, 2020) demarcated the COVID-19-related campus closure of in-person operations, with remote instruction occurring after break and the administration encouraging students to return to their pre-college residence. A local state of emergency began March 13th and a shelter-in-place order began March 27th.

3. Measures

Alcohol-related variables. Past 30-day drinking was measured relative to spring break (i.e., pre-/post-closure). For our main independent variable, we assessed sex-specific binge drinking frequency pre-

and post-campus closure with two separate items. The pre-closure item asked, "During the month prior to spring break, how often did you have 4/5 [tailored for: females/males] or more drinks containing any kind of alcohol within a two-hour period?" The post-closure item was parallel and read: "During the last 30 days..." Response options were: none, once, twice, 3 to 5 times, 6 to 9 times, and 10 or more times (coded as 0 to 5; item adapted from Center for Behavioral Health Statistics and Quality, 2018).

We measured current motives with the 20-item Drinking Motives Questionnaire (Cooper, 1994) including subscale scores for four domains: coping ($\alpha = 0.71$; to alter negative affect), social ($\alpha = 0.89$; to make a social gather more enjoyable), conformity ($\alpha = 0.83$; to fit in), and enhancement ($\alpha = 0.98$; to have fun) drinking motives (all motives: 1 = almost never/never to 5 = almost always/always). Regarding perceived drinking norms, students were asked the percentage of first-year students at their campus with past 30-day alcohol consumption (0% to 100%) consistent with a campus survey (Boynnton Health Service, 2018).

COVID-19-related variables. Students completed several items about COVID-19, including: whether they had COVID-19 symptoms (e.g., fever, cough, difficulty breathing; yes/no), concern about getting or having COVID-19 (0 = "not at all" to 3 = "very much"), worry about the COVID-19 situation (0 = "not at all" to 4 = "extremely worried"), and feeling alone/isolated due to COVID-19 (0 = "not at all" to 5 = "extremely").

Demographics. Measures included sex, race/ethnicity (dichotomized due to cell size: non-Hispanic White/others), Greek life involvement (yes/no), and post-campus closure residence (campus housing, non-campus housing, with parents, other relatives, fraternity/sorority house; dichotomized: living with parents vs. not).

4. Analyses

In order to assess differences in self-reported ordinal binge drinking frequency between items assessing pre- and post-closure binge drinking we examined the equality of matched pairs (non-parametric paired t -test) using the Wilcoxon matched-pairs signed-rank test (Wilcoxon, 1945). We created four mutually exclusive groups based on students' responses about their pre- and post-closure binge drinking frequency: two groups that reported differing frequencies (fewer or greater number of times) and two groups that reported consistent frequencies (consistent number of times binge drinking or consistent lack of binge drinking). We examined these groups' past 30-day drinking and whether they differed based on intervention group or demographic, COVID-19-related, or psychosocial variables using chi-square and F -tests.

5. Results

Descriptively, the means for binge drinking frequency among drinkers pre- and post-COVID-19 campus closure were: $M_{pre} = 1.54$ ($SD = 1.38$); $M_{post} = 0.72$ ($SD = 1.10$). About half of students (56.41%) reported a consistent level of binge drinking on both pre- and post-closure binge drinking items, such that 49.66% consistently reported no binge drinking (Consistent No BD; included non-drinkers and drinkers) and 6.75% reported the same level of binge drinking on both survey items (i.e., once = 38%, twice = 28%, 3–5 times = 24%, 6 + times = 10%; Consistent BD). Compared to their reports about pre-closure binge drinking, 39.41% reported lower levels of binge drinking (Lower BD; $M_{pre} = 2.34$ [$SD = 1.06$] and $M_{post} = 0.37$ [$SD = 0.78$]) and 4.18% reported higher levels of binge drinking (Higher BD; $M_{pre} = 0.65$ [$SD = 0.88$] and $M_{post} = 1.97$ [$SD = 1.02$]) post-closure. The Wilcoxon matched-pairs signed-rank test showed these differences were statistically significant ($|z| = 14.699$; $p < 0.001$; Fig. 1).

