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Drinking to Cope in the COVID-19 Era: an Investigation Among College Students.

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Abstract

Objective: The COVID-19 pandemic has resulted in abrupt, drastic changes to daily life in many nations. Experiences within the U.S. have varied widely, with relatively limited virus exposure in the State of Oregon in the early months of the pandemic; however, protective protocols (e.g., social distancing) were comparatively high in this state during this time resulting in concern for increases in loneliness and COVID-related stress. For college students, pandemic stress compounds existing upward trends in mental health service use and high rates of substance use, necessitating research to identify how COVID-related factors predict substance use within this population during unprecedented times. **Method**: The present study examined the indirect relationship of loneliness and other stressors to alcohol use, via drinking-to-cope motives. A sample of traditional- and nontraditional-aged college students (N = 215; 68.1% female; age M=24.8 years) completed an online survey assessing COVID-19 experiences during shelter-in-place orders in Oregon over a five-week period in April and May of 2020. **Results**: Cross-sectional SEM analyses revealed that loneliness and COVID-19 news consumption were associated with stronger coping motives, whereas rated seriousness of COVID-19 was related to weaker coping motives. Coping motives, in turn, were related to more frequent past 30-day consumption; significant indirect effects were revealed for all three predictors on drinking frequency and heavy drinking frequency, via drinking-to-cope motives. Drinking-to-cope motives were also related to greater past 30-day marijuana use. **Conclusion**: Findings provide insight into how COVID-related stressors and associated social relationship repercussions relate to alcohol and marijuana use, and drinking-to-cope motivations while sheltering in place. These results have implications for how frequent substance use and coping-motivated use can be

mitigated during a crisis.

The novel coronavirus pandemic of 2019 (COVID-19) has dramatically changed daily life in most countries, including the United States (U.S.) with potential repercussions for stress, social relationship functioning, and health behaviors including alcohol consumption. Social distancing and shelter-in-place orders across the U.S. and internationally in spring of 2020 shifted the nature of social, work, and educational activities. The cumulative psychological effects of these events are yet to be seen, though evidence suggests the presence of individual differences (e.g., Tran et al., 2020). The consequences of social isolation and loneliness may be most significant among young and older adults (Beam & Kim, 2020). Given pre-COVID-19 concerns about dramatic increases in the number of college students seeking mental health services (e.g., Lipson et al., 2019) for both mental health and substance use problems (e.g., Pedrelli et al., 2015), evidence points to the critical importance of understanding the impact of COVID-19 on student health and well-being.

Early reports indicate that substance use in the COVID-19 era is changing. Substantial increases in alcohol sales as of March 2020 (54% national sales increase; 262% online sales increase; Pollard et al., 2020) have been reported. Cannabis sales also hit record highs in May 2020 (Foden-Vencil, 2020). In Oregon, drinking jumped 83% the first day after the state issued shelter-in-place orders, and weekday drinking jumped 39% the first week (BACtrack, 2020). At the same time, bars and restaurants were closed and social events prohibited. Of concern is the extent to which pandemic-related drinking is associated with stress and loneliness. Historically during pandemics, such as SARS (2004) and H1N1 (2009), public response to confinement, loss of routine, and reduction in social and physical contact has involved boredom, frustration, and a sense of isolation, which causes distress (e.g., Brooks et al., 2020). Further,

exposure to catastrophic events adversely affects drinking behavior. For example, rates of

alcohol consumption increased with heightened exposure to the 9/11 terrorist attacks (Boscarino

et al., 2006; Welch et al., 2014); a finding similar for both natural and man-made disasters (e.g.,

Reijneveld et al. 2003; Cerdá et al., 2011). Hospital employees who worked in a high-risk

location during the SARS outbreak in China demonstrated subsequent drinking-to-cope

motivations and alcohol dependence (Wu et al., 2008).

Accordingly, COVID-19-related stressors may be associated with drinking-to-cope

motivations and substance use. Individuals with greater depression and anxiety (Tran et al.,

2020) or those with more stress (Callinan et al., 2020) have *increased* their drinking post-COVID

outbreak in Australia; and similar increases have been reported among U.S. adults with COVID-

19-related distress and threat (Rodriguez et al., 2020). However, the relationship between

COVID-19-stressors and college student drinking is unclear, despite cause for concern. Over the

past few decades, the increasing number of students seeking mental health services has raised

alarm about emotional well-being of college students (Kruisselbrink-Flatt, 2013; Prince, 2015).

