

What happens when the party moves home? The effect of the COVID-19 pandemic on U.S. college student alcohol consumption as a function of legal drinking status using longitudinal data

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Abstract

Many young adults in the United States (U.S.) moved from college accommodations to live with their parents/family during the Spring 2020 semester due to the COVID-19 pandemic. While alcohol consumption fluctuates during a typical semester among students, the impact of the sudden changes stemming from the pandemic on students' alcohol consumption patterns is unclear. To examine the impact of the COVID-19 pandemic on college student alcohol consumption while accounting for legal drinking age and living situation. Data were collected from students ($n = 302$) at a large, northeastern U.S. university at the beginning and end of the of the 2019 and 2020 Spring semesters via an online survey that assessed socio-demographic characteristics (age, gender, race/ethnicity, living situation) and alcohol consumption using the daily drinking questionnaire. Data were analyzed using a 2 (cohort group: COVID-19 vs. normal) \times 2 (age group: above 21 vs. under 21) \times 2 (time: beginning vs. end of the semester) mixed model ANOVA. There was a significant three-way interaction. Students over the legal drinking age impacted by the pandemic demonstrated a drastic decrease in alcohol consumption by the end of the semester compared to those under normal circumstances. Change in living situation as a result of the pandemic drastically impacted the alcohol consumption patterns of students over the legal drinking age. Suggestions for future research on the continuing effects of the pandemic on students are discussed.

Keywords

Alcohol drinking in college, Young adults, Alcohol drinking habits, Alcohol abstinence

SARS-CoV-2 (COVID-19), the cause of the current global pandemic, was first identified in Wuhan, China in late 2019 with the first United States (U.S.) case confirmed on January 20, 2020 [1, 2]. By early March 2020, the virus had rapidly spread resulting in many changes, including over half a million U.S. college students transitioning to online learning [3]. Beyond the impact on classes, campuses experienced mass cancellations of programs and events, as well as closures of on-campus facilities. Students living in dormitories, Greek affiliated houses, and other university-controlled accommodations had to vacate these premises and many students found

Implications

Practice: Colleges, local public servants, and health officials should closely monitor student alcohol consumption as traditional establishments and campuses change policies due to the pandemic (e.g., closing and re-opening).

Policy: College administrators should work closely with local policymakers to identify and provide resources to students with high potential to abuse alcohol.

Research: Researchers should continue to monitor the impact of the pandemic on alcohol consumption among young adults (both underage and legal age) and account for living situation, setting, drinking motives, and other factors that influence alcohol consumption.

themselves moving back home. In the U.S. alone, 2.2 million adults between the ages of 18 and 25 moved back in with either a parent or grandparent through March and April [4]. The effects of this major disruption to the Spring semester were reflected in many social media posts, online forums, and news outlets. One especially telling article featured in the New York Times titled "I'm in High School Again": Virus Sends College Students Home to Parents, and Their Rules" documented the challenge of adjusting not only to online classes but also to the unexpected and abrupt transition to living back home [5].

Due to the pandemic, the conclusion of the Spring 2020 semester was in stark contrast to previous years. During a traditional academic year, the conclusion of the Spring semester is associated with enhanced positive mood states [6] as well as a significant increase in alcohol consumption [7]. This is consistent with research demonstrating increased alcohol consumption by college students during positive mood states and periods of celebration [8, 9]. However, because of the pandemic,

many end of semester celebratory events (Spring Break trips, embedded program trips, graduations, etc.) were either cancelled or moved online. Given the widespread impact of the pandemic on the Spring semester, it is yet unclear how the pandemic related changes may have impacted college student alcohol consumption.

Research on the impact of the pandemic on alcohol consumption has produced conflicting reports. While product research has shown an increase in alcohol sales [10], there is also data showing a higher number of respondents reporting either no change or a decrease in consumption (vs. an increase) [11]. Further still, research has found an increase in alcohol consumption by commuter college students (i.e., students less likely to experience a change in living situation as a result of the pandemic [12]). The college environment has been notoriously associated with a culture that endorses alcohol consumption. Research conducted prior to the pandemic has found that greater exposure to college environmental factors (e.g., living on-campus, greater amount of time spent at the university) correlates with increased drinking frequency [13]. The impact of the college environment on increased alcohol consumption is further supported by data showing that college students tend to consume more alcohol than their non-college attending peers [14]. Students who were living in dorms, near college downtown areas, and other campus related accommodations for the Spring 2020 semester may have had to severely adjust their drinking habits when they suddenly found themselves back home.

