

# Differences in mental health and alcohol use across profiles of COVID-19 disruptions

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## Abstract

This study aimed to examine differences in mental health and alcohol use outcomes across distinct patterns of work, home, and social life disruptions associated with the COVID-19 pandemic. Data from 2093 adult participants were collected from September 2020 to April 2021 as a part of a larger study examining the impacts of the COVID-19 pandemic on substance use. Participants provided data on COVID-19 pandemic experiences, mental health outcomes, media consumption, and alcohol use at baseline. Alcohol use difficulties, including problems related to the use, desire to use alcohol, failure to cut down on alcohol use, and family/friend concern with alcohol use, were measured at 60-day follow-up. Factor mixture modeling followed by group comparisons, multiple linear regressions, and multiple logistic regressions was conducted. A four-profile model was selected. Results indicated that profile membership predicted differences in mental health and alcohol use outcomes above and beyond demographics. Individuals experiencing the most disruption reported the strongest daily impact of COVID-19 and significantly high levels of depression, anxiety, loneliness, overwhelm, alcohol use at baseline, and alcohol use difficulties measured at 60-day follow-up. The findings highlight the need for integrated mental health and/or alcohol services and social services targeting work, home, and social life during public health emergencies in order to respond effectively and comprehensively to the needs of those requiring different types of support.

**Keywords:** COVID-19; mental health; alcohol use; psychological distress; health disparities

The COVID-19 pandemic has brought about many challenges, such as disruptions in daily routines, separation from loved ones, heightened fear and panic, and job and financial insecurity throughout the United States (US). These challenges have led to seemingly unprecedented uncertainty, unmitigated fear, and urgency in responses and evaluation of the impacts (World Health Organization, 2005; Friedman *et al.*, 2021). These experiences have been described as a “parallel epidemic” (Yao *et al.*, 2020) of worsened mental health, psychological functioning, and increased substance use with significant rises in alcohol consumption (Holmes *et al.*, 2020; Killgore *et al.*, 2020; Kumar and Nayar, 2020; Pollard *et al.*, 2020; Friedman *et al.*, 2021; Graupensperger *et al.*, 2021; MacMillan *et al.*, 2022). In order to develop effective mental health and alcohol use resources that address the combined effects of the pandemic, it is crucial to understand how these experiences have impacted the US population. This understanding will be particularly important as we move forward from the height of the pandemic.

Research on the impact of COVID-19 has focused on social determinants of health in established high-risk communities (e.g. essential/frontline workers, individuals with substance use disorders, and individuals with psychological disorders)

or key demographic groups (e.g. distinct racial/ethnic, gender, and economic groups; Yao *et al.*, 2020; Fisher *et al.*, 2021; Gaitens *et al.*, 2021; Katikireddi *et al.*, 2021; Devoto *et al.*, 2022; Lee *et al.*, 2022). These approaches to community classification have undoubtedly assisted policymakers in designing comprehensive population-targeted mental health resources. However, the underlying assumption that individuals in these established groups, often based on proximity or other group-level characteristics rather than individual-level psychosocial factors, are homogeneous in their experiences overlooks intra- and inter-group variances. It potentially reduces the impact of such programs (Drapeau *et al.*, 2012). Consequently, research is needed to understand how commonalities in pandemic experiences relate to mental health and alcohol use outcomes in order to identify those most vulnerable to COVID-19 disruptions, subsequent economic and health difficulties, and similar experiences that may arise in the future. Person-centered analytical methods such as factor mixture modeling can be employed to achieve this goal. These methods examine individual-level characteristics and recognize groups within a sample based on these characteristics’ emerging patterns (Laursen and Hoff, 2006; Fernández *et al.*, 2020; Luk *et al.*, 2022; Yaçın *et al.*, 2022).

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As the impact of the pandemic continues to be felt across broader economic and health consequences, it is essential to comprehend the extent to which diverse COVID-19 experiences are associated with mental health and alcohol use outcomes to provide adequate services in the future. Therefore, the current study has two main aims. The first was identifying person-centered classifications based on COVID-19 experiences in one's work, home, and social life. Prior international population-based studies reflecting the social determinants of health indicate that mental health risk is associated with salient COVID-19-related experiences, including changes in employment and income (Fana *et al.*, 2020; Fisher *et al.*, 2021; Lee *et al.*, 2022), changes in housing (Fisher *et al.*, 2021), work-from-home transitions (Shankar, 2021), decreases in perceived social support (Szkody *et al.*, 2020; Long *et al.*, 2022; Villasanta *et al.*, 2022), and increases in catastrophizing COVID-19 media consumption such as "doom-scrolling" (Garfin *et al.*, 2020; Huang and Zhao, 2020; Kumar and Nayar, 2020; Liu and Liu, 2020; Bendau *et al.*, 2021; Geirdal *et al.*, 2021; Ytre-Arne and Moe, 2021; Villasanta *et al.*, 2022). The second aim of this study was to assess whether the patterns of emerging experiences would predict differences in mental health outcomes, including perceived loneliness, feeling overwhelmed, anxiety, depression at baseline, and alcohol use outcomes at baseline and 60-day follow-up.