Meanwhile, the growing number of nontraditional aged students (aged 24 and older; Larovici,

2014) has increased the number of students balancing school, work, and family (Gilardi &

Guglielmetti, 2011). Trenz et al. (2015) revealed that nontraditional students experienced

significantly greater life stressors, anxiety, and depression than traditional students, but did not

differ in alcohol use.

Relevant to COVID-related social isolation is loneliness, defined as the perceived

inadequacy of the quality or quantity of social ties, which can harm health (e.g., shorten lifespan,

worsen cardiovascular health, increase disease susceptibility; Holwerda et al., 2016). Emerging

adulthood has been associated with heightened susceptibility to loneliness (Qualter et al., 2015)

and loneliness has been identified as a mediator of the relationship between social skills, depression, anxiety, and other mental health outcomes (Moeller, & Seehuus, 2019). Emerging adults are also more sensitive to emotional stimuli (e.g., fear; Aslanian & Giles, 2009) than older people, which may exacerbate loneliness responses to sheltering in place. Exposure to stress (during adolescence *and* adulthood alike) is also predictive of alcohol and substance use disorders (Cerdá et al., 2011). For example, higher use of substances has been found in survivors of traumatic events like Hurricane Katrina (Flory et al., 2009; Beaudoin, 2011) and the 9/11 terrorist attacks (Frank et al., 2006). College students managing the transition to distance learning during the COVID-19 era may be facing new, complex challenges such as isolation from peers, lack of support and family, health, and financial security concerns, which could influence substance use.

Health behavior is one mechanism through which loneliness impacts health (loneliness health behaviors hypothesis; Hawkley & Cacioppo, 2003). Evidence for the influence of loneliness on alcohol use has been mixed, with some work suggesting greater use and misuse among lonely persons (e.g., Sadava & Thompson, 1986; Arpin et al., 2015), and other research demonstrating no difference between the lonely and non-lonely (Cacioppo et al., 2002). Yet, it is likely that loneliness indirectly influences alcohol use via other health-compromising processes, including drinking-to-cope motivations. Substance use is one commonly-reported coping response to loneliness (Kuntsche et al., 2005) as a form of "sad passivity" response (Rubenstein & Shaver, 1980).

Motivational models of alcohol use describe drinking to cope with negative experiences as one motivational pathway (e.g., Cooper et al., 1992) based on the tension-reduction hypothesis (TRH; Conger, 1956). Accordingly, drinking to alleviate distress is reinforced because of the

distress-dampening properties of alcohol (Conger, 1956). Across age groups, countries, and special populations (e.g., college students, military service members), tension-reduction drinking has consistently predicted a host of problematic alcohol use (e.g., Cooper et al., 1992; Kuntsche et al., 2005; Mohr et al., 2005). Since drinking motives are uniquely related to the development of alcohol problems independent of drinking quantity (Cooper et al., 1992), it is essential to investigate whether COVID-related circumstances enhance coping-related drinking.

Present Study

The present study examined the psychosocial context of college student alcohol use at a time of rigid shelter-in-place orders (Executive Order NO.20-12) enacted in the U.S. State of Oregon at the outset of the COVID-19 pandemic. Whereas COVID-19 exposure was relatively limited in Oregon at the time of the study (1.3 cases/100,000; COVIDActNow.org, 2020), lockdown measures and protective protocols were stringent relative to other U.S. states (Riski, 2020); restaurants and bars were closed and social events were prohibited. Survey data were collected between April 23 and May 31, 2020, fully overlapping the spring quarter academic term, and began once students had settled into the first few weeks of remote learning. Importantly, the study period occurred prior to increases in racial tensions, widespread protesting, and political strife during the summer of 2020. Rates of infection were relatively low at the survey launch (see Supplemental Materials for details). Thus, most individuals were not coping directly with the symptoms of the virus; rather, they were coping with heightened stress associated with COVID-19.

Consistent with the TRH, we predicted that loneliness and COVID-related stressors (i.e., seriousness of COVID-19, COVID-19-related news-seeking) would be associated with greater alcohol consumption as a function of coping motives. Because marijuana is legal and widely

used in Oregon, we considered marijuana in relation to our COVID-19 and loneliness predictors

to account for such use in our examination of motivated alcohol use.

