ABSTRACT

The COVID-19 pandemic was an overwhelming, negatively emotionally charged time, which, for some, led to increased drinking behaviors as a way to cope with these difficult experiences. Interestingly, there have been mixed findings on people's experiences of negative affect during the pandemic and its associations with drinking behaviors. This study sought to elucidate some of these mixed findings. Specifically, this study considered a nationally representative sample of U.S. residents to examine changes in negative emotions across three waves of data from the pandemic (April, June, & November 2020) and the associations between negative emotions and drinking behaviors at the third wave. Additionally, this study explored the relationships between coping strategies and drinking behaviors, and whether coping strategies moderated the association between negative affect and drinking behaviors. The results of this study revealed that negative affect decreased across the pandemic, and that Wave 1 negative affect was not significantly associated with Wave 3 drinking, however Waves 2 & 3 negative affect were significantly associated with Wave 3 drinking. Maladaptive coping was significantly associated with Wave 3 drinking behaviors, however adaptive coping was not. Furthermore, the results did not reveal a significant interaction between coping strategies and negative affect. The results of this study show how people's experiences of negative emotions during the COVID-19 pandemic may have led them to unhealthy, maladaptive coping strategies like drinking. This study sets the stage for future research to uncover interventions to improve negative emotionality, coping strategies, and drinking behaviors.

Exploring the Relationships between Negative Emotions, Coping Strategies, & Drinking Behaviors During the COVID-19 Pandemic

by

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INTRODUCTION

The world shut down: the streets emptied, and people's faces were hidden behind masks. Coming within six feet of anyone outside of your home was considered dangerous. This was part of the unprecedented, overwhelming, COVID-19 pandemic. Negative emotions emerged: fear, anxiety, sadness, anger. How did people cope with such intense emotions, stress, and unprecedented times? For some, this meant turning towards alcohol. Research has shown that reports of negative emotions (Hagen, Lai, & Goldmann, 2022) and stress (Lakhan, Agrawal, & Sharma, 2020) increased during the pandemic, and that reports of significant stress early in the pandemic were associated with simultaneous increases in alcohol use (Turna et al., 2021). Additionally, research has shown that COVID-related stress, especially psychological distress, was associated with drinking behavior (Rodriguez, Litt, & Stewart, 2020), and people with increased feelings of stress, loneliness, and hopelessness since the start of the pandemic were twice as likely to increase their frequency of drinking since the beginning of the pandemic, compared to people who experienced these feelings to a lesser degree (Thompson et al., 2021). Heightened stress was a common response to the pandemic, and alcohol use may have served as a maladaptive way to cope with the daunting stress of the pandemic. However, there have also been mixed findings regarding people's experiences of negative affect during the pandemic (e.g. Hagen, Lai, & Goldmann, 2022; Zacher & Rudolph, 2021) and its relationship with drinking behaviors (e.g. Prestigiacomo et al., 2021; Patrick et al., 2022). The present study will seek to elucidate some of these mixed findings by examining how people's experiences of negative

affect changed across the pandemic, and its later association with drinking behaviors.

Changes in Negative Affect

The pandemic was a challenging time that brought up many difficult emotions. Interestingly, research has shown mixed findings regarding how people's experiences of negative affect changed across the pandemic. For example, research has shown that there was an especially high prevalence of negative emotions during the first few months of the pandemic in the spring and summer of 2020 (Hagen, Lai, & Goldmann, 2022). People may have felt especially overwhelmed by the uncertainty, newness, and intensity of the pandemic, which may have led to more negative affect. Similarly, other research has shown that negative affect increased rapidly at the start of the pandemic, however these increases in negative affect slowed down during the first four months of the pandemic (Ebert et al., 2020). Correspondingly, other research has shown that people experienced strong negative emotions at the initial COVID outbreak, but eventually went back to pre-pandemic levels of negative emotions from April 2020 to January 2021 (Li et al., 2021). This is likely because maintaining negative emotions over a long period of time is difficult and has negative implications for well-being (Li et al., 2021). Conversely, other research has shown that negative affect *decreased* early in the pandemic (Zacher & Rudolph, 2021). People may have experienced less negative affect because the pandemic was so demanding and overwhelming, which may have created less emotional activation (Russell, 1980, as cited in Zacher & Rudolph, 2021). The pandemic was a daunting time for many, and while it can be difficult to maintain negative emotions over time, there were likely fluctuations in people's experiences of negative affect. While previous research has focused on changes in negative emotions at the onset of the pandemic, little research has

examined changes in negative emotions later in the pandemic.

Negative Affect & Drinking

As the pandemic was an intensely uncertain, stressful, emotionally charged time, some people turned to unhealthy behaviors like drinking. For example, a study examining U.S. residents' drinking motives during the pandemic found that individuals who were motivated to drink to cope with stress increased both their quantity and frequency of alcohol consumption (Prestigiacomo et al., 2021). Other research has shown that people showed overall decreases in alcohol use; specifically frequency increased but drinks per occasion decreased. In addition, those who were already heavier drinkers showed a higher frequency of alcohol use (Patrick et al., 2022). Rather than binge drinking, people consistently drank smaller amounts of alcohol more frequently. The pandemic also likely provided more opportunities for drinking at home, and heavy drinkers may have seen it as a more opportune time to increase their drinking compared to non-heavy drinkers.

Relatedly, other research has also shown that people experienced more negative affect during the pandemic compared to before, and individuals who normally drink experienced more negative affect during the pandemic than non-drinkers (Neppala et al., 2022). Regular drinkers may use alcohol to cope with negative emotions, and the difficult negative emotions the pandemic brought about may not have been easily masked with alcohol. Alternatively, regular drinkers may also use alcohol as a way to socialize. Since the pandemic was lacking in social interactions, regular drinkers may have used alcohol to cope with the lack of social interactions and increased negative affect.

Adaptive vs. Maladaptive Coping & Drinking

Considering people drank to cope with negative affect during the pandemic, examining

the specific kinds of coping strategies is especially important. Life is full of stressors, and people engage in different coping strategies to try to handle these stressors. Some coping strategies can be adaptive and helpful in handling stress, whereas some coping strategies can be maladaptive and unsustainable in handling stressors. Adaptive coping involves strategies such as monitoring one's behavior and emotions when dealing with difficulties and responding to stressors with awareness of one's self and the situation (Cortez et al., 2023). Adaptive coping also involves practices like self-regulation, planning, and choosing to overcome adversity (Cortez et al., 2023), and positively reappraising stressors (Jackson & Preston, 2022, as cited in Zarowsky & Rashid, 2022). Positively reframing stressors (cognitive reappraisal) can be especially helpful in regulating emotions. This coping strategy is associated with greater resilience (Cardi et al., 2021) and can help reduce unhealthy behaviors like alcohol consumption (Svaldi et al., 2014, as cited in Cardi et al., 2021). Adaptive coping strategies may have been especially helpful in handling the overwhelming stress of the pandemic.