## Materials and methods

### Participants and procedures

The current data were derived from a larger, nationally representative study investigating the social determinants of mental health and substance use outcomes during the COVID-19 pandemic among a sample of US adults. A total of 2796 individuals were recruited online by a Qualtrics panel to complete an online survey hosted by Qualtrics. Inclusion criteria included those 18 or older, US residents, and current Facebook users (Fisher *et al.*, 2021). Participation was voluntary, and informed consent was provided during the screening process. Individuals were compensated \$30 for their participation. Data were de-identified and stored on the lab server, password-protected and only accessible by authorized researchers working on the project. Copying or storing data on personal devices or other workstations was prohibited. Study procedures were reviewed and approved as exempt by the University of Pennsylvania's Institutional Review Board. After removing participants for poor completion, duplicate data logs, inattention, or incomplete responses, a total of 2093 adult participants (18–81 years old; 66.6% female) who provided data from 30 September 2020 to 5 April 2021, were included in the final data analysis for this study. Of the 2093 participants, 37% ( $N = 769$ ) had been diagnosed with depression by a health provider at a certain point in the past, 24% ( $N = 503$ ) took antidepressant medications [e.g. paroxetine (Paxil) and sertraline (Zoloft)], 19% ( $N = 399$ ) used medications to control anxiety [e.g. diazepam (Valium) and alprazolam (Xanax)], and 90% ( $N = 1876$ ) were not in any treatments for either nicotine, alcohol, or other substances. Out of the 10 participants receiving treatment for alcohol alone or both alcohol and other substances, six participants were taking medications, including naltrexone, methadone, acamprosate, disulfiram, varenicline, and nicotine replacement therapies.

### Demographic measures

We collected demographic data such as race, age, gender, education level, household income, and socioeconomic status (SES). SES was measured as subjective social status by the MacArthur Scale of Subjective Social Status (Adler *et al.*, 2000), where participants ranked themselves in society relative to others (1 = worst off to 10 = best off). Table 1 reports descriptive statistics for all participant demographics and work, home, and social life measures described below.

### Profile measures of work, home, and social life disruptions

COVID-19-related disruptions within work, home, and social life contexts were operationalized by seven measures assessing employment and housing experiences, social support, and COVID-19 media consumption (see Table 1).

Work life disruptions were operationalized as changes in employment and being bothered by changes in employment. Changes in employment were assessed with a single categorical item with five mutually exclusive levels created by reducing a single 10-option "check-all-that-apply" item with principal component analysis (PCA) with "promax" rotation. Bothered by changes in employment was measured with a single 5-point Likert scale item, ranging from 1 = no employment changes to 6 = extremely troubled.

Home life disruptions were operationalized as changes in housing, responsibilities caring for others, and difficulties with work-home balance. PCA was utilized to create a single categorical item of changes in housing with five mutually exclusive levels derived from a single 11-category "check-all-that-apply" item. Responsibility for caring for others was assessed by a single item for which participants indicated whether they cared for others at home; responses were coded as caring for no one, children, older adults, or multiple people. Work-home balance was measured by a single item assessing whether participants had to balance working from home with caring for others.

Social life disruptions were operationalized as perceived social support and COVID-19 media consumption. Social support was assessed with the six-item Perceived Social Support Questionnaire (F-SozU K-6; e.g. "I receive a lot of understanding and security from others") on a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree) (Kliem *et al.*, 2015). The F-SozU K-6 had good internal consistency in the current study, Cronbach's  $\alpha = 0.86$ . COVID-19 media consumption was measured with a single self-report item ("On average, how many hours per day did you spend on this [following media coverage]?").

### Outcome measures

#### Mental health outcomes

Participants' perceptions of (i) COVID-19 impact at baseline ("How much does/did COVID-19 (coronavirus) impact your day-to-day life?"; 1 = not at all to 5 = extremely), (ii) loneliness at baseline measured by one item from the UCLA loneliness scale ("How often do you feel isolated from others?"; 1 = hardly ever to 3 = often) (Hughes *et al.*, 2004), and (iii) feeling overwhelmed at baseline measured by one item from the Perceived Stress Scale ("In the last month, how often have you found that you could not cope with all the things that you had to do?"; 0 = never to 4 = very often) (Cohen *et al.*, 1983) were assessed.

**Table 1.** Participant characteristics and endorsement of profile measures across profiles.

Participant characteristics	N (%)
Age—range: 18–81	M (SD) = 38.44 (12.79)
Race	
White race	1244 (64.2%)
Other race/ethnicity	749 (35.8%)
Gender	
Male	654 (31.2%)
Female	1394 (66.6%)
Other or prefer not to say	45 (2.2%)
Education	
Did not attend college	175 (8.4%)
Did attend college	1918 (91.6%)
Household income	
<\$20 000	260 (12.4%)
\$20 000–\$49 999	554 (26.5%)
\$50 000–\$89 999	641 (30.6%)
\$90 000 or more	638 (30.5%)
Subjective social status, M (SD)—scoring: 0–10	6.02 (1.69)
Profile measures	N (%)
Changes in employment	
Decrease in pay, decrease in number of work hours, or switched to remote work	628 (30%)
Increase in pay, increase in number of work hours, or got a new job in my normal line of work	271 (12.9%)
Furloughed or obtained unemployment pay	297 (13.7%)
Let go from job or got a new job outside of my normal line of work	388 (18.5%)
No employment changes	519 (24.8%)
Bothered by changes in employment	
No employment changes	519 (24.8%)
Not at all troubled	240 (11.5%)
Slightly troubled	470 (22.5%)
Moderately troubled	371 (17.7%)
Considerably troubled	295 (14.1%)
Extremely troubled	198 (9.5%)
Changes in housing	
Stayed in an abandoned building, car, or other place not meant as housing, I did not know where I was going to sleep, even for one night, or didn't have a home	5 (0.2%)
Didn't pay full amount of rent or mortgage or didn't pay full amount of utilities	359 (17.8%)
Had to move, moved in with other people due to financial problems, or evicted from or asked to leave home	239 (11.9%)
Stayed in a shelter	8 (0.4%)
No housing changes	1402 (69.6%)
Caring for someone at home	
Caring for no one	1754 (83.8%)
Only a child/children	167 (8%)
Only an elderly person or someone else	135 (6.5%)
Multiple people	31 (1.8%)
Work-home balance	
Not working from home	927 (44.3%)
Did not have to balance	623 (29.8%)
Had to balance	543 (25.9%)
Social support—scoring: 1–5	M (SD) = 3.91 (0.89)
COVID-19 media consumption (in hours)—scoring: 0–24	M (SD) = 2.24 (1.27)

Note. M, mean; SD, standard deviation. Total sample,  $N = 2093$ . Other race/ethnicity includes American Indian/Alaskan Native ( $N = 26$ , 1.2%), Asian ( $N = 196$ , 9.4%), Black ( $N = 254$ , 12.1%), Hispanic ( $N = 178$ , 8.5%), Native Hawaiian or other Pacific Islander ( $N = 6$ , 0.3%), and other race participants ( $N = 89$ , 4.3%).