Method

Participants

Undergraduate student participants (N=220) completed an online cross-sectional survey

of students' experiences during the COVID-19 pandemic. All participants were enrolled in

Spring 2020 academic quarter at an urban university in Oregon, U.S., which was operating

remotely (online). An advertisement for the survey was distributed through the undergraduate

email listserv, university instructors, and on social media platforms. Participants were entered to

win 1 of 2 gift cards upon survey completion and were provided health resources.

Five participants were extreme age outliers (>3+SD, 52-71) and were removed, leaving

215 students (68.1% female and 66.1% White). Participants were on average 24.8 years old

(SD= 6.47, Median age= 22, IQR [21, 26]); 37% were 25 or older. Approximately 37% of

participants were married/cohabiting; most did not have children (93%); 32.6% identified as

LGBT, 29.4% did not, and 35.8% identified as allies. Many students were employed (47%) and

mostly lived with 1-2 (50%) or 3+ (47%) adults. See Table 2 for additional demographic

information.

Procedure and Measures

Following provision of informed consent, the Internet-based questionnaire was

administered via Qualtrics[©]2013 assessing the initial impact, experiences, and psychosocial

consequences of the pandemic.

COVID-19 Survey Items. The 4-item adapted Flu Telephone Survey Template (Rubin et

al., 2014) measured perceived seriousness (SERIOUS) of the COVID-19 virus: "The coronavirus

would be a serious illness for me," "If I catch the coronavirus (COVID-19) it will have major

consequences on my life," " If I catch coronavirus (COVID-19) it will cause difficulties for

people who are important to me," and "If I don't take any preventative action, then I am likely to

catch coronavirus (COVID-19) in the next 3 months" (1=*strongly agree* to 4 =*strongly disagree*;

α=.72). The Short-form (2-item) COVID-19 News Impact Scale (NEWS) was administered with

items: "I watch a lot of news about the coronavirus," and "I spend a huge percentage of my time

trying to find updates online or on TV about coronavirus (COVID-19)," (Conway et al., 2020) on

a 5-point Likert scale (1= *definitely false* to 5= *definitely true*; α=.70). Students also indicated

COVID-19 status: "I have been diagnosed with coronavirus (COVID-19) with *yes*, *no*, *Test in-*

progress, and *Prefer not to answer*.

  Substance Use and Motives. Past 30-day alcohol consumption was assessed with items

from the AUDIT-C (Bush et al., 1998), measuring frequency (FRQ), "How often do you have a

drink containing alcohol?" 0=*never*, 1=*monthly or less*, 2=*2-4 times a month*, 3=*2-3 times a*

week, and 4=*4 or more times a week*; quantity (QTY), "How many standard drinks containing

alcohol do you have on a typical day when you are drinking?" (standard drinks were defined on

the webpage), with responses ranging from *1-2* to *10 or more*; and heavy drinking frequency

(HFRQ), "How often do you have six or more drinks on one occasion?" (0=*never* to 4=*daily or*

almost daily). The 3-item coping motives (COPE) subscale of the Drinking Motives Revised

Short-form (DMQ-SF; Kuntsche, & Kuntsche, 2009) was administered (e.g., "to forget about my

problems") on a Likert scale (1=*almost never* to 5=*almost always*; α=.89). Frequency of past 30-

day marijuana use (MFRQ) was assessed with response options including 1=*never*, 2=*not in the*

past 30 days, 3=*once or twice*, 4=*once or twice a week*, 5=*three or four times per week*, 6=*five or*

six times per week, and 7=*daily*. Two author-generated items were included to assess change in

drinking or marijuana use since the pandemic social-distancing began with six responses (0=*I do not use this*, 1=*Yes, a lot less*, 2=*Yes, a bit less*, 3=*No, about the same*, 4=*Yes, a bit more*, and 5=*Yes, a lot more*).

Loneliness (LONELY). The three-item Brief Loneliness Scale (BLS; Russell, 1996) assessed how often participants felt "left out," "isolated," or "lacking companionship," in the past 30 days (1=*never* to 4=*always*; α=.83).