It is worth noting that research has found an impact of legal drinking status on alcohol consumption using college student samples. Students above the legal drinking age (21 years old in the U.S.) demonstrate patterns of drinking that are distinct from their underage peers. Some research has demonstrated that younger students report more frequent alcohol consumption compared to older students [15], however, this pattern of drinking may be dependent on a number of different factors (gender, setting, type of event, etc.). For example, students above the age of 21 have been shown to be more likely to engage in heavy alcohol consumption before going to, and while at, bars [15]. This indicates that students over the age of 21 who were living on campus or near downtown bar areas may be especially impacted by pandemic-related closures. Specifically, they have lost access to preferred establishments due to bar closures and/or having to relocate. Because of the complex relationship between legal drinking status, drinking settings, and exposure to college environmental factors, the impact of pandemic-related changes on college student's alcohol consumption is a topic worthy of investigation. This is especially the case as many health experts anticipate additional waves of the virus [16] and the effects may continue into the academic year.

The current study sought to investigate the impact of the COVID-19 pandemic on the alcohol consumption habits of college students as a function of legal drinking age. The current study utilized longitudinal data from a large land grant university located in the Northeast U.S. to compare alcohol consumption data from past Spring cohorts to actively enrolled Spring 2020 students across two time points (at the beginning and end of the semester). Analyses were conducted using students who reported living either on-campus or near the downtown area at the beginning of the semester.

METHODS

Design

Data for this longitudinal cohort study were collected at a large, northeastern U.S. university during the Spring 2019 and 2020 semesters via an online survey (Qualtrics, Provo, UT) as part of a larger ongoing research project examining college student health behaviors and outcomes. Baseline data for the independent cohorts were collected at the start of the semester (~late January) after the add/drop deadline, and follow-up data were collected prior to the end of semester exams (~mid-to-late April). Data collected in 2019 and 2020 cohorts were considered to be collected during “normal” and “COVID-19” circumstances, respectively. COVID-19 cohort participants experienced a shift to online instruction after Penn State issued a university wide shut down immediately following 2020 Spring break in mid-March. The Pennsylvania State University Institutional Review Board approved this study.

Participants and procedures

Undergraduates enrolled in general health and wellness classes were recruited to complete the baseline survey. Data were password protected, and only accessible to research team members. An informed consent statement was presented to students upon opening the survey link. Cookies were used to prevent multiple submissions.

Measures

Demographic characteristics

Participants in both cohorts self-reported their age, gender, race/ethnicity, sexual orientation, year of study, and living situation at baseline. The Spring 2020 “COVID-19” cohort reported their living situation at follow-up too, however, this measurement focused on specifying the type of housing they resided in (house, single apartment/condo complex, etc.) as well as the zip code.

Alcohol consumption

Alcohol consumption was assessed using the Daily Drinking Questionnaire [17]. The DDQ assesses the

quantity and frequency of alcohol use by asking students to estimate the typical number of drinks consumed on each day of the week, averaged over the previous three months. Baseline DDQs for both cohorts were framed for 3 months, while the 2019 and 2020 follow-up DDQs were framed for 3 months and 1 month, respectively. The 2020 framing of the DDQ was altered to exclusively encompass the period post-pandemic and closure of the university. DDQ was summed to compute a variable indicative of typical total weekly alcohol consumption (in standard drinks) which was used as the dependent variable in analyses.

Statistical analyses

Analyses were conducted using SPSS Version 26.0 (IBM, Armonk, NY). Data were analyzed using a 2 (cohort group: COVID-19 vs. normal) × 2 (age group: over 21 vs. under 21) × 2 (time: beginning of the semester vs. end of the semester) mixed model ANOVA, with cohort group and age group as between-subjects factors and time as a within-subjects factor. The main model was analyzed using

only students reporting living either on-campus or in the downtown area at time 1. An alternative model was analyzed using only off-campus students to confirm the unique effect on students living near or on-campus.

RESULTS

Participant characteristics

The majority of participants were women, non-Hispanic White, and heterosexual. Participant characteristics are displayed in [Table 1](#) and attrition rates are displayed in [Table 2](#).