Anxiety symptoms at baseline were measured using the seven-item Generalized Anxiety Disorder-7 scale (e.g. “Over the last 2 weeks, how often have you been bothered by the following problems—Feeling nervous, anxious, or on edge?”) measured on a 4-point Likert scale (0 = not at all to 3 = nearly every day) (Spitzer *et al.*, 2006). Composite scores range from 0 to 21, and the scale showed excellent reliability in the current sample, Cronbach's  $\alpha = 0.93$ .

Depression symptoms at baseline were rated using the Patient Health Questionnaire-9 (e.g. “Over the last 2 weeks, how often have you been bothered by any of the following

problems—Little interest or pleasure in doing things?”) measured on a 4-point Likert scale (0 = not at all to 3 = nearly every day) (Kroenke *et al.*, 2001). Composite scores range from 0 to 27 and the measure showed excellent internal consistency in the current sample, Cronbach's  $\alpha = 0.91$ .

#### Alcohol use outcomes

Alcohol use at baseline was assessed with the three-item Alcohol Use Disorders Identification Test-Concise (e.g. “How often do you have a drink containing alcohol?”), which has been used as a validated screen for heavy alcohol use

(Bush *et al.*, 1998). Each question is measured on a 5-point scale where total composite scores range from 0 to 12.

Alcohol use coping self-efficacy at baseline was assessed with the DTCQ-8, an eight-item global measure of self-efficacy derived from the Drug-Taking Confidence Questionnaire (Sklar and Turner, 1999) adapted for alcohol use in the current study (e.g. “I would be able to resist the urge to drink alcohol . . . If I were angry at the way things had turned out”). Participants rated their confidence in their ability to resist alcohol use in eight scenarios on a 100-point scale (0 = not at all confident to 100 = very confident), and scores were averaged. The measure showed excellent internal consistency in the current sample, Cronbach’s  $\alpha = 0.91$ .

Alcohol use difficulties were measured at the 60-day follow-up with four items adapted to assess alcohol use from the NIDA-modified ASSIST (National Institute on Drug Abuse, 2016) in four areas: (i) health, social, legal, or financial problems related to alcohol use coded as 1 = never or once or twice and 2 = weekly or almost daily/daily, (ii) desire or urge to use alcohol coded as 1 = never or once or twice and 2 = weekly or almost daily/daily, (iii) failure to cut down on alcohol use coded as 1 = no/never or 2 = yes in the past, and (iv) family and friend concern about alcohol use coded as 1 = no/never or 2 = yes in the past.

## Data analysis

First, a person-centered statistical approach known as factor mixture modeling was used to identify profiles among the sample based on seven measures of work, home, and social life (see Fig. 2) with the DepmixS4 package in R (Visser and Speekenbrink, 2010). This analytical method is a probabilistic latent model that estimates distinct profiles based on relationships among categorical and continuous multivariable data (Clark *et al.*, 2013; Kusrkar *et al.*, 2021; Luk *et al.*, 2022). Factor mixture models with two through six solutions were estimated. Model selection was guided by (i) fit statistics including log-likelihood, Akaike information criterion, and Bayesian information criterion, (ii) theoretical representation and interpretability where profiles represent theoretically and clinically meaningful patterns among participants, and (iii) parsimony where the smallest number of profiles necessary is preferred (Collins and Lanza, 2009). There was no missing data among profile indicators. Second, profiles were compared on sociodemographic characteristics and psychological outcomes utilizing Welch-corrected ANOVA results with post hoc Games–Howell comparisons and chi-square tests of independence with adjusted standardized residuals. Lastly, profile membership was entered as a correlate of psychological and alcohol use outcomes in six adjusted multiple linear regressions and four adjusted multiple logistic regressions.

## Results

### A four-profile model solution

Based on parsimony and theoretical and clinical significance, the four-profile solution was determined to provide the most meaningful differentiation among the sample. Figure 1 compares probabilities of endorsing profile indicators across profiles. As shown, the “No Disruptions” profile (24%,  $N = 497$ ) was characterized by no probability of any employment disruptions and a 100% probability of experiencing no employment changes, a high probability of experiencing no housing

changes, average social support, and below-average COVID-19 media consumption compared with the other profiles. The “Work Life Disruptions” profile (39%,  $N = 824$ ) was the largest profile and was characterized by a higher probability of negative employment changes, a low probability of experiencing any housing changes, the highest average of social support, and the lowest average of COVID-19 media consumption. The “Work and Social Life Disruptions” profile (7%,  $N = 142$ ) was characterized by a higher probability of employment changes and the highest average of COVID-19 media consumption of all profiles but a low probability of housing changes and average social support. Lastly, the “Work Home and Social Life Disruptions” profile (30%,  $N = 630$ ) was characterized by a higher probability of negative employment changes and negative housing changes, the lowest average of social support, and above-average COVID-19 media consumption for the sample.