Data Analysis

Once the factor structure of variables was affirmed with CFAs conducted via Mplus Version 8.2 (2018) [$\chi^2(48)$=78.658, *p*<.05, RMSEA=.057 (95%C.I.=.033 to .079), *p* of Close Fit=.290, CFI=.957, SRMR=.065], we conducted structural equation modeling (SEM) analyses, wherein QTY, FRQ, HFRQ, and MFRQ were modeled as a function of psychosocial predictors. Maximum Likelihood estimation and bias-corrected bootstrapping with resampling (10,000) accounted for non-normality in alcohol outcomes[1] and any missing data. Based on inspection of correlations and previous research, we considered gender with 2 dummy-coded (0,1) variables (*other* vs. *male*, *other* vs. *female*)[2], race (0=*white*, 1=*nonwhite*), Hispanic ethnicity (0=*non-Hispanic*, 1=*Hispanic*), age, and marital status (0=*no*, 1=*yes*) as potential covariates; all were significantly related to at least one substance use variable in our SEM model. The inclusion of marital status significantly worsened model fit and was not retained. Preliminary model tests determined that COVID-related financial strain (Conway et al., 2020) and social isolation (i.e., number of high contact roles; Cohen et al., 1997; see Supplemental Materials for measures information) were not significantly related to any substance use variable; including these variables significantly reduced model fit and were not retained.

Results

Descriptive Statistics

Descriptive statistics and correlations for study variables are presented in Table 1. On average, participants drank alcohol 2-4 times/month (M=1.73, SD=1.35), typically consuming 1-2 drinks/day (62%); 13.6% report drinking 4+ times/week, and 8% reported consuming 5+ drinks/day, and 4% drank 6+ drinks weekly or more. Approximately 26.1% reported using marijuana weekly or more; 11.6% used daily. Since sheltering in place, 29.1% of drinkers increased their QTY (35.6% of users increased MFRQ). Demographic differences for age, gender, ethnicity, and race groups are presented in Table 2. Non-Hispanics and whites reported higher FRQ than Hispanics and non-whites; similarly, older students had higher FRQ than younger students (i.e., nontraditional vs. traditional; underage vs. of-age drinkers). Non-binary or other gender students reported significantly higher MFRQ compared to men or women. We also observed a trend, whereby students participating toward the end of the study reported higher COPE than those completing the survey toward the beginning ($r = .16$, $p = .048$). Three participants (1.4%) had been diagnosed with COVID-19.

Model Testing

Inspection of our hypothesized model revealed a good model fit, $\chi^2(141) = 180.563$, $p<.05$, RMSEA=.039, 95%C.I.= [.019, .055], p of Close Fit=.870, CFI=.955, SRMR=.062. As revealed in Table 2 and Figure 1, LONELY and NEWS were related to stronger COPE, whereas SERIOUS was related to weaker COPE. COPE was related to higher FRQ and HFRQ, but not QTY. LONELY was related to greater MFRQ.

Next, we examined evidence for indirect effects between psychosocial predictors and alcohol outcomes via COPE, modeling all indirect effects simultaneously. The bootstrapped

unstandardized indirect effect between LONELY, .218, 95%C.I.=[.056, .531], NEWS, .347, 95%

C.I.=[.096, .813], and SERIOUS, -.258, 95%C.I.=[-.737, -.034] and FRQ were significant as

determined by the absence of zero within the 95% confidence intervals. All three indirect effect

pathways were significant in predicting FRQ through COPE. A similar pattern emerged for

HFRQ, wherein the bootstrapped unstandardized indirect effect between LONELY, .134,

95%C.I.=[.035, .351], NEWS, .214, 95%C.I.=[.067, .536], and SERIOUS, -.159, 95%C.I.=[-

.461, -.032] and HFRQ was significant.[3]

Post-hoc Model Test

Existing research documents that coping motives for marijuana and alcohol use are

significantly correlated (e.g., r=.44, $p < .01$) and there is no significant difference in coping

motive endorsement for different substances (Simons et al., 2000). Drinking-to-cope motives

also predict simultaneous alcohol and marijuana use (Conway et al., 2000). In this study, we

found significant relationships between higher MFRQ and greater alcohol use (see Table 1);

those with stronger COPE reported higher MFRQ (i.e., r=.213, $p < .05$). Thus, we re-estimated

our hypothesized model including a pathway between COPE and MFRQ, revealing a superior-

fitting model [$\Delta\chi^2(1) = 6.41$, $p = .0137$; $\chi^2(140) =174.153$, $p < .05$, RMSEA=.036