We examined prevalence of past 30-day drinking across these groups. In the Consistent No BD group, past 30-day drinking prevalence was 42.90% for the pre-closure period and 30.43% for the post-closure

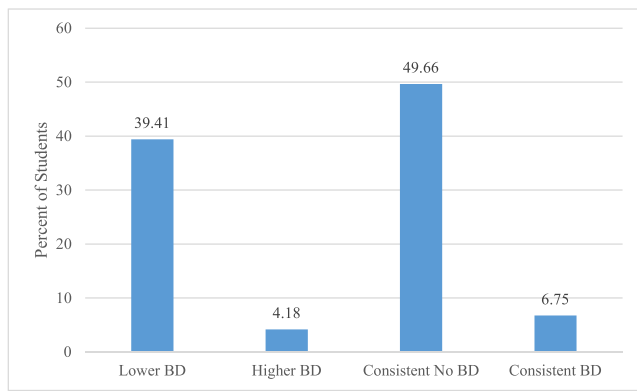


Fig. 1. Student groupings based on reports of binge drinking (BD) for 30 days pre- and post-campus closure.

period. In the Lower BD group, 66.78% reported any drinking post-closure; 33.22% binge drank before closure but had no alcohol consumption at all on the post-closure item. In the Higher BD group, 80.65% reported any 30-day drinking pre-closure; 19.35% shifted from

reporting not drinking before closure to reporting binge drinking post-closure.

Table 1 displays differences based on binge drinking grouping and pairwise comparisons. Note that the binge drinking groups did not significantly differ based on whether or not they were randomized to an intervention group for Fall 2019. Non-Hispanic White students were more likely to be in the Lower and Consistent BD groups. The Higher BD group had the highest percentage of Greek life students. Consistent non-binge drinkers reported significantly less isolation/feeling alone due to COVID-19 versus those with Lower BD post-closure and they had the lowest levels of coping, social, and enhancement drinking motives. The Lower BD group had greater enhancement motives than the higher group. Finally, the Higher BD group reported the highest perceived drinking norms (vs. the Lower and Consistent BD groups).

6. Discussion

At the beginning of a COVID-19-related campus closure, about half of first-year students surveyed remained consistent non-binge drinkers (i.e., did not drink or drank at a level below the binge threshold). Similar to a multi-campus survey of U.S. college students (Martinez & Nguyen,

Table 1

Demographic, COVID-19-related, and psychosocial characteristics according to groups defined by reports of binge drinking.