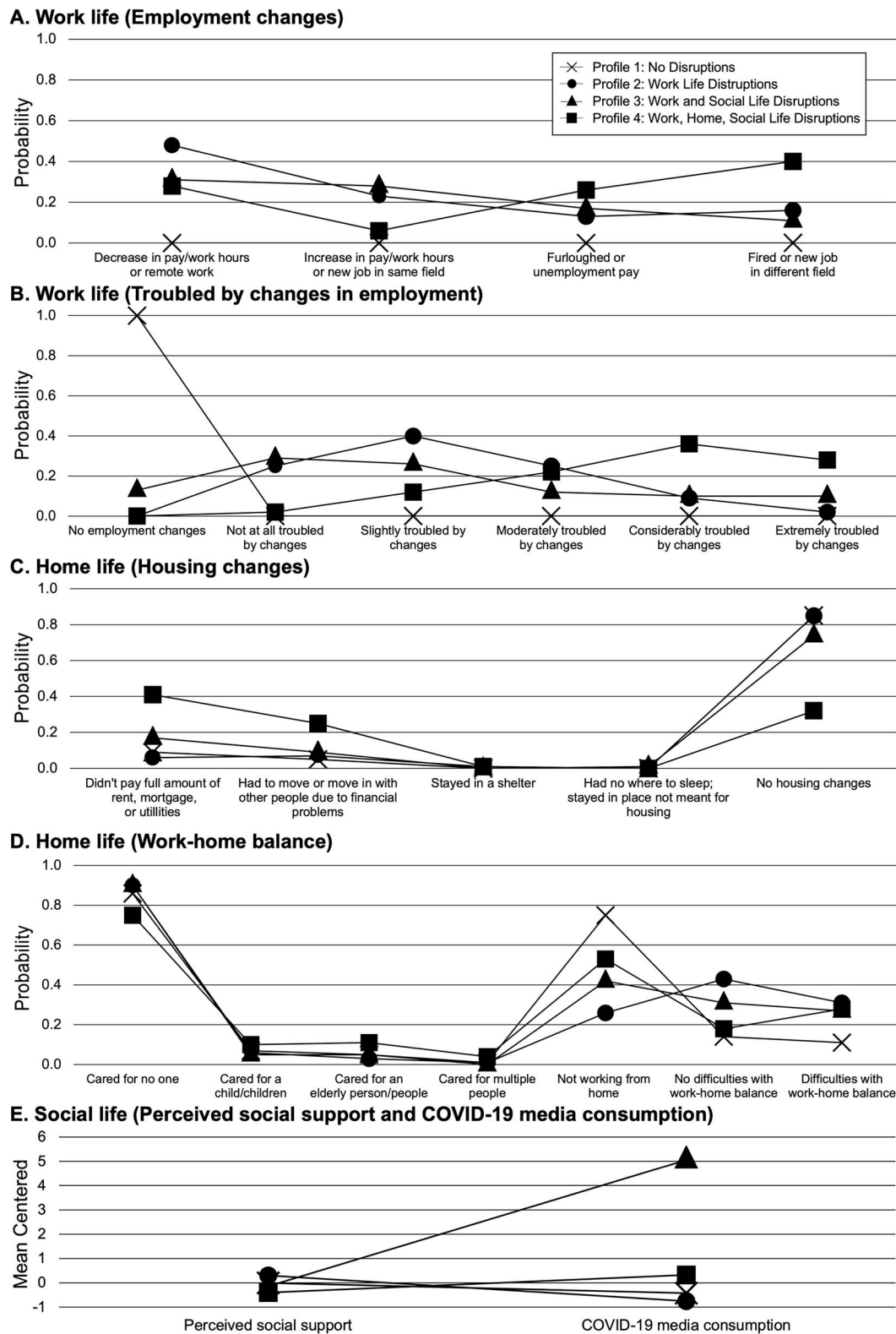
### Demographics across the four profiles

Differences by age, race, education, household income, and subjective social status observed across the four profiles were examined through Welch-corrected ANOVA results with post hoc Games–Howell comparisons and chi-square analyses interpreted with adjusted standardized residuals. Given the lower percentages of American Indian/Alaskan Native ( $N = 26$ , 1.2%), Asian ( $N = 196$ , 9.4%), Black ( $N = 254$ , 12.1%), Hispanic ( $N = 178$ , 8.5%), Native Hawaiian or other Pacific Islander ( $N = 6$ , 0.3%), and other race participants ( $N = 89$ , 4.3%) in the current sample, these responses were combined for analyses. As depicted in Fig. 2, the “No Disruptions” and “Work Life Disruptions” profiles were more likely to be White than the other two profiles. The “No Disruptions and Work” and “Social Life Disruptions” profiles were significantly older. Although a large proportion of participants across profiles were college-educated, a significant proportion of the “No Disruptions” profile had yet to attend college.

In contrast, the “Work Life Disruptions” profile was significantly more likely to have attended college. A significantly larger proportion of the “Work Life Disruptions” profile also reported a household income of \$90 000 or more and the highest subjective social status ranking compared with all other profiles. In contrast, the “Work Home and Social Life Disruptions” profile was significantly more likely to report a household income of <\$50 000 and a significantly lower subjective social status ranking than all other profiles.