(95%C.I.=[.013, .053]), p of Close Fit=0.914, CFI=.961, SRMR=.057](See Supplemental Table

1S). COPE significantly predicted MFRQ (B=.402, SE=.166, β=.242, $p < .05$), although the

MFRQ-FRQ relationship was no longer significant (B=.218, SE=.142, β=.122, $p> .05$). MFRQ

related to greater QTY (B=.301, SE=.137, β=.229, $p<.05$) and greater HFRQ (B=.293, SE=.124,

β= .239, $p<.05$). All three indirect effects were significant: the indirect effect between LONELY

and MFRQ via COPE was .150, 95%C.I.=[.037, .392]; NEWS predicted greater MFRQ via

COPE (.261, 95%C.I. =[.045, .663]); whereas SERIOUS predicted *less* MFRQ via COPE (-.181, 95%C.I. =[-.554, -.019]).

Discussion

College student alcohol and marijuana use was associated with COVID-19-related psychological factors, providing insights into students who potentially engage in pandemic-related drinking-to-cope. Substance use for both traditional- and nontraditional-aged students appeared to be influenced by events during this early COVID-19 pandemic period. Students experiencing higher loneliness and those consuming more COVID-19-related news reported drinking more frequently as a function of coping motivations, compared to their less lonely or news-consuming counterparts. Conversely, perceived seriousness of COVID-19 was related to weaker coping motives and reduced substance use. Students endorsing stronger drinking-to-cope motivations also used marijuana more frequently. These findings have implications for strategies that can buffer students during the pandemic shelter-in-place period.

Confined to remote learning by stay-at-home orders, student loneliness was of concern, demonstrating a unique association with drinking, even accounting for students' social network quality. Thus, it was the *subjective* experience of social isolation and not necessarily actual frequency of social engagement (or lack thereof) that was associated with drinking-to-cope motives and drinking frequency. The conceptual distinction between social isolation and loneliness is important in the literature (Holt-Lunstad et al., 2015), suggesting distinct avenues for intervention efforts. Whereas social contact helps alleviate social isolation, the negative effects of loneliness can be ameliorated through interventions addressing relevant social-cognitive factors (e.g., negative perceptions in and expectations of social interactions; Masi et al., 2011). Loneliness developed as an adaptive, emotional signal to reconnect upon disconnection

from the group (Cacioppo et al., 2006); prolonged experiences of loneliness may make social connection (and support-seeking) difficult (Cacioppo & Hawkley, 2005), making it a critical concern.

Our COVID-19 news consumption findings suggest that news-seeking activity is raising stress levels based on evidence from previous pandemics (Garfin et al., 2020). News- and information-seeking behavior during times of uncertainty increases psychological distress particularly when that information heightens perceptions of uncertainty or lack of control. This trend is exacerbated by social media, which leads to increased indirect exposure and trauma (Neria & Sullivan, 2011). Clinicians treating anxiety and depression echo these concerns based on studies documenting powerful negative effects of news exposure (e.g., Johnston & Davey, 1997). Although we could not control for depression or anxiety, supplemental analyses controlling for non-specific psychological distress did not alter our conclusions.

It is seemingly counterintuitive that perceived seriousness of COVID-19 related to weaker coping motives and reduced substance use; however, these findings can be interpreted in light of the terror management health model (TMHM; Goldenberg & Arndt, 2008), which posits that when mortality concerns are conscious, health decisions are largely guided by immediate goals of reducing perceived vulnerability to health threats (Spina et al., 2018). A pandemic is likely to trigger heightened thoughts of death (Becker, 1973) and efforts to mitigate perceived vulnerability involve either adaptive (e.g., Arndt et al., 2006; Cooper et al., 2010) or maladaptive health behaviors (e.g., denial of one's vulnerability to health threats; Arndt & Goldenberg, 2017; McCabe & Arndt, 2016). Using TMHM, our results imply that for students perceiving COVID-19 as more serious, conscious mortality reminders may be more salient, leading them to engage in more productive health behaviors, including reducing drinking.