Maladaptive coping, on the other hand, involves avoiding handling an issue head on, and can involve things like turning toward alcohol or drugs to handle negative emotions or situations (Carver, 1997), or suppressing one's emotions (Bonanno & Burton, 2013). Maladaptive coping is a poor strategy for handling life's stressors because it is associated with a poorer quality of life and greater stress, phobia, and anxiety, whereas adaptive coping is associated with a greater quality of life and less stress, phobia, and anxiety (Cortez et al., 2023). Similarly, research has shown maladaptive coping strategies to be more strongly related to psychopathology symptoms than adaptive coping strategies both cross-sectionally and longitudinally (Moritz et al., 2016).

As the pandemic was an immense stressor that brought up many challenging emotions,

some people turned to alcohol use as a (maladaptive) way to cope with these negative emotions. Research has shown that when people commonly drink to cope with negative emotions, this makes drinking an automatic response to cope with these negative emotions (Ostafin & Brooks, 2011). Similarly, research has also shown that, during the pandemic, those who were the most vulnerable to developing alcohol abuse and who reported increasing their drinking from the time the pandemic began had pre-existing difficulties coping with everyday stressors and used alcohol as a coping strategy and a form of self-medication (Chodkiewicz et al., 2020). Both individuals who engaged in heavy drinking before the pandemic began and those who drank more intensely during the pandemic compared to before often preferred to cope with their stressors through substance use (Chodkiewicz et al., 2020). This study illustrates how, during the pandemic, some people turned toward alcohol as a way to cope with the complicated emotions the pandemic brought about. The present study will more deeply examine the relationships between negative emotions, coping strategies, and drinking behaviors. As research has shown, maladaptive coping was especially prevalent during the COVID-19 pandemic, as many people turned toward alcohol use as a way to cope with the struggles of the pandemic (e.g. Chodkiewicz et al., 2020). Since the pandemic was such an overwhelming time, considering the kinds of coping strategies people engaged in and how negative emotions and alcohol use played into these decisions is especially important.

Emotion Regulation Difficulties & Drinking Behaviors

Some people increase their drinking when they experience more negative emotions, which could be due to difficulties in emotion regulation and coping strategies. Research has shown that people who struggle to regulate their emotions may turn to maladaptive behaviors like drinking in an attempt to escape or get rid of their unwanted emotional experiences

(Buckholdt et al., 2015). Similarly, research has also shown that people who lack adaptive coping strategies are more likely to drink to cope (Hasking, Lyvers, & Carlopio, 2011). People who lack effective emotion regulation strategies can become overwhelmed by their negative emotions, and turn to maladaptive coping strategies like drinking in an attempt to regulate their emotions. In fact, research has shown that people who experience more negative affect are more likely to drink because they lack adaptive emotion regulation strategies to effectively handle their negative emotions (Veilleux et al., 2014). In other words, when the stressors people experience are disproportionate to the resources they have to handle these stressors, this can lead them to engage in unhealthy behaviors like drinking. This emotion regulation framework can help explain why some people who use more maladaptive coping strategies may also show greater negative affect and engage in greater drinking behaviors to cope with these negative emotions.

Considering this emotion regulation framework, research has shown that negative life events are associated with higher levels of sadness, which is in turn associated with greater alcohol use as a way to cope with arduous life circumstances and emotions (Dermody, Cheong, & Manuck, 2013). This tendency to use alcohol to cope with difficult emotions and circumstances may be due to a belief that an individual can't approach the issue head on or with their usual coping strategies (Smith, Lazarus, 1993, as cited in Dermody, Cheong, & Manuck, 2013). This lack of confidence in coping strategies and greater tendency to drink to cope may have been especially salient during the pandemic, as this was such a daunting, unprecedented stressor that many people may not have known how to handle, and people's use of maladaptive coping strategies may have exacerbated their negative affect and lead them to drink more to cope with this negative affect.

Similarly, research has also shown that using more maladaptive coping strategies can worsen negative emotions and anxiety (e.g. Kim & Kwon, 2020; Moritz et al., 2016). For example, previous research has examined how maladaptive coping strategies like avoidance and suppression impact the relationship between negative emotions and alcohol craving. Specifically, one study examined these relationships in people with and without social anxiety disorder (SAD) and found that maladaptive coping strategies interacted with negative emotions, creating more anxiety, and thus, greater alcohol cravings in both SAD and non-SAD groups (Kim & Kwon, 2020). For the non-SAD group, coping strategies like avoidance, rumination, and suppression also interacted with negative emotions, thus leading to greater alcohol cravings (Kim & Kwon, 2020). This study also found that higher levels of negative emotions lead to greater alcohol cravings (Kim & Kwon, 2020). This study shows how maladaptive coping can exacerbate negative affect, leading to greater drinking behaviors. While this study considered the relationship between maladaptive coping, negative affect and drinking in the context of psychopathology, little research has examined these relationships outside of this context or during the COVID-19 pandemic.

The pandemic may have been especially overwhelming for those who struggle to regulate their emotions and who use more maladaptive coping strategies. In fact, research from the pandemic has shown that individuals who have difficulty with emotional clarity and awareness showed increased drinking levels (Buckner et al., 2021). Additionally, because the pandemic was anxiety and negative emotion-inducing, individuals also reported elevated anxiety levels (Gallageher et al., in press; Rosen et al., 2020, as cited in Buckner et al., 2021), which led some individuals to drink more alcohol to cope with the stress of the pandemic (Rogers et al., 2020; Wardell et al., 2020, as cited in Buckner et al., 2021). Since the stress of

the pandemic may have been disproportionate to people's coping resources, this may have led people to drink more alcohol to cope with this stressor. Additionally, because people struggled to regulate their emotions and turned to maladaptive coping strategies, which are ineffective in regulating emotions, this likely worsened people's negative affect, leading them to drink more to cope with these negative emotions.

While previous research has shown that people who use maladaptive coping strategies struggle to regulate their emotions and therefore may engage in more drinking behaviors and people who experience greater negative affect increase their drinking behaviors, little research has considered how maladaptive coping may exacerbate the relationship between negative emotions and drinking behaviors. As the pandemic was a stressful, challenging time with limited adaptive coping resources, individuals showed higher levels of negative affect (McPhee et al., 2020) and higher drinking to cope after the pandemic began compared to before (Spillane et al., 2023; McPhee et al., 2020). These increased coping motives after the onset of the pandemic were also associated with increased alcohol consumption (Spillane et al., 2023; McPhee et al., 2020; Prestigiacomo et al., 2021; Irizar et al., 2021; Wardell et al., 2020). This is in line with the framework that overwhelming stress can lead people to engage in maladaptive coping behaviors like drinking to handle this unfathomable stressor and the negative emotions that came with it. If people who struggle to regulate their emotions turn to maladaptive coping, then the more negative affect they experience, the more maladaptive coping strategies they are likely to engage in. Since maladaptive coping is not an effective way to regulate emotions, people who use more maladaptive coping strategies compared to less are likely to intensify their negative emotions and turn to alcohol in an attempt to cope with these strenuous emotional experiences.