### Differences in mental health and alcohol use outcomes

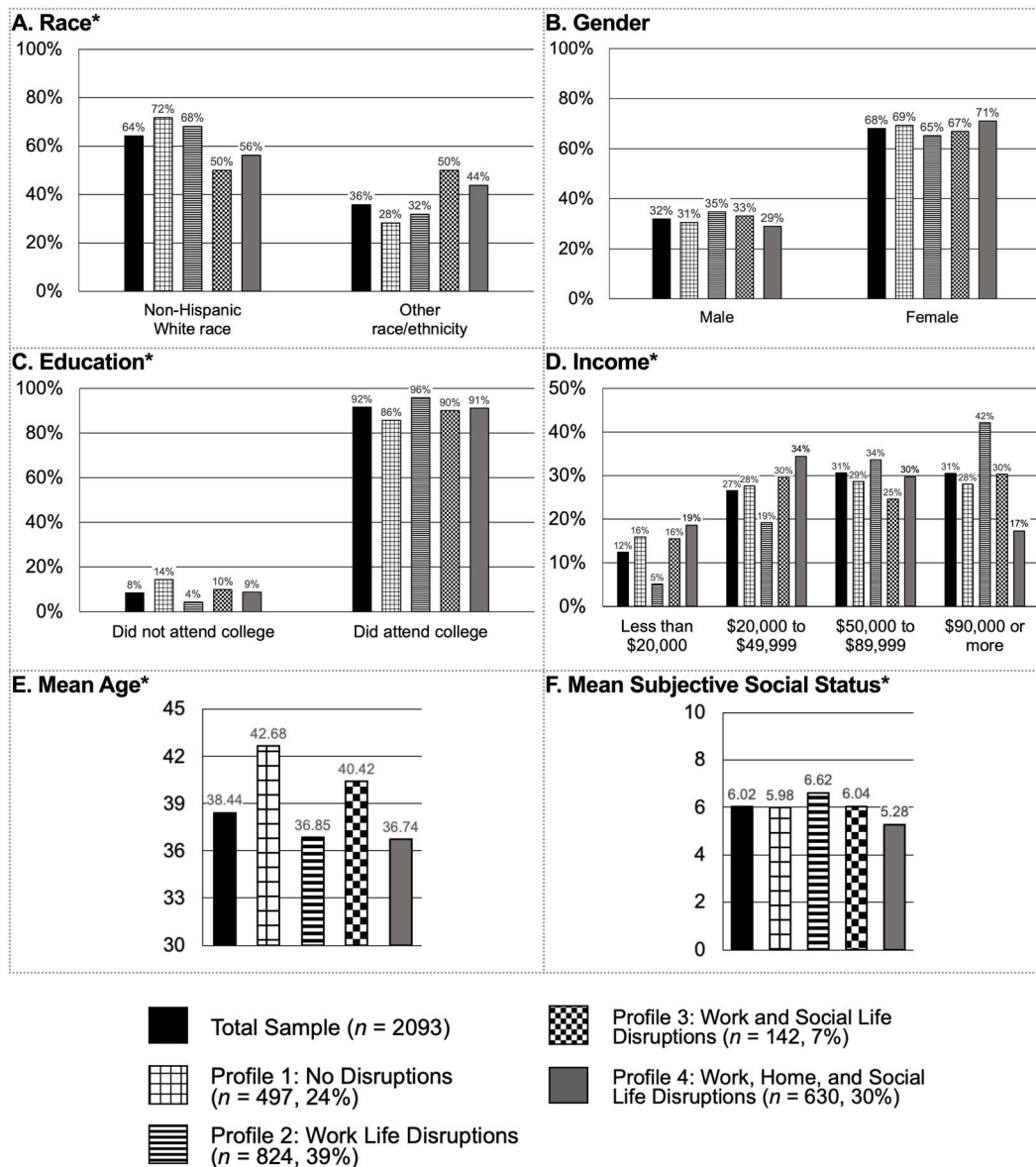
Figure 3 illustrates significant differences between profiles on baseline mental health and alcohol use outcomes based on Welch-corrected ANOVA results with post hoc Games–Howell comparisons and follow-up alcohol use outcomes based on chi-square analyses interpreted with adjusted standardized residuals. The “Work and Social Life” and “Work Home and Social Life” profiles reported significantly higher day-to-day impact of the COVID-19 pandemic and anxiety than the other two profiles. Participants in the “Work Home and Social Life Disruptions” profile also indicated significantly greater loneliness, feeling overwhelmed, and depression than all other profiles. Compared with the “No Disruptions” profile, all other profiles reported significantly higher alcohol



**Figure 1.** Item probabilities of COVID-19 work, home, and social life experiences among profiles. (A–E) show probabilities of endorsement of work, home, and social life COVID-19 experiences across the optimal four-profile salutation empirically generated from factor mixture modeling. For (e), data points below 0 indicate below-average means, and data points above 0 indicate above-average means

use at baseline. Those in the “No Disruptions” and “Work Life Distruptions” profiles also reported significantly higher alcohol use coping scores compared with those in the “Work and Social Life Distruptions” and “Work Home and Social

Life Distruptions” profiles at baseline. At the 60-day follow-up, those in the “Work Home and Social Life Distruptions” profile were more likely than all other profiles to report frequent experience with problems because of alcohol use and frequent



**Figure 2.** Demographic characteristics of participant sample by profile. This figure shows the demographic characteristics of the total sample and differences by profile. Bars in (A–F) report the percentage of participant endorsement, whereas bars in (e, f) report group means. An asterisk (\*) indicates significant chi-square results [(a) race,  $p < 0.001$ ; (c) education,  $p < 0.001$ ; (d) income,  $p < 0.001$ ] and ANOVA results [(e) mean age,  $p < 0.001$ ; (f) mean subjective social status,  $p < 0.001$ ].