Drinking quantity was not associated with COVID-19 variables; yet, the overall pattern

of relationships is consistent with those reported in drinking-motivations literature, wherein

frequency and quantity are differentiated. For instance, in a rigorous large-scale daily diary

study, Piasecki et al. (2014) demonstrated that coping motives were not significantly related to

total number of drinks or peak BAC, but rather to the alleviation of unpleasant emotions. It was

enhancement and social motives that related to drinking quantity variables, motives reflecting

positive emotional and appetitive motivations to seek reward (Cooper et al., 1995). This

dovetails with Kuntsche and Cooper (2010) who revealed that heavier weekend drinking quantity

was related to enhancement but not coping motives. Further evidence comes from a comparison

of college student extreme drinkers, whereby changes to extreme drinking (i.e., double the binge-

drinking quantity) across time were related to increases in enhancement and social, but not

coping motives (White et al., 2016). Seemingly, our participants were increasing number of

drinking occasions, not drinking quantity in relation to COVID-related stressors, potentially as a

means of regulating stress.

Furthermore, drinking quantity among those who were increasing drinking "a lot" was

not significantly different from those decreasing drinking "a lot." Mean levels for the two groups

indicate they were drinking between 3-4 and 5-6 drinks (increasing drinkers) or about 3-4 drinks

(decreasing drinkers) on a typical day; values that are above recommended daily limits. While

underage drinkers were more likely to report drinking "a bit less," of-age drinkers reportedly

drank "about the same"—these findings suggest a more complex relationship between the

pandemic crisis and quantity consumed. Underage drinkers may have reduced access to alcohol,

limiting quantity consumed. Yet, drinking-to-cope motives relate to the development of alcohol-

related problems, regardless of quantity of consumption (e.g., Cooper et al., 1992), pointing to

concern about student drinking given the connection between pandemic-related stressors, coping motives, and drinking. Patterns were similar for marijuana use frequency, indicating that students who more strongly endorse drinking-to-cope incorporate marijuana into their tension-reduction coping.

Limitations

One limitation of our study concerns the student sample, which may not represent other U.S. undergraduate students, partly because it includes traditional- and nontraditional-aged students. The students, attending college in an urban center, live mostly off-campus (91%), not in dormitories. Nontraditional students face unique stressors such as employment and childrearing (Denning et al., 2018). Yet the prevalence of nontraditional students in college is becoming more common in the U.S. despite being underrepresented in research (Choy, 2002). Thus, our study may present a more realistic representation of the broader college student population. We note that there were few differences between traditional- and nontraditional-aged (as well as underage and of-age) students aside from drinking frequency (higher among nontraditional and of-age drinking students). However, we acknowledge that given our recruitment approach, it is not possible to determine our response rate; thus, our student sample may contain response bias. We also note that we cannot document that each student was in Oregon at the time of the survey, though 78% of students are from Oregon.

The cross-sectional nature of the survey limits our conclusions about mediation. Yet, our predictions are based on theory linking stressors, motives, and consumption and a history of empirical research upholding our hypothesized model. Our interpretation of results was supported by tests of alternative specifications of mediation, which yielded few results. What we can glean from our study is a snapshot of our students' loneliness, stress, coping, and health at a

critical point in our nation's (world's) history. We also note that our survey did not include a marijuana-use motives measure, which could elucidate the interrelationships among coping motives and simultaneous use.

Conclusion

Our study highlights the conditions under which college students drink to cope with pandemic-related stressors. As the spread of COVID-19 continues, Beam and Kim (2020) warn that the negative psychological effects of social isolation and loneliness are growing for young adults. Our findings highlight how such effects can impact college student drinking and have implications for needed support. The pandemic comes on the heels of dramatic decades-long increases in rates of college students seeking mental health services for stress, substance use, anxiety, and depression (Kruisselbrink-Flatt, 2013; Prince, 2015). Support resources need to offer evidence-based loneliness interventions (e.g., Masi et al., 2011) and should recommend limiting news consumption to a few reliable outlets for brief exposure periods (Garfin et al., 2020), while also conveying the serious nature of COVID-19 and how best to prevent illness. We also encourage intervention efforts targeted at reducing negative experience-related drinking, which may be trending upward, such as through mindfulness-based training, which may help to "decouple" the link between negative emotions and coping motives (see e.g., Bravo et al., 2016). As the pandemic and associated sheltering-in-place orders persist, health effects may be compounded, and already-overextended college mental health services overwhelmed. Colleges need to bolster support to meet students' needs during this extraordinary time.