The Present Study

While the pandemic was a universal phenomenon, individuals had different experiences, and there is still more to uncover about people's experiences across the pandemic. For example, while previous research has focused on changes in negative emotions at the onset of the pandemic, little research has examined changes in negative emotions later in the pandemic, and much research on drinking during the pandemic has focused on local convenience samples. Additionally, more research is needed on the relationships between negative affect, coping strategies, and drinking behaviors during the pandemic.

To gain a more holistic understanding of people's experiences across the pandemic, the present study examined a nationally representative sample of U.S. residents, and considered changes in negative affect, as well as drinking behaviors and coping strategies during the first 6-9 months of the pandemic. This study used three waves of existing, longitudinal data (see e.g., Reid et al., 2023) collected in April, June, & November 2020) to examine changes in negative emotions over time and associations among negative emotions, coping strategies, and drinking behaviors. This study utilized a longitudinal analysis of both changes in negative emotions and the relationships between negative affect, coping, and drinking behaviors.

Specifically, this study sought to uncover how negative affect changed across the first eight months of the COVID-19 pandemic and to what extent negative affect and adaptive and maladaptive coping strategies were associated with alcohol use. I hypothesized, first, that negative emotions would decrease across the three waves of data. Second, I

hypothesized that those reporting greater negative emotions at Wave 1 would show greater drinking behaviors at Wave 3 compared to those reporting lower negative emotions. Third, I hypothesized that, controlling for maladaptive coping, people who used more adaptive coping would use less alcohol at Wave 3. Similarly, I hypothesized that, controlling for adaptive coping, people who used more maladaptive coping would use more alcohol at Wave 3. Furthermore, I hypothesized an interaction between coping strategies and negative affect, such that those who used more maladaptive coping strategies would show a stronger association of negative affect with alcohol use compared to those who were lower in their use of maladaptive coping strategies. Lastly, I hypothesized that those who used more adaptive coping strategies would show a weaker association of negative affect with alcohol use compared to those who were lower in their use of adaptive coping strategies.

METHOD

Participants

Participants were U.S. residents who were recruited via YouGov, an online polling platform, to attain a nationally representative sample. Data from the U.S. Census Bureau, voter registration databases, the Pew U.S. Religion Landscape Survey, and the Current Population Survey were used to obtain a nationally representative sample from YouGov's database. Data were collected at three time points: the first wave was in April 2020, the second in June 2020, and the third in November 2020. Participants self-reported their sex as male (coded as = 1) or female (coded as = 0). Participants' ages ranged from 19-99 and the mean age was 51.93 years. Participants' other demographic information is reported in Table 1. The final sample of participants for this study were those who completed the survey at all three waves and had data for negative emotions, coping strategies, and drinking behaviors (N = 2,416).

Table 1. *Demographics.*

	Wave 1 (N= 4271)		Wave 2 (N = 3199)		Wave 3 (N = 2422)	
	n	%	*n*	%	*n*	%
Sex						
Male	1909	44.69	1433	44.79	1086	44.83
Female	2362	55.30	1766	55.20	1336	55.16

Race						
White	2901	67.92	2210	69.08	1710	70.60
Black	455	10.65	326	10.19	246	10.15
Hispanic	549	12.85	401	12.53	275	11.35
Asian	140	3.27	105	3.28	73	3.01
Native-American	69	1.61	48	1.50	32	1.32
Mixed	72	1.68	51	1.59	39	1.61
Other	85	1.99	58	1.81	47	1.94
Middle-Eastern	0	0	0	0	0	0

Materials

Negative Emotions

Eight items adapted from the Positive & Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) assessed the extent to which people experienced negative emotions in relation to the COVID-19 pandemic at all three waves. Five-point Likert-type scales were used, and example items included: “In thinking about your feelings related to the coronavirus outbreak, how intensely did you feel each of the following emotions or feelings over the last week:”, where 1 = *Not at all* and 5 = *Extremely*. Emotions assessed included: afraid, anxious, angry, frustrated, sad, grieving, guilty, and confused. These items are reported in Appendix A. The emotions “proud” and “hopeful” were also assessed, however they were not included in the present analysis, because they are not negative emotions. These measures captured the negative emotions participants were experiencing regarding the pandemic at each time point.

An exploratory factor analysis was conducted to determine which negative emotion items to include in the final measure of negative affect. A scree plot revealed a one factor solution, and all factor loadings were above 0.465; therefore, the eight negative emotion items were analyzed as one factor. Cronbach’s alpha = 0.870, indicating good internal

consistency. Measures of negative affect were averaged at each wave of data to create one measure of negative affect for each of the three waves of data.

Coping Strategies

Fourteen items adapted from the BRIEF Cope Scale (Carver, 1997) assessed coping strategies during the pandemic at the first wave. Consistent with prior research, (e.g. Carver, 1997; Alosaimi et al., 2018), items were grouped into adaptive (religion, active, planning, acceptance, positive reframing, instrumental support, emotional support, humor) and maladaptive coping strategies (self-distraction, self-blame, venting, behavioral disengagement, denial, substance use). An example of adaptive coping (active) included: "When I'm feeling stressed about coronavirus, I concentrate my efforts on doing something about the situation I'm in", where 1 = *I don't do this at all*, and 4 = *I do this a lot*. An example item of maladaptive coping (substance use) included: "When I'm feeling stressed about coronavirus, I use alcohol or other drugs to make myself feel better", where 1 = *I don't do this at all*, and 4 = *I do this a lot.* The full list of coping items and responses are reported in Appendix B.

Exploratory factor analyses were conducted to determine which adaptive and maladaptive coping items to include in the final measures. For adaptive coping, a scree plot revealed a one factor solution, and all factor loadings were above 0.250, therefore, all adaptive coping items were analyzed as one factor. Cronbach's alpha = 0.706, revealing acceptable internal consistency. Humor showed the lowest factor loading (0.250). However, excluding humor did not substantially improve Cronbach's alpha (0.706 versus 0.718). Humor was included in the final measure of adaptive coping. For maladaptive coping, a scree plot revealed a one factor solution, and all factor loadings were above 0.239, therefore, all

maladaptive coping items were analyzed as one factor. Cronbach's alpha = 0.630, revealing questionable internal consistency. Distraction showed the lowest factor loading (0.239). However, excluding distraction did not substantially improve Cronbach's alpha (0.630 versus 0.653). Distraction was included in the final measure of maladaptive coping. The adaptive coping items were averaged to be analyzed as one factor in later analyses, as were the maladaptive coping items.

Drinking Behaviors

Items from the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C, Bush et al., 1998) assessed current and pre-COVID alcohol use at Wave 3 only. Three questions assessed pre-COVID alcohol use: "Now think back to the month of February, how often did you have a drink containing alcohol during that month?" where 0 = *Never* and 4 = *Four or more times a week*; "How many drinks did you have on a typical day when you were drinking in February?" with response options from *0* to *10 or more*; and "How often did you have six or more drinks on one occasion in February?" where 0 = *Never* and 4 = *Daily or almost daily*. The same three items assessed current alcohol use, but referenced alcohol use in the past month rather than in February. These measures compared drinking behaviors before and during the COVID-19 pandemic and assessed both frequency and quantity of alcohol use, as well as binge drinking. Cronbach's alpha for pre-COVID drinking = 0.708, showing acceptable internal consistency, and Cronbach's alpha for current drinking = 0.695, showing questionable internal consistency. Response options for each question were coded on a scale of 0-4 according to the AUDIT-C (Bush et al., 1998; WHO, 2001). Consistent with the recommended scoring, items were summed to create a final drinking score. Therefore, the lowest drinking score someone could have was 0 and the highest was 12. All drinking items and scoring information are reported in Appendix C.