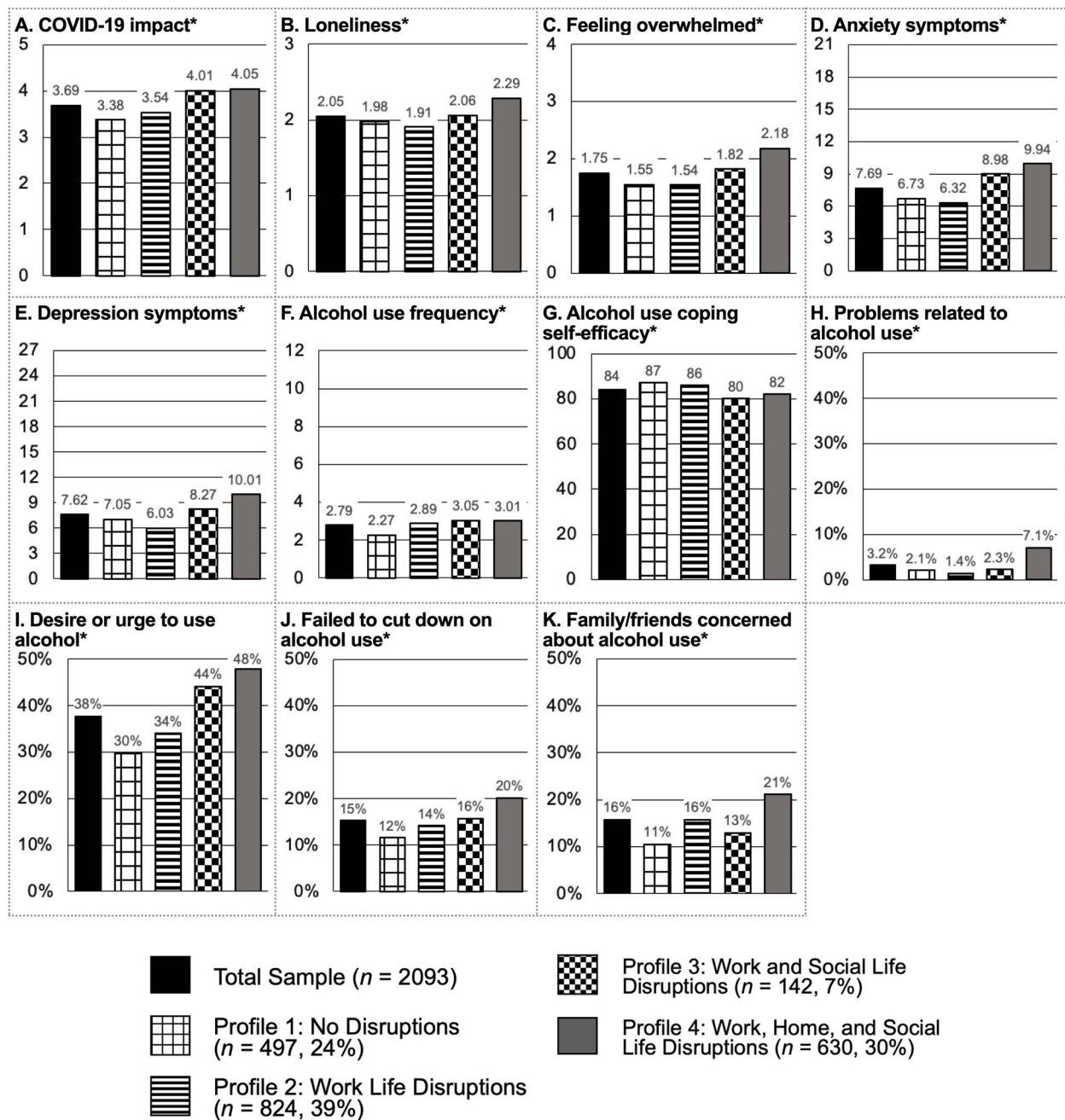
desire to use alcohol in the past month, and failure to reduce alcohol use and family/friend concern with alcohol use ever in the past.

As indicated in Table 2, profile membership independently contributed to the mental health and alcohol use outcomes at baseline as well as alcohol use difficulties at 60-day follow-up when adjusting for sociodemographic characteristics, including age, race, gender, education, and subjective social status. Compared with those in the “No Consequences” profile, increased COVID-19 impact, increased alcohol use, and decreased alcohol use comping were associated with all other profiles. The “Work and Social Life” and “Work Home and Social Life” profiles reported increased feelings of being overwhelmed, anxiety symptoms, and depression symptoms. Although the “Work Life” profile reported decreased depression symptoms than the “No Consequences” profile, family/friend concern about alcohol use was higher. Furthermore, the “Work Home and Social Life” profile

reported increased loneliness, the desire to use alcohol, failure to reduce alcohol use, and family/friend concern with alcohol use compared with those in the “No Consequences” profile.

### Discussion

Public health priorities for minimizing adverse COVID-19-related health outcomes have highlighted the urgency of identifying groups most vulnerable to negative mental health and alcohol use outcomes during the height of the pandemic and as we move forward (Holmes et al., 2020). The profile analysis utilized in the present study adds to prior international research on population-based outcomes through a more granulated understanding of how work, home, and social disruptions operate as person-centered characteristics differentiating individual mental health and alcohol use responses to the pandemic.



**Figure 3.** Mental health and alcohol use outcomes at baseline and 60-day follow-up. This figure shows differences in endorsement of mental health and alcohol use outcomes at baseline (a–g) and 60-day follow-up (h–i). (a–g) report mean scores where the y-axis represents possible total scores and (h–k) report the percentage of participant endorsement. An asterisk (\*) indicates significant ANOVA results [(a) COVID-19 impact,  $p < 0.001$ ; (b) loneliness,  $p < 0.001$ ; (c) feeling overwhelmed,  $p < 0.001$ ; (d) anxiety symptoms,  $p < 0.001$ ; (e) depression symptoms,  $p < 0.001$ ; (f) alcohol use frequency,  $p < 0.001$ ; (g) alcohol use coping self-efficacy,  $p < 0.001$ ] and chi-square results [(h) problems related to alcohol use,  $p = 0.002$ ; (i) desire or urge to use alcohol,  $p = 0.001$ ; (j) failed to cut down on alcohol use,  $p = 0.02$ ; (k) family/friends concerned about alcohol,  $p = 0.003$ )]