Footnotes

[1] FRQ was relatively normally distributed (skew = 0.244468, kurtosis = -1.102), however QTY

was zero-inflated, skewed (2.031), and leptokurtic (5.056), as was HFRQ (i.e., skew=1.131) and

kurtosis=1.285).

[2] Because of conceptual overlap between psychological distress and study predictors (e.g.,

Richardson et al., 2017), we re-estimated the hypothesized model controlling for Kessler K-6

scores (Kessler et al., 2003). Controlling for distress resulted in a significantly poorer fitting

model (i.e., $\Delta\chi^2$ (128) = 241.101, $p < .05$) and did not substantively change study conclusions.

[3] We tested alternative indirect effect models changing the relative position of study variables

(e.g., modeling coping as an outcome with substance use as mediator) following guidelines of

Danner et al. (2015) and Preacher and Kelley (2011). There were no significant indirect effects

in 2 of 3 alternatively-specified models. For the inverse model (substance use predicting COVID

variables through coping motives), only 3 of 6 were significant and were all descriptively smaller

than in the hypothesized model (see Supplemental Materials and Table 2S).

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Table 1–Means, Standard Deviations and Correlations for Latent Variables and Outcome Variables

Variable	M	SE	Range	1	2	3	4	5	6	7	8	9	10	11	12
1. LONELY	2.72	0.79	[1,4]												
2. SERIOUS	3.00	0.57	[1,4]	**.183***											
3. NEWS	2.67	1.14	[1,5]	-.009	**.230****										
4. COPE	1.79	1.00	[1,5]	.150	-.019	**.283****									
5. Alcohol FRQ	1.73	1.35	[0,4]	-.095	**-.153***	-.092	**.310****								
6. Alcohol QTY	.51	.79	[0,4]	-.047	.001	.042	.126	.128							
7. HFRQ	.75	.83	[0,4]	-.066	**-.171***	.013	**.370****	**.317****	**.549****						
8. Marijuana FRQ	1.24	1.83	[0,5]	.125	-.066	-.045	**.213****	**.207****	**.219****	**.265****					
9. Age	24.80	6.47	[18,50]	-.040	.067	.050	.020	**.280****	.040	-.028	-.092				
10. Non-white	--	--	[0,1]	-.077	.007	.121	-.013	**-.280****	.068	.124	**-.203****	-.109			
11. Hispanic	--	--	[0,1]	.004	-.029	-.080	-.020	**-.185***	-.034	.135	-.127	**-.157***	**.206****		
12. Gender (Men)			[0,1]	-.012	-.018	-.007	-.035	.072	.081	-.043	-.050	**.181***	.074	-.080	
13. Gender (Women)	--	--	[0,1]	-.055	.057	.002	.034	-.071	-.078	.022	-.101	-.132	-.027	.069	**-.795****

Note: Significant correlations in Bold Font. (*) Indicated correlation is significant at the .05 level (two tailed) and (**) correlation significant at .01 level (two tailed). Gender (Men or Other): 1=Male (22.9%), 0=Other genders (77.1%); Gender (Female or Other): 1=Female (68.1%), 0=Other Genders (31.9%). Nonwhite: 0=white (66.1%), 1=nonwhite (33.9%). Hispanic: 0=no (82.4%), 1=yes (17.6%). COPE = Drink to Cope; SERIOUS = COVID-19 Seriousness. NEWS = COVID-19 News watching. LONELY = loneliness. FREQ = frequency. QTY = quantity. HFREQ = heavy drinking frequency.

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Table 2 – Demographic Differences in Study Variables and Mean Comparisons.