Procedure

A comprehensive survey was administered online via YouGov at 3 time points across the COVID-19 pandemic (April, June, & November 2020), asking participants about their experiences of negative emotions, coping strategies, drinking behaviors, among several other factors. These data were merged and analyzed for the present study.

RESULTS

Descriptive Statistics

Participants' mean negative affect was 2.14 (SD=0.84) at Wave 1; 2.11 (SD=0.85) at Wave 2; and 1.98 (SD=0.85) at Wave 3, providing some initial indication that negative affect decreased over time. Participants' mean adaptive coping score (at Wave 1) was 2.35 (SD=0.57) and participants' mean maladaptive coping score (at Wave 1) was 1.82 (SD=0.48), showing moderate use of both adaptive and maladaptive coping strategies. Participants' mean drinking score at Wave 3 was 1.88 (SD=2.39). Participants' mean pre-COVID drinking score at Wave 3 was 1.83 (SD=2.30), showing moderate drinking behaviors. These results are reported in Table 2.

Correlations

All correlations are reported in Table 2. Some interesting correlations arose across negative affect and in relation to drinking behaviors. For example, Wave 1 negative affect was significantly and positively associated with Wave 2 negative affect and Wave 3 negative affect. Wave 1 negative affect was also significantly and negatively associated with sex and age. Wave 2 negative affect was significantly and positively associated with Wave 3 drinking and significantly and negatively associated with sex and age. Wave 3 negative affect was significantly and positively associated with Wave 3 drinking and pre-COVID drinking. Wave 3 negative affect was also significantly and negatively associated with sex and age. Waves 1, 2, & 3 negative affect were also significantly and positively associated with both adaptive and maladaptive coping strategies.

In addition to its associations with negative affect, adaptive coping was also significantly and positively associated with maladaptive coping. Maladaptive coping was significantly and positively associated with Wave 3 drinking and significantly and negatively associated with sex and age.

In addition to its associations with negative affect and maladaptive coping, Wave 3 drinking was also significantly and positively associated with pre-COVID drinking and sex. Wave 3 drinking was significantly and negatively associated with age.

In addition to its associations with negative affect, maladaptive coping, and Wave 3 drinking, pre-COVID drinking was also significantly and positively associated with sex, and was significantly and negatively associated with age.

Table 2. *Descriptive Statistics & Pairwise Bivariate Correlations*

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1 Wave 1 Negative Affect	*1*								
2 Wave 2 Negative Affect	.66**	*1*							
3 Wave 3 Negative Affect	.65**	.68**	*1*						
4 Adaptive Coping	.15**	.12**	.10**	*1*					
5 Maladaptive Coping	.49**	.41**	.43**	.36**	*1*				
6 Wave 3 Drinking	.03	.05*	.09**	.01	.20**	*1*			
7 Pre-COVID Drinking	.02	.02	.05*	.002	.18**	.87**	*1*		
8 Sex	-.13**	-.13**	-.15**	-.07**	-.09**	.15**	.18**	*1*	
9 Age	-.16**	-.16**	-.20**	.02	-.20**	-.06**	-.06**	.03	*1*
Mean	2.14	2.12	1.98	2.35	1.82	1.88	1.83	0.45	51.93
SD	.84	.85	.85	.57	.48	2.39	2.30	.50	16.28

Note. $N = 2421$ (W1, W2, W3 NA, Adaptive Coping, Maladaptive Coping, Sex, Age)

$N = 2416$ (Wave 3 Drinking) $N = 2417$ (Pre-COVID Drinking)

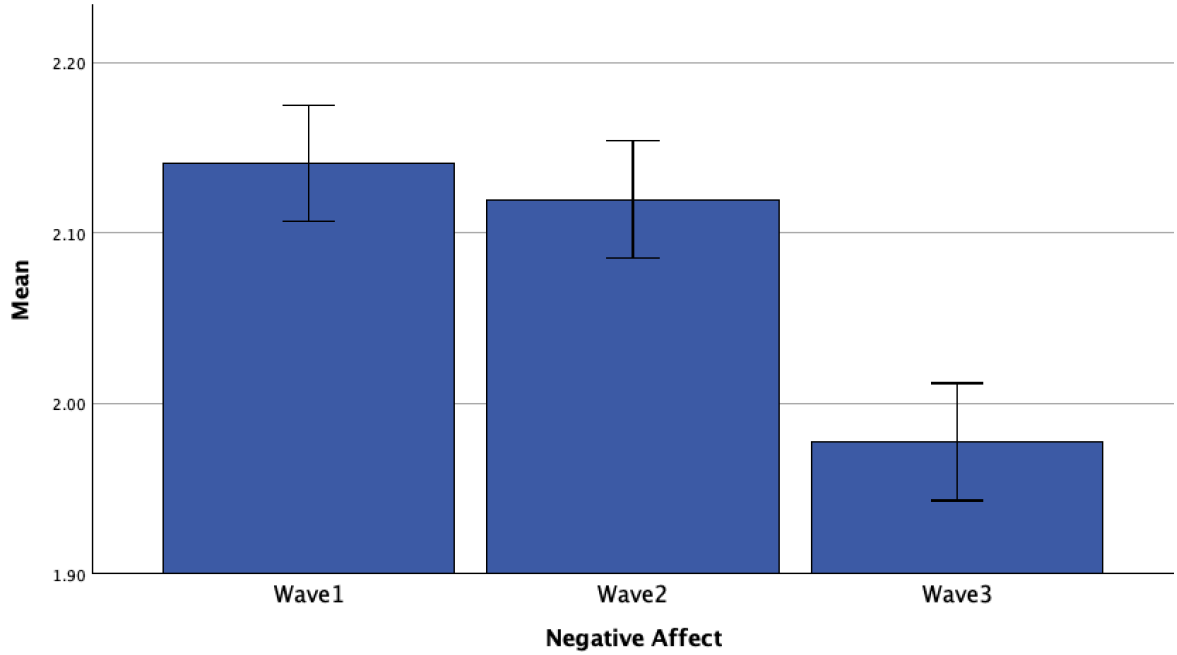
** $p < 0.01$

* $p < 0.05$

Hypothesis 1: Changes in Negative Affect

A paired samples t-test examined whether negative emotions decreased across the three waves of data. Negative affect decreased slightly from Wave 1 ($M = 2.14$, $SD = 0.84$) to Wave 2 ($M = 2.12$, $SD = 0.85$), but this was not significant ($t(2420) = 1.52$, $p = 0.13$). However, negative affect significantly decreased from Wave 2 ($M = 2.12$, $SD = 0.85$) to Wave 3 ($M = 1.98$, $SD = 0.85$, $t(2420) = 10.27$, $p < .001$). Negative affect also significantly decreased from Wave 1 ($M = 2.14$, $SD = 0.84$) to Wave 3 ($M = 1.98$, $SD = 0.85$, $t(2420) = 11.35$, $p < .001$). Therefore, this hypothesis was supported. These results are reported in Figure 1.