	Groups According to Self-Reported Binge Drinking (BD) Level Before and After Campus Closure							p-value	Total Sample % (N)/Mean (SD)		
	Post-Closure Level Differs from Pre-				Post-Closure Level Same as Pre-Closure Level						
	Lower BD		Higher BD		Consistent No BD	Consistent BD					
	% (N)/Mean (SD)	% (N)/Mean (SD)	% (N)/Mean (SD)	% (N)/Mean (SD)							
<i>Demographic Variables</i>											
<i>Sex</i>											
Female	64.38%	(188)	54.84%	(17)	63.59%	(234)	66.00%	(33)	0.746	63.70%	(472)
Male	35.62%	(104)	45.16%	(14)	36.41%	(134)	34.00%	(17)		36.30%	(269)
<i>Race/ethnicity</i>											
Non-Hispanic White	89.04%	(269)	80.65%	(25)	74.18%	(269)	96.00%	(48)	<0.001	81.78%	(607)
Other	10.96%	(32)	19.35%	(6)	25.82%	(95)	4.00%	(2)		18.22%	(136)
<i>Living with parents post-closure</i>											
Yes	96.23%	(281)	90.32%	(28)	92.93%	(342)	94.00%	(47)	0.247	94.20%	(698)
No	3.77%	(11)	9.68%	(3)	7.07%	(26)	6.00%	(3)		5.80%	(43)
<i>COVID-19 Variables</i>											
Had COVID-19 symptoms	8.45%	(25)	16.13%	(5)	7.67%	(29)	14.81%	(8)	0.162	8.83%	(67)
Concerned about getting COVID-19 (0 to 3)	0.70	(0.61)	0.74	(0.68)	0.71	(0.62)	0.64	(0.60)	0.863	0.70	(0.61)
Worried about COVID-19 situation (0 to 4)	2.02	(1.00)	1.81	(1.08)	1.96	(1.04)	1.96	(1.14)	0.706	1.98	(1.03)
Feel alone because of COVID-19 (0 to 5)	2.37	(1.17)	2.23	(1.28)	2.10	(1.21)	2.40	(1.05)	0.022 ^a	2.23	(1.19)
<i>Psychosocial Variables</i>											
Pledged Greek life	20.20%	(60)	25.81%	(8)	7.16%	(27)	20.37%	(11)	<0.001	13.77%	(102)
<i>Drinking motives (1 to 5)</i>											
Coping	1.83	(0.70)	1.73	(0.71)	1.47	(0.62)	1.83	(0.93)	<0.001 ^b	1.71	(0.72)
Social	3.29	(0.95)	3.43	(0.94)	2.53	(1.06)	3.05	(1.12)	<0.001 ^c	3.05	(1.06)
Conformity	1.40	(0.59)	1.45	(0.58)	1.38	(0.65)	1.41	(0.64)	0.938	1.39	(0.61)
Enhancement	2.99	(0.98)	2.24	(3.75)	2.14	(0.95)	2.83	(0.95)	<0.001 ^d	2.68	(1.34)
Perception of % of other first-year students that currently drink (0 to 100)	38.89	(22.27)	51.03	(22.61)	39.48	(21.57)	43.56	(22.62)	0.018 ^e	40.01	(22.07)
<i>Intervention Groups</i>											
Control	34.93%	(102)	25.81%	(8)	35.05%	(129)	34.00%	(17)	0.773	34.55%	(256)
Treatment	65.07%	(190)	64.95%	(239)	66.00%	(33)	74.19%	(23)		65.45%	(485)

P-values are from chi-square tests for categorical measures and F-tests for continuous measures.

COVID-19 refers to the novel coronavirus.

^a The difference between the consistent no binge drinking group and the group that decreased binge drinking was the only statistically significant pairwise comparison.

^b For coping drinking motive, the consistent no binge drinking group had a statistically significant difference from the consistent binge group and the decrease group; no other pairwise comparisons were statistically significant.

^c For social drinking motive, the consistent no binge drinking group has a statistically significant difference from all other groups; no other pairwise comparison was statistically significant.

^d For enhancement, the consistent no binge drinking group differed significantly from the decrease and consistent binge group, and the difference between the decrease and increase group was statistically significant.

^e The differences for the group that increased binge drinking compared to the groups that decreased and did not binge drink were statistically significant. N = 741; samples for motive drinking variables only included students who did not respond to the option of “I do not drink” in the motive scale.

2020), we found that many students (~40% of the sample) reported lower binge drinking early after the campus closure due to COVID-19, compared to before their campus closed. In another single-campus study of recent drinkers, drinking in the week after campus closure increased by an average of about 1.5 drinks compared to the week before closure (Lechner et al., 2020). In the current work, which included non-drinkers, our measurement of past 30-day binge frequency differed from Lechner et al.'s focus on past-week quantity and past 2-week binge prevalence. Specifically, in our sample, on past 30-day measures, about half of students did not binge drink at all (pre- or post-closure) whereas 39.41% were categorized as reporting lower binge drinking post-closure. Comparing reports about pre- and post-closure, we found that 4.18% reported more frequent binge drinking post-closure (of those, nearly 20% reported not drinking at all in the 30-days pre-closure) while 6.75% reported the same frequency of binge drinking.

It is important to note that, across the U.S., pandemic-related stay-at-home orders and campus closures varied considerably which could affect the generalizability of results. For many students who were previously engaged in binge drinking, the transition away from the college drinking environment could have been a protective environmental intervention, potentially altering these first-year college students' risky drinking behaviors, which can be influenced by perceived norms. Specifically, when surveyed, more than 90% were living with their parents during COVID-19 whereas approximately 90% typically live on campus. Those who reported greater binge drinking post-COVID-19 campus closure had significantly higher perceived norms of past 30-day drinking by first-year peers than the individuals who did not binge drink, consistent with theory (Borsari & Carey, 2001) and suggesting that perceived drinking norms could still be influential when students are away from campus.