Variable	Traditional vs. Nontraditional Student		Under- vs. Of-Age		Gender			Race		Ethnicity	
	18-24	25+	18-20	21+	Male	Female	Other	White	Non-white	Hispanic	Non-Hispanic
	(63%)	(37%)	(23%)	(77%)	(22.9%)	(68.1%)	(9%)	(66.1%)	(33.9%)	(17.6%)	(82.4%)
LONELY	2.74	2.65	2.65	2.72	2.70	2.68	2.98	2.77	2.65	2.74	2.73
SERIOUS	2.98	2.99	2.95	2.99	2.97	3.01	2.87	2.99	3.00	2.95	3.00
NEWS	2.58	2.80	**2.97**	**2.57**	2.66	2.68	2.71	2.58	2.87	2.48	2.72
COPE	1.77	1.89	1.64	1.86	1.75	1.84	1.81	1.82	1.79	1.77	1.82
Alcohol FRQ	**1.42**	**2.26**	**.77**	**2.02**	1.91	1.66	1.76	**1.98**	**1.19**	**1.18**	**1.83**
Alcohol QTY	.53	.51	.68	.49	.64	.47	.54	.49	.61	.45	.53
HFRQ	.81	.73	.64	.80	.71	.78	.85	.71	.95	1.05	.73
Marijuana FRQ	1.24	1.34	1.07	1.34	**1.10[a]**	**1.14[a]**	**2.65[a]**	**1.52**	**.73**	.76	1.37

Note: Significance of group differences denoted in bold, all significant at p < .01; [a] denotes significance post hoc *Scheffé* comparisons. Race: 66.1% White (58.5% non-Hispanic White), with 12.7% Asian, 2.1% Black, 1.6% American Indian/Alaska Native, 1.6% Pacific Islander, and 15.9% Other or Multiracial. Other gender includes non-binary/third gender and self-described. COPE = Drink to Cope; SERIOUS = COVID-19 Seriousness. NEWS= COVID-19 News watching. LONELY= loneliness. FRQ= frequency. QTY= quantity. HFRQ= heavy drinking frequency

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Table 3 – Standardized and Unstandardized Direct Path Model Estimates

Model 1 Predictor	Alcohol FRQ			Alcohol QTY			HFRQ			Marijuana FRQ			COPE		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
COPE	**.52****	**.15**	**.44**	.09	.11	.13	**.32*****	**.10**	**.42**						
SERIOUS	-.11	.24	-.05	.05	.19	.04	-.21	.17	-.15	-.42	.30	-.13	**-.49***	**.24**	**-.26**
NEWS	-.31	.19	-.17	.01	.17	.01	-.13	.14	-.11	.22	.24	.09	**.66****	**.21**	**.45**
LONELY	**-.37***	**.18**	**-.20**	-.11	.12	-.10	-.17	.13	-.14	.37	.23	.14	**.42****	**.15**	**.27**
Gender (Men)	.03	.33	.01	.11	.28	.06	-.12	.24	-.06	**1.27***	**.61**	**-.29**			
Gender (Women)	-.13	.30	-.05	-.02	.22	-.01	-.06	.20	-.04	**-1.31***	**.56**	**-.33**			
Age	**.05****	**.02**	**.23**	.00	.01	.03	.01	.01	.04	**-.03***	**.02**	**-.11**			
Non-White	**-.61****	**.20**	**-.22**	.10	.19	.06	.11	.16	.06	**-.71***	**.29**	**-.18**			
Hispanic	-.29	.25	-.08	-.18	.18	-.09	.22	.23	.10	-.52	.34	-.11			

Note: Bold font indicates significant values. * Estimate is significant at the .05 level, ** significant at .01 level, *** significant at .001 level (two tailed). (†) significant bootstrap 95% CI interval. Gender (Men): 0=other, 1=Male. Gender (Women): 0=other, 1=Female. Nonwhite: 0=white, 1=nonwhite. Hispanic: 0=no, 1=yes. $\chi^2(141) =180.563$, p<.05, RMSEA=.039, 95%C.I. = [.019, .055], p of Close Fit=0.870, CFI=.955, SRMR=.062. COPE = Drink to Cope; SERIOUS = COVID-19 Seriousness. NEWS = COVID-19 News watching. LONELY = loneliness. FRQ = frequency. QTY = quantity. HFRQ = heavy drinking frequency

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Figure 1. Indirect Effects Model of Latent variables with standardized direct and indirect (in parentheses) path estimates. (*) p<.05, (**) p<.01, (***) p<.001, (†) Bootstrap 95% CI. "C" is for COVID. Covariates not modeled in this figure. COPE = Drink to Cope; SERIOUS = COVID-19 Seriousness. NEWS = COVID-19 News watching. LONELY = loneliness. HFRQ = heavy drinking frequency. FRQ =Alcohol frequency. QTY =alcohol quantity. MFRQ = marijuana frequency.

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