Figure 1. *Changes in Negative Affect*



Hypothesis 2: Negative Affect & Drinking

A linear regression tested whether, co-varying for age, sex, and pre-COVID drinking, those reporting greater negative emotions at Wave 1 would show greater drinking behaviors at Wave 3, compared to those reporting lower negative emotions at Wave 1. Wave 1 negative affect was not significantly associated with greater drinking behaviors at Wave 3. Therefore, this hypothesis was not supported. However, pre-COVID drinking was significantly and positively associated with Wave 3 drinking behaviors, indicating that people who drank more before the pandemic also showed greater drinking behaviors during the pandemic. Sex and age were not significantly associated with Wave 3 drinking. These results are reported in Table 3.

Table 3. *Wave 1 Negative Affect & Wave 3 Drinking*

	β	*t*	*p*
Wave 1 Negative Affect	.04	1.32	.19
Pre-COVID Drinking	.90	83.41	<.001
Sex	-.01	-.21	.83
Age	.00	-.22	.83

Note. $N = 2{,}416$

Given the bivariate correlations, additional analyses examined whether there was an association between Wave 2 negative affect and Wave 3 drinking. Results indicated that there was in fact a significant association between Wave 2 negative affect and Wave 3 drinking, indicating that people who experienced greater negative affect at Wave 2 showed greater drinking behaviors at Wave 3. These results are reported in Table 4. Further analyses examined whether there was a cross-sectional association between negative affect and alcohol use. Indeed, Wave 3 negative affect was significantly and positively associated with Wave 3 drinking behaviors, indicating that people who experienced more negative affect at Wave 3 also showed greater drinking behaviors at Wave 3. These results are reported in Table 5 .

Table 4. *Wave 2 Negative Affect & Wave 3 Drinking*

	β	*t*	*p*
Wave 2 Negative Affect	.09	3.18	.001
Pre-COVID Drinking	.90	83.52	<.001
Sex	.001	.02	.98
Age	.00	.06	.96

Note. $N = 2{,}416$

Table 5. *Wave 3 Negative Affect & Wave 3 Drinking*

	β	*t*	*p*
Wave 3 Negative Affect	.13	4.32	<.001
Pre-COVID Drinking	.90	83.39	<.001
Sex	.02	.35	.73
Age	.001	.42	.67

Note. $N = 2{,}416$

Hypothesis 3: Coping Strategies & Drinking

A linear regression tested whether, controlling for Wave 1 maladaptive coping, sex, age, and pre-COVID drinking, people who used more adaptive coping at Wave 1 would use less alcohol at Wave 3, and if, controlling for Wave 1 adaptive coping, people who used more maladaptive coping at Wave 1 would use more alcohol at Wave 3. This test revealed that maladaptive coping was significantly associated with greater drinking behaviors. Adaptive coping was negatively associated with drinking behaviors, however this relationship was not significant. Therefore, this hypothesis was partially supported. These results are reported in Table 6.

Table 6. *Wave 1 Coping Strategies & Wave 3 Drinking*

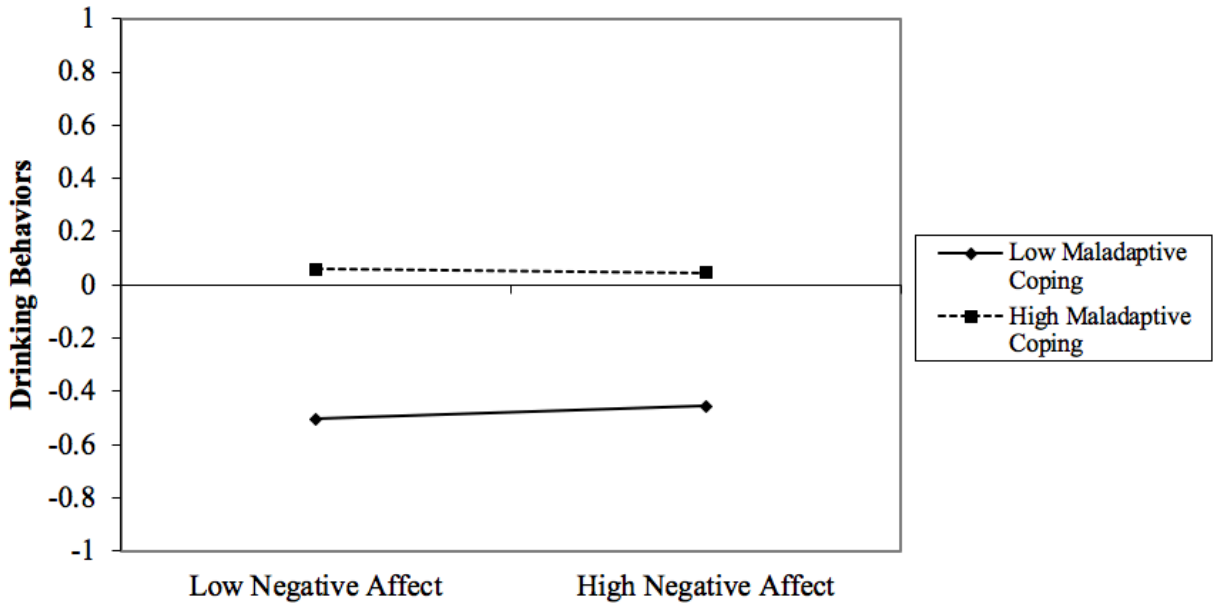
	β	*t*	*p*
Adaptive Coping	-.02	-.43	.67
Maladaptive Coping	.22	3.89	<.001
Pre-COVID Drinking	.89	81.28	<.001
Sex	.004	.08	.94
Age	.001	.36	.72

Note. $N = 2{,}416$

Hypotheses 4 & 5: Negative Affect, Coping, & Drinking

Multiple regression using SPSS Process Macro tested whether, co-varying for age, sex, and pre-COVID drinking, there would be an interaction between negative affect and maladaptive coping, such that those who used more maladaptive coping strategies (at Wave 1) would show a stronger association of (Wave 1) negative affect with alcohol use compared to those who were lower in their use of maladaptive coping strategies. This test revealed no significant interaction between negative affect and maladaptive coping ($F(1, 2408) = 0.09$, $p = 0.77$). Therefore, this hypothesis was not supported. These results are reported in Figure 2.

