Meaning in life and stress-related drinking: A multicohort study of college students during the COVID-19 pandemic

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ABSTRACT

During the COVID-19 pandemic, college students have experienced heightened stressors and reported stress-related drinking. To identify potential protective factors among college students, we investigate the possibility that finding meaning and purpose in one's life may lessen the strength of the association between stress and alcohol consumption in a multicohort sample of college students ($N = 694$; 64.8% women) recruited between November 2019 and September 2021. Consistent with expectations, negative binomial regressions revealed significant interactions, such that higher stress was only associated with more past-month alcohol use among individuals who reported low levels of meaning in life. The buffering role of meaning in life appeared to be robust; interaction results held when investigating both general perceived stress and COVID-specific stress, and did not vary by cohort. Although longitudinal and experimental research are needed, findings indicate that finding meaning and purpose in one's life may help college students to navigate heightened periods of stress with more adaptive coping strategies that do not result in drinking to cope. Findings highlight the potential utility of meaning-promoting strategies in college alcohol interventions.

1. Introduction

College typically involves many potentially stressful transitions (Cadigan et al., 2021). Beginning March 2020, the COVID-19 pandemic has amplified students' transitions by necessitating housing changes, distance learning, and physical distancing (Hoyt et al., 2021; Tasso et al., 2021). Compounding these transition-related stressors, concern for contracting the virus or losing loved ones has created a period of heightened stress (Buckner et al., 2021; Charles et al., 2021).

As alcohol is often a salient part of college (Osberg et al., 2010), students may respond to heightened stress by drinking to cope. Much research (but not all; Luk et al., 2018) has shown students' perceived stress is associated with elevated alcohol use (Park, Armeli, & Tennen, 2004) and subsequent drinking-related problems (Russell et al., 2017). Although college students largely decreased drinking at the onset of the pandemic (Bollen et al., 2021; Bonar et al., 2021) given changes in living situation (Jaffe et al., 2021), college drinking remained prominent, with 65% of students endorsing past-month alcohol use (Schulenberg et al.,

2021). During the pandemic, some students also increased drinking to cope, which has been associated with increased binge drinking (Buckner et al., 2021; Fruehwirth, Gorman, & Perreira, 2021; Mohr, Umemoto, Rounds, Bouleh, & Arpin, 2021) and negative consequences (Hingson et al., 2017).

Although considerable research has examined stress and college drinking before and during the pandemic (Fruehwirth, Gorman, & Perreira, 2021; Ham & Hope, 2003; Mohr, Umemoto, Rounds, Bouleh, & Arpin, 2021), resilience to stress-related drinking has received less attention (Johnson et al., 2011; Lechner et al., 2020). One potential resource is *meaning in life*, which refers to the "sense made of, and significance felt regarding, the nature of one's being and existence" (Steger et al., 2006). Meaningful living has been linked to happiness, wellbeing, and resilience (Steger, 2012; Steger et al., 2006). Meaning in life encourages effective coping (Steger, 2012), growth in the face of adversity (Triplett et al., 2012), decreased psychopathology (Steger, 2012), and increased physical health (Czekierda et al., 2017). In turn, meaning in life has been associated with less stress generally (Park & Baumeister,

2017) and specific to COVID-19 (Trzebiński et al., 2020).

The stress of the pandemic has likely prompted many to question or revise their sense of meaning in life. This meaning-making process might foster more positive views in light of current circumstances (Park, 2010). Within college, a distinct sense of meaning in life might allow students to overcome stress as they prioritize achievement of valued goals without turning to alternative coping efforts like drinking (Palfai & Ralston, 2011). Indeed, meaning in life has been associated with less alcohol use among students (Lecci, MacLean, & Croteau, 2002; Palfai & Ralston, 2011; Palfai & Weafer, 2006). Thus, a strong sense of meaning may be an important resilience factor during the pandemic.

In sum, greater perceived stress and less meaning in life have both been associated with more alcohol use among college students. For students experiencing elevated stress during the pandemic, meaning in life may mitigate the link between stress and drinking. Thus, we examined college students' stress, meaning in life, and alcohol use within a multicohort study. We hypothesized that the stress-alcohol association would be lessened among individuals reporting greater meaning in life. We expected this finding to be apparent for both general and COVID-specific stress, and robust regardless of timepoint in the pandemic.