Main model

There was a significant 2 (cohort group: COVID-19 vs. normal) × 2 (age group: above 21 vs. under 21) × 2 (time: beginning of the semester vs. end of the semester) interaction, $F(1, 227) = 14.198, p < .001, \eta^2 = 0.059$. There was a significant main effect for all three factors (cohort group, age, and time), as well as a significant two-way interaction between time and cohort ([Table 3](#)). At the onset of a typical

Table 1 | Participant characteristics

	2019 (normal) (<i>n</i> = 115)		2020 (COVID 19) (<i>n</i> = 187)	
	<i>N</i>	%	<i>N</i>	%
Age group				
Underage (<21 years)	50	43.5	59	31.6
Legal age (≥21 years)	65	56.5	127	67.9
Gender				
Men	42	36.5	59	31.6
Women	73	63.5	128	68.4
Race/ethnicity				
NH White	84	74.3	141	75.4
NH Black	1	0.9	2	1.1
Hispanic/Latinx	8	7.1	3	1.6
NH Asian American	10	8.8	21	11.2
NH other	4	3.5	7	3.7
NH multiracial	6	5.3	13	7.0
Sexual orientation				
Heterosexual (straight)	107	93.0	167	89.8
Nonheterosexual	8	7.0	19	10.2
Living situation at beginning of semester				
On campus/downtown	94	81.7	139	74.3
Off-campus	21	18.3	48	25.7
Residency type at end of semester^a				
House			145	80.1
Other			36	19.9
Zip code location^a				
In university county			33	18.2
Outside of university county			148	81.8

NH non-Hispanic.

^aData only collected for 2020 (COVID-19) cohort; one case missing for age in 2020 cohort.

Table 2 | Attrition rates by gender and cohort

	Gender			Age		Total
	Men	Women	Total	Underage (<21)	Legal (≥21)	
2020						
Baseline	175	264	439	137	307	444
Follow-up	59	128	187	59	127	186
Attrition	66.3%	48.5%	57.4%	56.9%	58.6%	58.1%
2019						
Baseline	164	232	396	179	222	401
Follow-up	42	73	115	50	65	115
Attrition	74.4%	68.5%	71.0%	72.1%	70.7%	71.3%

Table 3 | ANOVA results detailing main effects and interactions

	Sum of squares	df	Mean square	F	p
Main effects					
Cohort	622.47	1	622.47	8.14	.005
Age	3328.82	1	3328.82	43.52	<.001
Time	245.01	1	245.01	13.67	<.001
Interaction terms					
Time × cohort	419.03	1	419.03	23.38	<.001
Time × age	1.63	1	1.63	0.09	.764
Cohort × age	232.25	1	232.25	3.04	.083
Time × cohort × age	254.45	1	254.45	14.120	<.001
Error	4068.11	227	17.92		

Spring semester, students over the age of 21 consumed more alcohol ($M = 10.74$, $SD = 7.79$) than their underage peers ($M = 5.09$, $SD = 6.82$) with the discrepancy increasing slightly at the end of the semester ($M = 12.63$, $SD = 8.97$; $M = 4.13$, $SD = 5.13$, respectively). At the onset of the Spring 2020 semester, students over the legal age consumed more alcohol ($M = 10.37$, $SD = 7.08$) compared to students under 21 ($M = 4.58$, $SD = 6.29$), however, by the conclusion of the semester, there was a marked decrease in the discrepancy between the two age groups ($M = 5.20$, $SD = 6.15$; $M = 2.75$, $SD = 6.60$, respectively). This change was largely driven by a drastic drop in consumption by students of legal drinking age (Fig. 1).

It should be noted when gender was included as an additional factor the overall model was not significant, $F(1, 223) = 0.46$, $p = .50$; there was not a significant main effect for gender ($p = .44$); and, gender did not interact with age group ($p = .67$) or cohort ($p = .19$), but did interact with time ($p = .02$). Given the lack of strong statistical support that gender played an important role in the relationships of interest it was excluded from main model. It should be noted that within the factorial ANOVA model that included gender, the three-way interaction of cohort, age, and time remained significant ($p < .001$).

Model assessing off-campus students

In order to fully investigate the impact of living situation, the model was computed using only students

who reported living off campus outside of the downtown area. The model was non-significant, $F(1, 62) = 0.487$, $p = .488$, providing further support for the enhanced impact of the pandemic on students living on-campus or near campus within the downtown area.