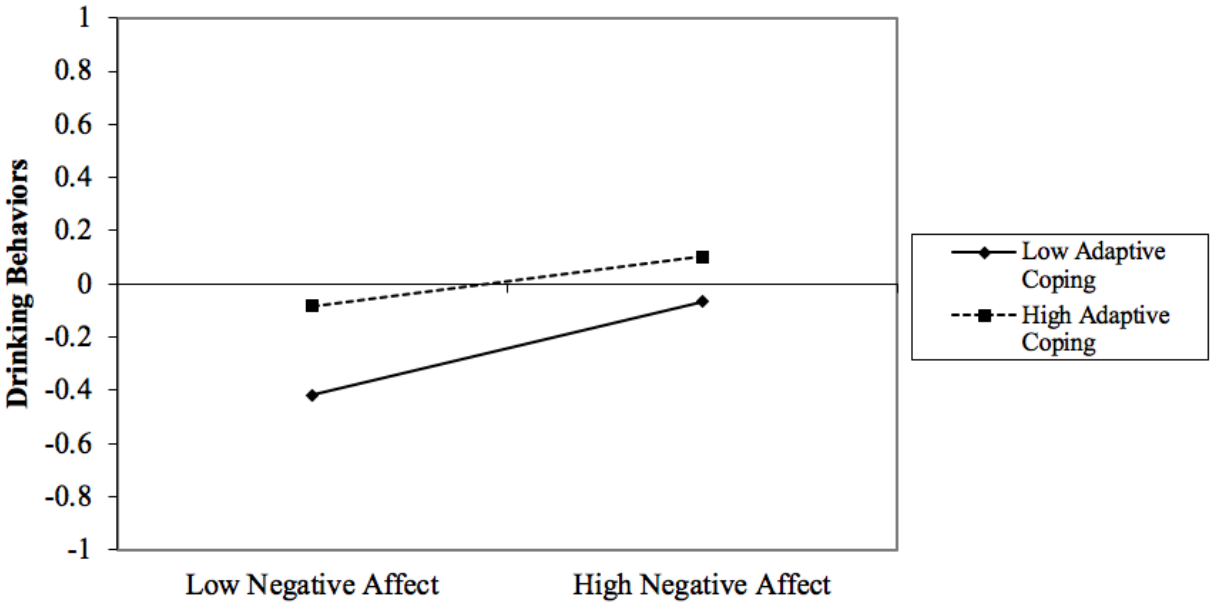
Figure 2. *Interaction between Negative Affect and Maladaptive Coping Predicting Drinking Behaviors*



Note. Maladaptive coping did not significantly moderate the association between negative affect and Wave 3 drinking behaviors ($F(1, 2408) = 0.09$, $p = 0.77$).

Secondly, multiple regression using SPSS Process Macro tested whether, co-varying for age, sex, and pre-COVID drinking, there would be an interaction between negative affect and adaptive coping, such that those who used more adaptive coping strategies (at Wave 1) would show a weaker association of (Wave 1) negative affect with alcohol use compared to those who were lower in their use of adaptive coping strategies. This test revealed no significant interaction between negative affect and adaptive coping ($F(1, 2408) = 0.74$, $p = 0.39$). Therefore, this hypothesis was not supported. These results are reported in Figure 3.

Figure 3. *Interaction between Negative Affect and Adaptive Coping Predicting Drinking Behaviors*



Note. Adaptive coping did not significantly moderate the association between negative affect and Wave 3 drinking behaviors ($F(1, 2408) = 0.74$, $p = 0.39$).

DISCUSSION

This study examined people's experiences of negative emotions, coping strategies, and drinking behaviors across three time points during the COVID-19 pandemic. Specifically, this study examined how people's experiences of negative affect changed across the pandemic, and how negative emotions and coping strategies at Wave 1 related to drinking behaviors at Wave 3. This study also examined if those who used more maladaptive coping strategies showed a stronger association of negative affect with alcohol use, and if those who used more adaptive coping strategies showed a weaker association of negative affect with alcohol use. The results of this study revealed that negative affect decreased across the three waves of data during the pandemic. Additionally, Wave 1 negative affect was not significantly associated with Wave 3 drinking, however, upon further analysis, Waves 2 & 3 negative affect were significantly associated with greater drinking behaviors at Wave 3. Furthermore, maladaptive coping strategies at Wave 1 were significantly associated with greater drinking at Wave 3. Adaptive coping was negatively associated with Wave 3 drinking, however this relationship was not significant. Lastly, analyses revealed that there was not a significant interaction between negative affect and coping strategies in predicting drinking behaviors.

Changes in Negative Affect

Negative affect did in fact decrease across the pandemic, supporting Hypothesis 1. However, these changes were only significant from Waves 2-3 and Waves 1-3, but not from Waves 1-2. Overall, negative affect decreased across these three waves of data. This is likely

because maintaining negative emotions over time is difficult and draining, and has negative implications for well-being, which is in line with previous research (Li et al., 2021). Negative affect also likely decreased because of what was occurring at the different waves. Negative affect was likely higher at Waves 1 and 2 in April and June because the pandemic was still new and uncertain. While Wave 3 (in November) was likely a challenging time because the weather was getting colder and people couldn't travel or see friends and family at the holidays, negative affect likely decreased because maintaining negative affect is difficult and draining to well-being, as mentioned earlier. Additionally, there were likely other events besides the pandemic causing uncertainty and negative emotions in November, like the presidential election, and this study only focused on negative emotions in relation to the pandemic.

Negative Affect & Drinking

Wave 1 negative affect was not significantly associated with Wave 3 drinking, and therefore, Hypothesis 2 was not supported. This is likely because, as the previous analysis revealed, people's experiences of negative affect were significantly different between Waves 1 and 3. Therefore, people's experiences of negative emotions at Wave 1 likely had little influence on their drinking behaviors at Wave 3. However, additional analyses revealed that those who experienced greater negative affect at Waves 2 & 3 also showed greater drinking behaviors at Wave 3. The negative emotions people experienced at Wave 3, in particular, likely had more bearing on their drinking behaviors at Wave 3, compared to people's experiences of negative affect at Wave 1. This association between negative affect and greater drinking behaviors is in line with previous research (e.g. Neppala et al., 2022; Veilleux et al., 2014). It's interesting that there was an association between Waves 2 & 3 negative affect and Wave 3 drinking, but not Wave 1 negative affect and Wave 3 drinking, because as we saw, people's experiences of

negative affect were higher at Wave 1 than at Waves 2 & 3. However, people's experiences at Wave 3 likely had more bearing on their behaviors at Wave 3 compared to their experiences at Wave 1. Additionally, it's interesting that Wave 2 negative affect (but not Wave 1 negative affect) was associated with Wave 3 drinking behaviors, because Wave 2 negative affect was not significantly different from Wave 1 negative affect. Perhaps the fact that this time point was closer to that of Wave 3 provides more bearing on people's behaviors at Wave 3. Sex and age did not show significant associations with Wave 3 drinking behaviors.