2. Method

2.1. Procedures and participants

Following Institutional Review Board approval, 11,480 students from a large Northwestern US public university were randomly invited (based on predetermined birthdate windows) from the registrar's list to the screening survey of the parent study assessing alcohol-related interventions (#NCT04030325). To date, there have been 8 cohorts: Cohort 1: Nov 6–20, 2019; Cohort 2: Jan 10-Feb 9, 2020; Cohort 3: Apr 23-May 23, 2020; Cohort 4: Aug 20-Sept 19, 2020; Cohort 5: Oct 22-Nov 20, 2020; Cohort 6: Jan 10-Feb 9, 2021; Cohort 7: Apr 23-May 23, 2021; Cohort 8: Aug 20-Sep 18, 2021. The COVID-19 pandemic began between Cohorts 2 and 3, and classes at the current university were entirely online during Cohorts 3–8, with the exception of select lab-based classes. A total of 3,802 (34.8%) students completed the online screening survey. Eligibility criteria were: (a) aged 18–24, (b) $\geq$ 1 past-month heavy drinking episode (4+/5 + drinks on an occasion for females/males; Wechsler & Nelson, 2001), and (c) past-month alcohol-related consequences ($\geq$3 consequences in Cohort 1; relaxed to $\geq$ 2 consequences in Cohorts 2–8 to improve recruitment rates) as assessed by 33 selected items from the Rutgers' Alcohol Problems Index (White & Labouvie, 1989), Young Adult Alcohol Problems Screening Test (Hurlbut & Sher, 1992), and additional consequences not assessed by these scales (i.e., being a passenger of an impaired driver, drunk texting/dialing, and posting something on social media that was later regretted). Given our interest in cohort differences, we focused on Cohorts 2–8 with identical eligibility criteria. Within these cohorts, 3,506 completed screening, 804 (22.9%) were eligible, and 694 (86.3%) completed the online baseline survey. All participants provided informed consent and were compensated $10 for screening (increased to $20 in cohorts 6–8 to increase responses) and $25 for baseline.

Thus, the current analytic sample included 694 students (M_{age} = 19.01 years; SD = 0.94). Participants were 64.8% women, 33.2% men, 1.4% genderqueer/gender non-conforming, 0.4% transmen, and 0.1% preferred not to answer. Regarding sexual identity, 75.4% were straight/heterosexual, 15.9% bisexual/pansexual, 4.8% gay/lesbian, 2.7% questioning, 0.1% queer, and 1.2% preferred not to answer. Regarding ethnicity, 9.8% self-identified as Hispanic/Latinx. Students racially self-identified as 71.1% White/Caucasian, 14.9% Asian/Asian American, 9.1% multiracial, 1.4% American Indian/Alaskan Native, 1.2% Black/African American, 0.6% Native Hawaiian/Pacific Islander, and 1.7% Other. A quarter (26.8%) lived with parents and 41.6% were Greek organization members.

2.2. Measures

2.2.1. General stress

General stress was measured at baseline using five items from the Perceived Stress Scale (Cohen et al., 1983), which were selected for their focus on perceived control and self-efficacy to cope. Participants were asked how often in the past month they (a) "*felt that you were unable to control the important things in your life,*" (b) "*felt confident in your ability to handle personal problems*" (reverse-scored), (c) "*found that you could not cope with the things you had to do,*" (d) "*felt that you were on top of things*" (reversed-scored), and (e) "*felt difficulties were piling up so high that you could not overcome them.*" Responses ranged from 0 (*Never*) to 4 (*Always*) and were averaged (α = 0.80).

2.2.2. COVID-specific stress

Beginning in Cohort 3 (after the pandemic began), COVID-specific stress was measured using all 16 items from the Multifaceted COVID-19-Related Stressors Scale (Graupensperger et al., 2021) from the baseline survey. Participants were asked how concerned they were about the COVID-19 pandemic impacting different domains including job insecurity, financial, illness, social/relational, and school-related stressors, as well as feeling overwhelmed at work or with news/information. Responses ranged from 1 (*Not at All*) to 5 (*Extremely*) and were averaged (α = 0.88).