Consistent with previous research, we observed that adverse changes in work and income, housing instability, decreases in social support, and consumption of catastrophizing media were associated with the pandemic (Fana *et al.*, 2020; Huang and Zhao, 2020; Liu and Liu, 2020; Szkody *et al.*, 2020; Bendau *et al.*, 2021; Fisher *et al.*, 2021; Geirdal *et al.*, 2021; Ytre-Arne and Moe, 2021; Devoto *et al.*, 2022; Lee *et al.*, 2022; Villasanta *et al.*, 2022; Tao *et al.*, 2023). While some individuals reported no disruptions (“No Disruptions” profile), approximately two-thirds experienced disruptions solely

in their work life (“Work Life Disruptions” profile) or in all three contexts (“Work Home and Social Life Disruptions” profile), and a minority reported disruptions limited to their work and social life (“Work and Social Life Disruptions” profile).

As measured by profiles, our results demonstrate that COVID-19 experiences explain significant variance in mental health outcomes and alcohol use above and beyond demographic factors, including age, race, gender, education level, and SES. Those classified in the “No Disruptions” profile

**Table 2.** Adjusted linear and logistic regression analyses of profiles and mental health and alcohol use outcomes.

Baseline outcomes							
	COVID-19 impact (N = 2047)	Loneliness (N = 2047)	Feeling over- whelmed (N = 2047)	Anxiety symptoms (N = 2047)	Depression symptoms (N = 2047)	Alcohol use (N = 2047)	Alcohol use coping (N = 1652)
Age	-0.06 <sup>c</sup>	-0.14 <sup>c</sup>	-0.20 <sup>c</sup>	-0.21 <sup>c</sup>	-0.23 <sup>c</sup>	-0.05 <sup>a</sup>	0.05 <sup>c</sup>
Race							
Non-Hispanic White	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Other race/ethnicity	-0.02	0.06 <sup>b</sup>	0.03	0.02	0.03	0.02	-0.03
Gender							
Male	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Female	0.05 <sup>a</sup>	0.04	0.09 <sup>c</sup>	0.11 <sup>c</sup>	0.07 <sup>c</sup>	-0.13 <sup>c</sup>	0.02
Education							
Did not attend college	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Did attend college	0.06 <sup>b</sup>	0.02	0.02	0.002	-0.01	0.01	-0.05 <sup>a</sup>
Subjective social status	-0.06 <sup>b</sup>	-0.16 <sup>c</sup>	-0.15 <sup>c</sup>	-0.20 <sup>c</sup>	-0.24 <sup>c</sup>	0.09 <sup>c</sup>	-0.07 <sup>b</sup>
Profiles							
No consequences	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Work Life	0.06 <sup>a</sup>	-0.04	-0.02	-0.04	-0.09 <sup>c</sup>	0.09 <sup>c</sup>	-0.16 <sup>c</sup>
Work and Social Life	0.14 <sup>c</sup>	0.03	0.05 <sup>a</sup>	0.09 <sup>c</sup>	0.05 <sup>a</sup>	0.08 <sup>c</sup>	-0.06 <sup>b</sup>
Work, Home, and Social Life	0.26 <sup>c</sup>	0.14 <sup>c</sup>	0.18 <sup>c</sup>	0.18 <sup>c</sup>	0.13 <sup>c</sup>	0.16 <sup>c</sup>	-0.16 <sup>c</sup>
60-day follow-up outcomes							
	Problems because of alcohol use (N = 752)	Desire or urge to use alcohol (N = 756)		Failed to cut down on alcohol use (N = 1189)		Family/friends concerned about alcohol use (N = 1192)	
Age	1.03	1.00		1.01		1.01	
Race							
Non-Hispanic White	Ref	Ref		Ref		Ref	
Other race/ethnicity	0.46	1.25		1.06		1.21	
Gender							
Male	Ref	Ref		Ref		Ref	
Female	0.83	0.80		0.66 <sup>a</sup>		0.52 <sup>c</sup>	
Education							
Did not attend college	Ref	Ref		Ref		Ref	
Did attend college	1.10	0.89		0.71		0.96	
Subjective social status	0.92	0.96		0.96		0.95	
Profiles							
No consequences	Ref	Ref		Ref		Ref	
Work Life	0.76	1.27		1.50		1.80 <sup>a</sup>	
Work and Social Life	1.01	1.97		1.60		1.44	
Work, Home, and Social Life	3.44	2.25 <sup>a</sup>		2.24 <sup>c</sup>		2.49 <sup>c</sup>	

Note. Baseline outcomes were analyzed with multiple linear regressions, and adjusted standardized beta coefficients are reported; outcomes measured at 60-day follow-up were analyzed with multiple logistic regression outcomes, and adjusted odds ratios are reported in the table. <sup>a</sup> $p < 0.05$ . <sup>b</sup> $p \leq 0.01$ . <sup>c</sup> $p \leq 0.001$ .

reported less impact of COVID-19 on their daily life and lower scores for all mental health and alcohol use outcomes. Consistent with research that has associated psychological distress and alcohol use with COVID-19-related disruptions like greater economic instability, employment changes, and work-from-home difficulties during the pandemic (Fana et al., 2020; Graupensperger et al., 2021; Shankar, 2021; Lee et al., 2022; MacMillan et al., 2022), the “Work Life Disruptions” profile reported significantly greater COVID-19 impact, depression symptoms, alcohol use, alcohol use coping, and family and friend concern than the “No Disruptions” profile. However, there were no different in reports of perceived loneliness, feeling overwhelmed, or anxiety symptoms and problems related to alcohol use or failure to reduce alcohol consumption. This is likely related to protective factors reported among the “Work Life Disruptions” profile including high SES or a significantly greater sense of social support compared with all other groups (Szkody et al., 2020; Long et al., 2022; Villasanta et al., 2022).