Coping Strategies & Drinking

As predicted, maladaptive coping at Wave 1 was significantly associated with Wave 3 drinking behaviors. This is likely because the pandemic was such a grueling time and people likely turned to alcohol to cope with the stress of the pandemic. The fact that maladaptive coping strategies were associated with greater drinking behaviors is in line with previous research showing that people who generally struggle to regulate their emotions turn to maladaptive coping strategies like drinking (e.g. Buckholdt et al., 2015; Hasking, Lyvers & Carlopio, 2011), and that people who struggled to regulate their emotions were more likely to engage in greater drinking behaviors *during the pandemic* (Chodkiewicz et al., 2020). While the relationship between adaptive coping and drinking was non-significant, there was a negative relationship between these factors, indicating that those who used more adaptive coping strategies drank less. This conflicts with previous research showing that a greater use of adaptive coping strategies are associated with greater drinking behaviors (Merrill & Thomas, 2013). Since there was a negative relationship in the present analysis, these individuals who used adaptive coping strategies may have felt less of a need to drink to handle stressors because they engage in other, more effective and adaptive coping strategies.

Interaction Between Maladaptive Coping & Negative Affect Predicting Drinking

While some people may turn to maladaptive coping strategies like drinking to handle their negative emotions, this study did not reveal a significant interaction between negative affect and maladaptive coping strategies. This is likely because this study examined negative affect and coping strategies at Wave 1 in relation to drinking behaviors at Wave 3. These behaviors at Wave 1 likely had little bearing on people's behavior at Wave 3 because these time points were several months apart. The fact that these results are non-significant conflicts with previous research showing that maladaptive coping strategies can in fact lead to greater negative affect, and thus, a greater desire to drink alcohol (Kim & Kwon, 2020), and that people who engage in more maladaptive coping strategies are more likely to engage in drinking behaviors in an attempt to regulate their negative emotions (e.g. Buckholdt et al., 2015; Hasking, Lyvers, & Carlopio, 2011; Veilleux et al., 2014). These non-significant findings also conflict with previous research showing that individuals who struggled with emotional awareness drank more during the pandemic (Buckner et al., 2021), and that when some individuals reported greater anxiety levels (Gallageher et al., in press; Rosen et al., 2020, as cited in Buckner et al., 2021), this led them to drink more to cope with the stress of the pandemic (Rogers et al., 2020; Wardell et al., 2020, as cited in Buckner et al., 2021).

Interaction Between Adaptive Coping & Negative Affect Predicting Drinking

There was not a significant interaction between adaptive coping strategies and negative affect. Again, this is likely because people's experiences at Wave 1 likely had little impact on their behaviors at Wave 3. These non-significant results conflict with previous research showing that adaptive coping has a weaker association with negative affect (e.g. Moritz et al., 2016), and that adaptive coping strategies can lessen negative emotions like anxiety (Cholankeril, Xiang, &

Badr, 2023). These findings also conflict with previous research showing that both high and low levels of adaptive coping were associated with greater drinking behaviors following a stressor (e.g. Merrill & Thomas, 2013), and that this association was stronger with low levels of adaptive coping. This is surprising, as it seems as though adaptive coping would lead people to drink less. However, in stressful circumstances like COVID, this immense stress may have led people to drink more regardless of the kinds of coping strategies they used. Little research has considered the relationship between adaptive coping, negative affect, and drinking outside or during the pandemic, so, while these findings were not significant, they do provide some novelty.

Correlations

In addition to these results, the analyses also revealed some interesting correlations. For example, when participants experienced greater negative affect at Wave 1, they also reported greater negative affect at Waves 2 & 3. While Hypothesis 1 revealed that negative affect decreased over time, these correlations reveal that individuals higher in negative affect at Wave 1 were more likely to also be high in negative affect at Waves 2 and 3. While these individuals still showed decreases in negative affect overall, their experiences of negative affect remained relatively high and their decreases in negative affect shifted at similar rates.

Experiences of greater negative affect (across time) were also associated with greater usage of both adaptive and maladaptive coping strategies. This shows how individuals may have been using these coping strategies to cope with their negative emotions during the pandemic. Negative affect (at Waves 2 & 3) were also associated with greater drinking behaviors, showing that when people experienced greater negative affect, they also experienced greater drinking behaviors.

Interestingly, adaptive coping was positively associated with maladaptive coping, such that when participants were higher in their use of adaptive coping strategies, so too was their use of maladaptive coping strategies. This shows how individuals used both adaptive and maladaptive coping strategies during the pandemic. As my hypotheses showed, maladaptive coping was also associated with greater drinking behaviors, such that when people were higher in their use of maladaptive coping strategies, they also reported greater drinking behaviors. This shows how individuals who used more maladaptive coping strategies may have turned to alcohol to cope with their negative emotions. This is in line with previous research showing that negative affect (e.g. Dermody, Cheong, & Manuck, 2013; Thompson et al., 2021) and maladaptive coping strategies (e.g. Chodkiewicz et al., 2020) are associated with drinking behaviors, and people who struggle to regulate their emotions may turn to maladaptive behaviors like drinking to cope with their negative emotions (e.g. Buckholdt et al., 2015; Hasking, Lyvers, & Carlopio, 2011; Veilleux et al., 2014).

Wave 3 drinking was also positively associated with pre-COVID drinking, such that those who drank more before the pandemic were more likely to increase their drinking during the pandemic, which is in line with previous research (e.g. Neppala et al., 2022; Patrick et al., 2022).

Sex and Age Differences

The correlational analyses also revealed some interesting sex and age differences. For example, women experienced negative affect more strongly than men and younger people experienced negative affect more intensely than older people. This is in line with previous research showing that women experienced greater negative affect during the pandemic (Fenollar-Cortes et al., 2021), and that younger people experienced greater negative affect (Klaiber et al., 2021; Best, Strough, & Bruine de Bruin, 2023). Women used more adaptive

coping strategies than men, and younger people used more adaptive coping strategies than older people. This is surprising, as it seems like older people would have a better understanding of how to regulate their emotions and do so more effectively than younger people. The fact that women used adaptive coping strategies to a greater degree than men is, however, unsurprising, and is in line with previous research showing that women were more likely to engage in adaptive coping strategies than men during the pandemic (Cholankeril, Xiang, & Badr, 2023). Women were higher in their use of maladaptive coping strategies than men, and younger people were higher in their use of maladaptive coping strategies than older people. It makes sense that younger people used more maladaptive coping strategies than older people because they were likely still learning and less experienced in effectively regulating their emotions than older people, and previous research has shown that younger people experienced lower perceived coping efficacy than older adults during the pandemic (Klaiber et al., 2021). This shows how younger people may have felt less confident in their coping abilities during the pandemic. It's interesting that women were higher in their use of maladaptive coping strategies than men. However, the pandemic was shown to be a particularly challenging time for women, as women were shown to drink more than men to cope with the stress of the pandemic (Rodriguez, Litt, & Stewart, 2020). However, other research has also shown that more intense emotional states were associated with greater drinking in men than women (Thompson et al., 2021).

In terms of drinking behaviors, men were more likely to show greater drinking behaviors than women. This conflicts somewhat with previous research showing that women drank more to cope with the pandemic, however, this previous research has also shown that when men experienced low levels of COVID-related distress, they exhibited a greater pattern of drinking than women (Rodriguez, Litt, & Stewart, 2020). Younger people drank more than older people,

which contrasts with previous research showing that older adults increased their drinking (Sallie et al., 2020).