2.2.3. Meaning in life

Meaning in life was measured using two items from the Meaning and Purpose Domain of VanderWeele's (2017) Flourishing measure, which was administered in full at baseline. First, participants rated if they felt things they do in life are worthwhile from 0 (*Not at All*) to 10 (*Completely*). Second, participants indicated if they understood their purpose in life from 0 (*Strongly Disagree*) to 10 (*Strongly Agree*). Given psychometric support for the theoretical grouping of these two items in a single subdomain (Węziak-Białowolska, McNeely, & VanderWeele, 2019), scores for these two items were averaged (α = 0.79).

2.2.4. Alcohol use

Alcohol use was measured at baseline using the Timeline Followback (Pedersen et al., 2012). After viewing standard drink definitions, participants reported the number of drinks (0–29) consumed on each of the last 28 days. Responses were summed, yielding total past-month drinks consumed.

2.2.5. Demographics

Demographics were collected at screening, including age, sex assigned at birth, gender and sexual identity, ethnicity, race, living situation, and Greek membership.

2.3. Data analysis

To characterize the sample, descriptive statistics and Pearson correlations were examined. Omnibus differences by cohort were examined via analyses of variance; significant omnibus tests were probed with Tukey's HSD.

To examine predictors of past-month drinks consumed, two negative binomial regression models were estimated in *R* via the *glm.nb* function (Venables & Ripley, 2002). To control for sample variability across cohorts in demographics that may relate to stress and/or drinking, covariates in both models included: sex assigned at birth, age, identity as a sexual/gender minority, Hispanic/Latinx identity, race (White, Asian, or another racial identity), living with parents, Greek membership, and indicator-coded cohort. Predictors of interest were stress (general stress in the first model; COVID-specific stress in the second model) and meaning in life. These were both mean-centered, then examined as main and interactive effects predicting alcohol consumption. The general stress model utilized the full analytic sample of Cohorts 2–8; because the

COVID-specific stress measure was added after the pandemic began, this model was limited to Cohorts 3–8.

Negative binomial model assumptions were examined and there was no indication that distributional assumptions were violated (Hilbe, 2011). Estimates and 95% confidence intervals (CIs) were exponentiated to yield corresponding incident rate ratios (IRR) and CIs. A buffering effect of meaning on the stress-alcohol link would be reflected by interaction term with an IRR and 95% confidence interval below 1. Johnson-Neyman regions of significance (Bauer & Curran, 2005) were examined with the *interactions* package (Long, 2019) to determine the value of the moderator at which the simple slope changes from significant at $p < .05$ to non-significant.

Finally, to examine whether the buffering effect of meaning in life was robust across cohorts, two negative binomial regression models were estimated with a three-way interaction between stress, meaning, and cohort, controlling for demographics. Significant interactions were probed. All analyses were conducted in R v4.0.3 (R Core Team, 2020). Annotated code and output are available in the online supplement.

3. Results

3.1. Descriptive statistics

On average, participants reported mid-range levels of meaning in life ($M = 6.10, SD = 2.18$), general stress ($M = 1.64, SD = 0.76$), and COVID-specific stress ($M = 2.51, SD = 0.71$), and 33.18 past-month drinks ($SD = 36.15$). Pearson correlations revealed associations between all variables ($ps \leq 0.029$). General and COVID-specific stress were positively related ($r = 0.42$) and both were associated with less meaning in life ($r = -0.51$ and -0.16, respectively). Greater alcohol use had small (though counterintuitive) associations with less general and COVID-specific stress ($r = -0.14$ and -0.13, respectively), and more meaning in life ($r = 0.08$).

3.2. Differences by Cohort

Fig. 1 displays means by cohort. There were no differences by cohort in meaning in life, $F(6, 687) = 0.84, p = .543$, or general stress, $F(6, 687) = 0.76, p = .605$, but there were differences in COVID-specific stress, $F(5, 603) = 4.56, p < .001$. Pairwise comparisons revealed that COVID-specific stress was highest in Aug-Sep 2020 ($M = 2.66, SD = 0.73$) and Jan-Feb 2021 ($M = 2.67, SD = 0.76$), which were significantly different from the lowest stress reported Apr-May 2021 ($M = 2.36, SD = 0.70$) and Aug-Sep 2021 ($M = 2.35, SD = 0.67$). Cohorts differed in alcohol use, $F(6, 687) = 2.33, p = .031$, but the only

significant difference was between Apr-May 2020 ($M = 23.70, SD = 22.59$) and Apr-May 2021 ($M = 37.94; SD = 34.57$).