DISCUSSION

The current study investigated the impact of the global pandemic on alcohol consumption as a function of legal drinking status. Longitudinal data were used to compare Spring 2020 students to Spring 2019 students with data collected at the beginning and end of the semester. Analyses specifically focused on students who reported living on-campus or near campus in the downtown area. Results found a significant three-way interaction between all factors (cohort group, age group, and time of the semester). During the pre-pandemic Spring semester, students over 21 years (i.e., legal drinking age) consumed more alcohol than their underage counterparts, with the difference between the groups increasing slightly by the end of the semester. The start of the Spring 2020 semester was similar, with students over the age of 21 consuming more alcohol than underage students. However, by the end of the Spring 2020 semester (which was severely impacted by the pandemic), the alcohol consumption of students over the age of 21 dropped to a level that was similar to their

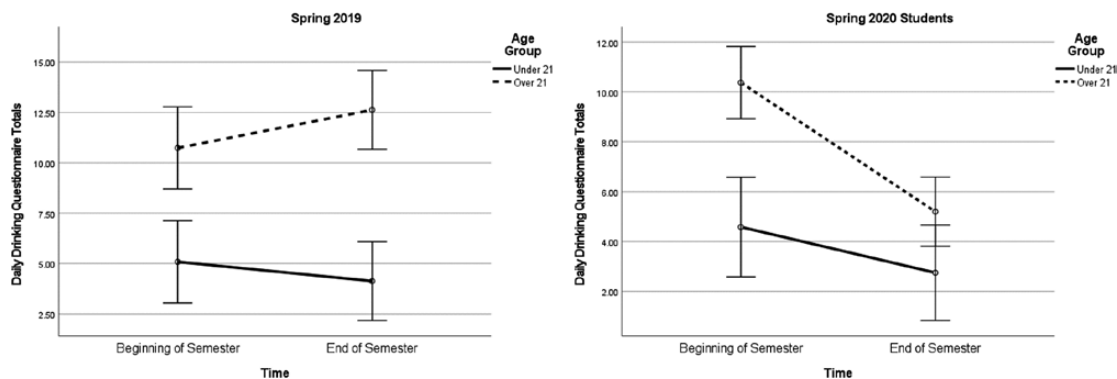


Fig 1 | Results of the significant 2 (cohort group: COVID-19 vs. normal) \times 2 (age group: above 21 vs. under 21) \times 2 (time: beginning of the semester vs. end of the semester) interaction predicting Daily Drinking Questionnaire totals. The first panel shows 2019 Spring data, the second panel shows 2020 Spring data. In both panels, data for underage students is designated by a solid line and data for students over 21 designated by a dashed line.

underage peers. There are several potential explanations for this pattern of results. One is that students lost access to their preferred drinking establishments. During March and April 2020, 43 state governors, including the (Pennsylvania) governor, issued stay-at-home orders which included the shut-down of non-essential businesses, in this case bars and restaurants [18]. It is common for large universities, like the one of the current study, to have downtown areas with bars that are frequented by students. Previous research has found that students tend to consume heavily at these establishments, especially students over the legal drinking age [15]. Therefore, the loss of access to these traditional consummatory settings may have played a role in the change of alcohol consumption behavior. Students over the legal drinking age could have purchased alcohol to maintain pre-pandemic consumption habits. However, given the marked decrease in reported consumption, it appears that this was not the case. This leads to a second potential explanation, change in living situation. Almost all on-campus students had to vacate university affiliated housing, with national data suggesting that millions of students moved back in with parents or grandparents as a result [4]. Many students may have found that their college level drinking habits were not endorsed within their family homes and adjusted accordingly. There are also additional explanations outside of the scope of the current study, such as decrease in peer pressure [19], change in caloric intake and physical activity [20], and loss of financial opportunities [21]. These, and others, should be explored in future research.

It is worth noting that a potential implication of this effect is that living with family and away from collegiate drinking establishments (as compared to living on campus) during the academic year may serve as a protective factor against overconsumption. This may be an unanticipated benefit of the current global pandemic and is in line with previous research that has identified living at home as a protective

factor against dangerous alcohol related behaviors [22]. Additional research has found that college students living in their familial home report a greater influence of their parents' beliefs impacting their decisions in general [23]. Research has also found that the protective effects of parental involvement extend to many risk-related behaviors associated with the collegiate environment [24]. Further support of the protective effects of parental involvement can be found in research demonstrating that these effects begin before the transition to college and may persist even if the child leaves home for college [25].