Those in the “Work and Social Life Disruptions” and “Work Home and Social Life Disruptions” profiles were most vulnerable to negative mental health outcomes. Both reported greater COVID-19 impact in their daily lives, feelings of being overwhelmed, and anxiety symptoms than all other profiles and significantly greater alcohol use than the “No Disruptions” profile. The “Work Home and Social Life Disruptions” profile additionally reported significantly greater depressive symptoms and alcohol use difficulties compared with all other profiles. Likely, the culmination of lower SES and COVID-19 adverse experiences, including economic instability, housing instability, and perceived loss of social support unique to this profile, contributes to the greatest vulnerability to cumulative worsened mental health, psychological functioning, and alcohol use difficulties of all four profiles.

Additionally, the “Work and Social Life Disruptions” profile reported markedly higher COVID-19 media consumption (~7 h a day on average) than all other groups (~1–2 h). Media-related distress has been linked to acute stress



responses because of overexposure to content during previous collective crises and the current pandemic (Garfin *et al.*, 2020; Kumar and Nayar, 2020; Geirdal *et al.*, 2021; Villasanta *et al.*, 2022). Research suggests that the current supply of COVID-19 information exceeded the needs of the population (Liu and Liu, 2020), leading to the overconsumption of distressing pandemic news referred to as “doom-scrolling” (Ytre-Arne and Moe, 2021). As observed in this profile, exposure to COVID-19 media over 3 h on average has been associated with anxiety symptoms and psychological distress (Huang and Zhao, 2020; Bendau *et al.*, 2021).

### Strengths and limitations

The current study utilized a novel, person-centered analysis to generate profiles of COVID-19-related disruptions among more than 2000 participants across the US. This approach provides a new methodological perspective for understanding how mental health disparities have manifested among adults in the US. However, this study has limitations. Our data are cross-sectional and cannot assess the causal effects of classification in profiles on mental health outcomes. Furthermore, the present study did not collect information regarding prior diagnoses of AUD or mental illnesses other than depression, which limits our ability to assess their impact on the findings. In addition, participant recruitment and participation were conducted online and limited to individuals who have access to the internet on web-enabled devices and a Facebook profile. As a result, we may not have reached those who do not use social media websites or applications, or our sample might be demographically different from individuals recruited by other means. Furthermore, the item-response probabilities among profiles for many factors were not very strong. They were often low to moderate (see Fig. 1), suggesting heterogeneity within each profile where greater homogeneity is preferred (Collins and Lanza, 2009). However, no profiles shared the same response pattern across profile factors, indicating successful latent class separation (Collins and Lanza, 2009).

### Conclusions

As illustrated in the current study, person-centered profile analysis allows for a better understanding of how COVID-19 experiences combine to cause significant negative effects related to mental health and alcohol use. However, current mental health support and social services systems might be limited in meeting these intersecting needs during widespread public health emergencies. Improvements are needed in the accessibility and integration of various mental health and social services, as well as interventions to enhance stability in work, home, and social life during future pandemics and other health emergencies. As suggested by the results of this study, substantial disruption related to the COVID-19 pandemic potentially contributes to sustained issues with alcohol use. In light of persistent disparities over the last 2 years (Kaiser Family Foundation, 2022) and anticipated long-term alcohol-related morbidity and mortality (Julien *et al.*, 2022), integration of multiple, distinct services for economic, housing, mental health, and alcohol use support is needed along with the implementation of comprehensive delivery systems for mental health and social services aimed at increasing service availability, reducing barriers to care, and providing linkages to support in the US.

### Author CRediT contribution

Aaliyah Gray (Conceptualization-Equal, Data curation-Equal, Formal analysis-Equal, Methodology-Equal, Validation-Equal, Visualization-Lead, Writing—original draft-Lead, Writing—review & editing-Lead), Tingting Liu (Conceptualization-Equal, Data curation-Equal, Formal analysis-Equal, Investigation-Equal, Methodology-Equal, Project administration-Lead, Supervision-Equal, Writing—original draft-Lead, Writing—review & editing-Lead), Salvatore Giorgi (Data curation-Equal, Formal analysis-Supporting, Investigation-Equal, Writing—review & editing-Equal), Celia Fisher (Writing—review & editing-Equal), and Brenda Curtis (Conceptualization-Equal, Funding acquisition-Equal, Investigation-Equal, Methodology-Equal, Project administration-Supporting, Supervision-Equal, Writing—review & editing-Equal)

### Author contributions

A.G. and T.L. contributed equally to this paper. A.G.: Conceptualization; Data curation; Methodology; Formal analysis; Validation; Visualization; Manuscript writing and edits. T.L.: Conceptualization; Data curation; Investigation; Methodology; Formal analysis; Project administration; Supervision; Manuscript writing and edits. S.G.: Data curation; Formal analysis; Manuscript review and editing. C.B.F.: Manuscript review and editing. B.C.: Conceptualization; Funding acquisition; Investigation; Project administration; Methodology; Supervision; Manuscript review and editing. All authors approved the final version of this paper. B.C. is the guarantor of the overall content.

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### Data availability

In order to protect the privacy of participants, data for the current study cannot be publicly released in any format to any party. Requests to access the data sets and results should be directed to B.C., [brenda.curtis@nih.gov](mailto:brenda.curtis@nih.gov).

### Ethics approval

This study involving human participants was reviewed and approved as exempt by the University of Pennsylvania Institutional Review Board.

### Informed consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Declaration of Helsinki. Informed consent was obtained from all participants to be included in the study.

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