3.3. Meaning in life buffering the Stress-Alcohol link

After controlling for covariates, there were significant interactions between stress and meaning in life predicting alcohol use (Table 1), with a similar pattern for general and COVID-specific stress. Regions of significance revealed that general stress was only associated with significantly more alcohol use for individuals with relatively low meaning in life (score < 3.74 on a 0–10 scale). Similarly, COVID-specific stress was only associated with significantly more alcohol use for participants with relatively low meaning in life (score < 4.37 on a 0–10 scale). Finally, the three-way interaction was not significant for general stress ($p = .579$) nor COVID-specific stress ($p = .266$), suggesting the buffering effect of meaning on the stress-alcohol link was robust to cohort differences.

4. Discussion

Adding to a burgeoning literature on drinking to cope during the COVID-19 pandemic, we examined the protective capacity of meaning in life. Consistent with expectations, the link between stress and alcohol use was lessened among students who perceived their life to be more meaningful. In fact, the association between higher stress and heavier drinking was *only* observed for individuals with relatively low meaning in life. Findings replicated across general and COVID-specific stress during the pandemic. Thus, meaning in life appears to be a robust protective factor for students experiencing general stressors during college, and for widespread community-based stressors during the pandemic.

Findings should be interpreted in the context of this study's limitations. First, the measures used to assess general stress and meaning in life were brief to minimize participant burden, and more comprehensive assessments should be used in future research. In particular, our meaning in life measure captured purpose and significance, but did not capture a third dimension—coherence, which is included in recent conceptualizations of meaning in life (Martela & Steger, 2016) . Second, despite multiple cohorts, the current study was cross-sectional. Meaning in life was presumed to be a stable pre-existing protective factor (Steger & Kashdan, 2007), but within-individual variability in meaning has recently been reported (Pavlacic et al., 2021). Longitudinal and event-based designs are needed to understand which protective factors prevent in-the-moment maladaptive coping with stress through drinking. Experimental research could also be leveraged to understand how alcohol cravings and consumption in response to a standardized stressor (Magrys & Olmstead, 2015; McGrath et al., 2016) differ based on
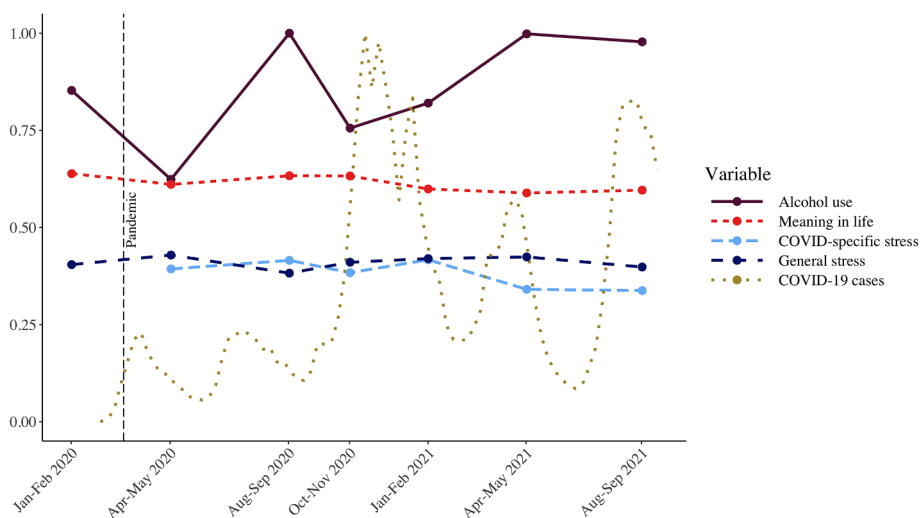

Fig. 1. Differences by Cohort. *Note.* Values for meaning, COVID-specific stress, and general stress are represented as the proportion of the possible scale responses; alcohol use and COVID-19 cases were represented as a proportion of the maximum value plotted. Values for a given cohort are plotted at the average date for that cohort. To contextualize the cohorts, COVID-19 cases are shown for the 7-day count on a given week for the county in which data collection took place (Washington State Department of Health, 2021). The vertical line represents when the World Health Organization declared the pandemic on March 11, 2020 (Cucinotta & Vanelli, 2020).