Identifying protective factors against harmful drinking in college student populations is especially important given that college students are a high-risk demographic for dangerous over consumptive behaviors [26]. However, in continuing to look toward the future, researchers and college administrators should closely monitor student alcohol consumption behaviors when full student bodies are welcomed back to campus and downtown drinking establishments resume business.

Although the current study did find a decrease in alcohol consumption among legal drinkers compared to past Spring semesters, recent research has found an increase in alcohol consumption among commuter college students [12]. This may be due to demographic differences between campuses, in particular student living situations. Students living in campus affiliated accommodation or near college campuses tend to consume more alcohol compared to commuter students [27]. It appears as though alcohol consumption increased for students who were not required to relocate [12], while students living in campus-affiliated accommodation had to adjust their drinking habits upon moving back home.

A limitation of the current study is that current living situation was only measured at the first time point. Although at follow-up (i.e., time 2), the COVID cohort was asked to report on their housing type (house, single apartment/condo complex, etc.)

and zip code. Inspection of this data found that the majority of the sample reported residing in a house and in a zip code outside of the university county (80.1% and 81.8%, respectively; see Table 1). These statistics indicate that the majority of students in the current sample altered their living situation due to the pandemic. This is in direct contrast to previous cohorts that presumably maintained their living situation throughout the semester. Additionally, the demographics of the campus indicate the majority of students would have experienced a change in living situation. Data were collected from a college campus with 35% of students residing in on-campus housing (dorms, university owned apartments, etc.) and 42% of the students coming from out of state to attend [28]. Again, indicating that a large portion of the university likely changed living situation due to the pandemic. Nonetheless, with only one data collection point for the specific living situation variable, it is not possible to get exact numbers of what proportion of the sample changed living situation. Future research should be more precise in measuring and tracking changes in living situation. This would allow for additional investigation into the impact of living situation changes throughout the academic year on alcohol consumption.

An additional limitation that warrants discussion is in reference to the influence of gender within the current study. Longstanding research spanning across cultures has consistently demonstrated gender differences in alcohol consumption with men reporting higher drinking frequencies and quantities compared to women [29]. However, the current study did not find statistical evidence for an impact of gender on the interaction between cohort, time, and age. One potential explanation for this pattern of results is that the current study did not have enough statistical power to detect the effect within the four-factor model. Another explanation could be that the overwhelming impact of COVID-19 on alcohol consumption may have had such a severe impact on both men and women that existing gender differences were no longer apparent. Future research to explore further into the impact of COVID-19 on alcohol consumption habits of male versus female college students. Related to this limitation are the patterns noted in attrition rates (see Table 2). The attrition rate for men (66.3%) was higher than that of women (51.5%) within the Spring 2020 cohort (i.e., the COVID affected group). Furthermore, it should be noted that these attrition rates were lower compared to the attrition rates for men (74.4%) and women (68.5%) for the Spring 2019 cohort. The lower attrition rate among the COVID group may be due to students having more time to complete the follow-up survey due to changes in academic, employment, and leisure activities as a result of the pandemic. However, differences in attrition rates based on age were negligible

within each cohort. Attrition represents one of the major concerns in conducting longitudinal studies as it can potentially impact the generalizability of the study. Although there are slight differences reported by gender and cohort, it is common for attrition rates between 30% and 70% to be reported in longitudinal studies [30]. However, results should still be interpreted with caution as the differences in attrition rates may imply a bias in relation to gender and cohort. Additional research is needed to further assess attrition in the time of COVID-19 related data collection.

In conclusion, the findings suggest that the effect of the pandemic on U.S. college student's alcohol consumption may depend on a number of factors including legal drinking status and living situation. As the COVID-19 pandemic continues to unfold, researchers should continue to monitor the impact it has on college students. This is especially the case with the varied approaches to course delivery (virtual, face-to-face with social distancing, hybrid, etc.) and anticipated future waves of the virus [16].

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Compliance with Ethical Standards

Conflicts of Interest: The authors declare that they have no conflict of interest.

Human Rights: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Penn State University Institutional Review Board approved this study. This article does not contain any studies with animals performed by any of the authors.

Informed Consent: Informed consent was obtained from all participants included in the study.

Transparency Statement

Study Registration: The study was not formally registered.

Analytic Plan Preregistration: The analysis plan was not formally preregistered.

Data Availability Deidentified data from this study are not available in a public archive. Deidentified data from this study will be made available by emailing the corresponding author.

Analytic Code Availability: There is no analytic code associated with this study.

Materials Availability: Materials used to conduct the study are not publicly available.

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