Furthermore, individuals who reported less frequent binge drinking post-closure tended to have stronger social and enhancement motives. These individuals may be especially susceptible to risky drinking when on campus, but the disruption and isolation of COVID-19 is likely to have limited opportunities to act on these motives early in the pandemic, particularly given the presence of stay-at-home orders during data collection. Coping motives, although relatively infrequently endorsed, were significantly higher for those students reporting a consistent level of binge drinking on both survey items and those who reported lower binge drinking post-closure compared to the consistent non-binge drinkers. Coping motives are infrequent, but may contribute to maintaining binge drinking during a stressful time for some students.

Next, we found statistically significant differences in the distribution of race/ethnicity by binge drinking pattern, such that there was a higher concentration of Non-Hispanic White students in the Lower and Consistent BD groups. However, only 41 non-White participants binge drank at all during the periods queried, thus future research is needed with larger, more diverse samples to fully elucidate patterns of drinking during the pandemic across racial/ethnic identities. With regard to Greek life findings, only 14% of the sample participated in Greek life and these individuals were more concentrated (i.e., 25%) in the group that had more frequent post-closure binge drinking which could reflect the general high risk drinking patterns in this population (Barry, 2007).

It is notable that although some students in this study had been randomized to receive invitations to online interventions as part of a larger trial, all interventions were completed by December 2019, with data used in this report collected at a single assessment in April/May 2020. Further, intervention group was not statistically associated with our primary dependent variable (binge drinking grouping pre- and post-campus closure). Additional limitations include the reliance on retrospective self-report, and data from a single campus which may limit generalizability to other types of campuses during COVID-19 (e.g., outside the Midwestern U.S., private institutions) or to locations that enacted policies at different times or experienced varying degrees of COVID-19 community spread. Of course, drinking patterns are subject to a number of factors not measured herein. For example, our results are

from a single data collection time point, and college drinking may also be affected by seasonal patterns or young adults' developmental changes; longitudinal research on college drinking during COVID-19 could aid our understanding of these topics, although if measured via self-report would have similar limitations in terms of causal implications. Although we asked about drinking in two time periods on one survey, this limitation is tempered because self-reported drinking behaviors were measured with items anchored to recent time periods (30 days before spring break, 30 days before the April/May survey) to aid in recall (Midanik & Hines, 1991).

Given the emerging research on this topic, and the propensity for individuals to use substances to cope during the COVID-19 pandemic (Bartel et al., 2020; Czeisler et al., 2020), this study provides important data on binge drinking among college students who experienced a campus closure. It may be that ongoing public health interventions related to COVID-19 (i.e., restricting gatherings, curfews, closures of bars/restaurants) could influence patterns of binge drinking for students as they return to campuses and the surrounding communities, for both remote and in-person instruction. Data from subsequent semesters is needed given that the pandemic has continued for nearly a year and initial disruptions in alcohol consumption may have changed; thus, ongoing research is needed to fully understand COVID-19 and drinking patterns. Targeted preventive outreach interventions may be needed for those who escalate risky drinking during this time of isolation and stress; and campuses should be prepared for a possible escalation of drinking behaviors when the restrictions are fully lifted.

CRedit authorship contribution statement

Erin E. Bonar: Conceptualization, Writing - original draft, Writing - review & editing, Investigation. **Michael J. Parks:** Formal analysis, Writing - original draft, Writing - review & editing, Conceptualization. **Meredith Gunlicks-Stoessel:** Writing - review & editing, Conceptualization. **Grace R. Lyden:** Writing - review & editing, Conceptualization, Formal analysis. **Christopher J. Mehus:** Writing - review & editing, Conceptualization. **Nicole Morrell:** Writing - review & editing, Project administration. **Megan E. Patrick:** Writing - review & editing, Project administration, Funding acquisition, Investigation.

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.

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