Table 1
Results of Negative Binomial Regressions Predicting Past-Month Alcohol Use.

Predictors of Alcohol Use	**General Stress Model** N = 693; R^2 = 0.510				**COVID-Specific Stress Model** N = 608; R^2 = 0.526		
	n = 693; R^2 = 0.510				n = 608; R^2 = 0.526		
	IRR	95% CI	p		IRR	95% CI	p
Female	**0.67**	**0.60 – 0.76**	<0.001		**0.64**	**0.56 – 0.73**	<0.001
Age	1.07	1.00 – 1.14	0.054		**1.08**	**1.01 – 1.16**	0.033
Sexual or gender minority	**0.87**	**0.75 – 1.00**	0.049		0.88	0.76 – 1.03	0.093
Hispanic or Latinx	1.00	0.82 – 1.23	0.977		1.01	0.82 – 1.26	0.932
Race							
White	1.12	0.94 – 1.33	0.198		1.08	0.89 – 1.29	0.422
Asian	**0.77**	**0.61 – 0.96**	0.018		**0.79**	**0.62 – 1.00**	0.045
Other	REF				REF		
Live with parents	**0.69**	**0.60 – 0.80**	<0.001		**0.68**	**0.59 – 0.79**	<0.001
Greek	**1.94**	**1.71 – 2.20**	<0.001		**1.96**	**1.71 – 2.24**	<0.001
Cohort							
2: Jan-Feb 2020	1.17	0.93 – 1.48	0.171				
3: Apr-May 2020	REF				REF		
4: Aug-Sep 2020	**1.37**	**1.10 – 1.69**	0.004		**1.37**	**1.11 – 1.70**	0.004
5: Oct-Nov 2020	1.13	0.88 – 1.45	0.351		1.13	0.88 – 1.45	0.352
6: Jan-Feb 2021	1.12	0.91 – 1.38	0.270		1.13	0.92 – 1.40	0.255
7: Apr-May 2021	**1.28**	**1.04 – 1.57**	0.016		**1.26**	**1.02 – 1.55**	0.028
8: Aug-Sep 2021	**1.48**	**1.20 – 1.81**	<0.001		**1.46**	**1.19 – 1.79**	<0.001
Stress[a]	1.03	0.94 – 1.13	0.499		1.02	0.93 – 1.13	0.605
Meaning in life	1.00	0.97 – 1.03	0.996		0.99	0.96 – 1.02	0.422
Stress[a] X Meaning in life	**0.97**	**0.94 – 0.99**	0.022		**0.95**	**0.91 – 0.99**	0.011

Note. Bolded values are statistically significant at p < .05. [a]Stress refers to either general stress or COVID-specific stress, matching the respective model name.

meaning in life. Finally, cohort differences may have been due to factors outside of the pandemic, including random variability and systematic differences in who was willing to participate at that time.

Despite these limitations, results highlight the importance of finding meaning in one's life to mitigate negative outcomes of stress such as alcohol use. Findings indicate potential value in supplementing alcohol interventions with additional activities to foster meaningful living. For example, university counselors might encourage heavy drinking students to reflect on and commit to intrinsically valued goals from an acceptance and commitment therapy framework to promote meaning in everyday life (Ostafin & Feyel, 2019). Students might also identify personal strengths to foster a greater purpose and create a sense of meaning (Seligman et al., 2006). Integrating meaning-promoting activities into widely disseminated online alcohol interventions may be warranted.

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Contributors

AEJ served as lead for coordinating the development and conceptualization of the overall manuscript, formal analysis, and writing of original and revised drafts. SAK, BAH, KNSL, and TAG contributed to conceptualization, interpretation of analyses, and writing original and revised drafts. JRC contributed to conceptualization, interpretation of analyses, reviewing, and editing. MEL secured funding, oversaw data collection and management, and contributed to conceptualization, reviewing, and editing of the manuscript. All authors contributed to and have approved the final manuscript.

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.2022.107281.

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