Lastly, men were more likely to show greater drinking behaviors before the pandemic than women, which is in line with previous research showing that men generally show greater drinking behaviors than women (Patrick, Maggs, & Osgood, 2010; Sher & Rutledge, 2007, as cited in Howard, Patrick, & Maggs, 2015). Younger people drank more before the pandemic, whereas older people drank less before the pandemic, which is in line with previous research showing that younger people generally drink more than older people (e.g. Chan et al., 2007). Younger people likely drank more before the pandemic because many young adults were perhaps in college and partying, and therefore drank less when shifting into lockdown.

Implications

This study shows how challenging the pandemic in fact was and how people's experiences of negative emotions shifted and related to their drinking behaviors. These findings also showed that with time, people's experiences of negative emotions decreased and shifted back to more manageable levels. Since maladaptive coping was associated with greater drinking behaviors, this study also showed that people may have found the pandemic to be so overwhelming that they turned to maladaptive, unhealthy coping strategies like drinking to handle the stress and negative emotions of the pandemic. This study implies that people should learn healthier, more adaptive coping strategies to better handle life's stressors. This research sets the stage for future studies to uncover interventions for improving negative emotionality, coping strategies, and drinking behaviors. For example, mindfulness exercises may be especially helpful in managing negative emotions and substance use behaviors. In fact, mindfulness exercises have been shown to lessen alcohol cravings and help with substance use and addiction (e.g. Chiesa &

Seretti, 2014; Sancho et al., 2018) as well as negative affect (e.g. Schumer, Lindsay, & Creswell, 2018). Mindfulness exercises may have been especially applicable during the pandemic, as these practices can be administered online.

Limitations

As with all research, this study had several limitations. First, coping strategies were only assessed at Wave 1 and drinking behaviors were only assessed at Wave 3, making it difficult to draw conclusions about the associations between these behaviors, since they were assessed several months apart. Moreover, precautions must be taken to draw inferences about how people's experiences of negative affect at Wave 1 related to their drinking behaviors at Wave 3, several months later. This study also only looked at decreases in negative affect, but unfortunately, did not consider individuals who experienced elevated negative affect and remained high in their level of negative affect. This study also analyzed data correlationally and with regression, and therefore, no causal relationships can be drawn. Another limitation is that pre-COVID drinking behaviors were subject to recall, and therefore, may not be accurate. A final limitation of this study is that there was no way to contact participants to elaborate on their experiences of negative emotions, the coping strategies they used, or their drinking behaviors during the COVID-19 pandemic.

Future Directions

Future studies should use mixed methods or hold qualitative interviews to gain a better understanding of people's emotional, coping, and drinking experiences during the pandemic. This would elucidate how people's experiences of negative emotions and coping strategies related to and perhaps motivated their drinking behaviors. Future studies should also use larger longitudinal datasets assessing variables at each time point to better understand people's

experiences of negative affect and coping strategies across the pandemic, as well as how people's drinking behaviors changed across the pandemic. Larger longitudinal datasets may also be helpful in examining people's experiences beyond November 2020, as other COVID variants like Omicron and Delta arose, and COVID vaccines were not yet available. These challenging times later in the pandemic also likely had implications for people's experiences of negative emotions, coping strategies, and drinking behaviors. Future research should also explore interventions for improving negative emotionality, coping strategies, and drinking behaviors, especially during a global shutdown. The present study and future studies are especially important in understanding people's emotional states and health behaviors and how to better support people during stressful, unprecedented events like global shutdowns. In the case of another global shutdown, public health messages should emphasize the use of adaptive coping strategies like active coping and support seeking, especially for women and younger individuals.

APPENDIX A

Table A1

(Adapted) Positive & Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988)

Emotion	
Question: *In thinking about your feelings related to the coronavirus outbreak, how intensely did you feel each of the following emotions or feelings over the last week?*	
Afraid	
Anxious	
Angry	
Frustrated	
Sad	
Grieving	
Guilty	
Confused	
Response Options	**Score**
Not at All	1
A Little Bit	2
Moderately	3
Quite a Bit	4
Extremely	5

APPENDIX B

Table B1

(Adapted) BRIEF Cope Scale (Carver, 1997)

Coping Strategy	Question
Religion	*When I'm feeling stressed about coronavirus, I try to find comfort in my religion or spiritual beliefs.*
Active	*When I'm feeling stressed about coronavirus, I concentrate my efforts on doing something about the situation I'm in.*
Planning	*When I'm feeling stressed about coronavirus, I try to come up with a strategy about what to do.*
Acceptance	*When I'm feeling stressed about coronavirus, I learn to live with it.*
Positive Reframing	*When I'm feeling stressed about coronavirus, I try to see it in a different light.*
Instrumental Support	*When I'm feeling stressed about coronavirus, I try to get advice or help from other people about what to do.*
Emotional Support	*When I'm feeling stressed about coronavirus, I get comfort and understanding from someone.*
Humor	*When I'm feeling stressed about coronavirus, I make jokes about it.*
Self-distraction	*When I'm feeling stressed about coronavirus, I turn to work or other activities.*

Self-blame

When I'm feeling stressed about coronavirus, I criticize myself.

Venting

When I'm feeling stressed about coronavirus, I express my negative feelings.

Behavioral Disengagement

When I'm feeling stressed about coronavirus, I give up trying to deal with it.

Denial

When I'm feeling stressed about coronavirus, I say to myself this isn't real.

Substance Use

When I'm feeling stressed about coronavirus, I use alcohol or other drugs to make myself feel better.

Response Options	**Score**
I don't do this at all.	1
I do this a little bit.	2
I do this a medium amount.	3
I do this a lot.	4

APPENDIX C

Table C1

(Adapted) AUDIT-C (Bush et al., 1998; WHO, 2001) Items & Scoring

Question	Answer	Score
How often did you have a drink containing alcohol in the last month?	Never	0
	Monthly or less	1
	2 to 4 times a month	2
	2 to 3 times a week	3
	4 or more times a week	4
How many drinks did you have on a typical day when you were drinking in the last month?	0, 1, or 2	0
	3 or 4	1
	5 or 6	2
	7 , 8, or 9	3
	10 or more	4
How often did you have six or more drinks on one occasion in the last month?	Never	0
	Less than monthly	1
	Monthly	2
	Weekly	3
	Daily or almost daily	4
Now think back to the month of February, how often did you have a drink containing alcohol during that month?	Never	0
	Monthly or less	1
	2 to 4 times a month	2
	2 to 3 times a week	3
	4 or more times a week	4

How many drinks did you have on a typical day when you were drinking in February?	0, 1, or 2	0
	3 or 4	1
	5 or 6	2
	7 , 8, or 9	3
	10 or more	4
How often did you have six or more drinks on one occasion in February?	Never	0
	Less than monthly	1
	Monthly	2
	Weekly	3
	Daily or almost daily	4

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