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Stress, alcohol use, and punitive parenting during the COVID-19 pandemic

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ABSTRACT

Background: Emerging research suggests that parents are experiencing heightened stress during the COVID-19 pandemic. Parental stress is a risk factor for harsh or punitive parenting, and this association may be exacerbated by the use of alcohol.

Objective: We examine whether parental stress is associated with use of punitive parenting, as well as whether this association is modified by drinking pattern.

Participants & setting: We used advertisements and word-of-mouth to recruit 342 parents living in Central Ohio during the initial stay-at-home order for COVID-19.

Methods: We used geographic ecological momentary assessment (gEMA) to measure parental stress and punitive parenting during three time periods (10 a.m., 3 p.m., and 9 p.m.) over a period of fourteen days using an app downloaded to their cellular telephone. Participants also completed a longer baseline survey. We used nested multilevel ordinal regression models, where at-the-moment assessments (Level 1) were nested within individuals (Level 2) to analyze data.

Results: Higher levels of parental stress [$OR = 1.149$ (95 % $CI = 1.123, 1.176$)] and later time of day [$OR = 1.255$ (95 % $CI = 1.146, 1.373$)] were positively related to odds of punitive parenting. Drinking pattern was not significantly related to punitive parenting in models with demographic covariates. Parents who drank alcohol both monthly and weekly and had higher levels of stress had greater odds of punitive parenting than parents with high levels of stress who abstain from alcohol.

Conclusions: Alcohol may be an accelerant in the use of punitive parenting for parents experiencing stress. As alcohol use increases during COVID-19, children may be at higher risk for punitive parenting.

1. Introduction

The COVID-19 pandemic has greatly impacted the lives of Americans. As of December 2020, an estimated 288,000 Americans have died due to complications from the virus, while an additional 15 million have contracted the virus ([Centers for Disease Control & Prevention, 2020](https://www.cdc.gov/media/releases/2020/s121620-covid-19-deaths.html)). As many as 55 % of those who were hospitalized due to COVID-19 may experience lasting negative side effects ([Carfi, Bernabei, Landi, Gemelli, & C. O. V. I. D.-19 P.-A. C. S. G., 2020](https://doi.org/10.1016/j.chiabu.2021.105090)). The impact on the economy has also been significant, with decreased labor force participation, particularly for women and people of color ([Stevenson, 2020](https://doi.org/10.1016/j.chiabu.2021.105090)). Initial international reports suggest

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approximately 30 % of the global general population experienced stress during the first months of the pandemic (Salari et al., 2020).

1.1. Parenting and stress during COVID-19 pandemic

Parents may be particularly impacted by social changes due to the pandemic. Across the country, many schools closed or moved to hybrid in-person/on-line and preschools and childcare centers temporarily or permanently shuttered (Cluver et al., 2020; Lee, Ward, Chang, & Downing, 2020). As a result, many parents found themselves either working from home with children present, or unable to find childcare in order to continue working. Emerging research suggests that parents reported heightened stress or distress during the pandemic as compared to previous levels, potentially stemming from lack of childcare or fear of the virus itself (Hiraoka & Tomoda, 2020; Miller, Cooley, & Mihalec-Adkins, 2020; van Tilburg et al., 2020).

Parenting stress occurs when parents perceive themselves to be overwhelmed by or in-equipped to cope with issues related to parenting. Abidin's parenting stress model (1995) argues that parental stress is a function of characteristics of both the child and parent, as well as contextual environmental factors (Abidin, 1995). The COVID-19 pandemic is one such environmental factor that could contribute to parenting stress, through the societal re-structuring of sheltering-in-place (e.g. schools transitioning to distance learning and working from home with children present) (Chung, Lanier, & Wong, 2020). Approximately 46 % of parents reported high levels of stress during COVID-19, in comparison to 28 % of adults without children (APA, 2020). COVID-19-related cumulative stressors are related to parental stress levels (Brown, Doom, Lechuga-Peña, Watamura, & Koppels, 2020).

Parental stress has long been a major risk factor for harsh or punitive parenting (Holden & Banez, 1996; Liu, Zhai, & Gao, 2020; Rodriguez & Richardson, 2007). Punitive parenting is behavior directed towards a child that is physically or emotionally harsh and asserts power over children (Straus & Fauchier, 2007; Zubizarreta, Calvete, & Hankin, 2019). Punitive parenting has been related to various negative outcomes for children, including depression, anxiety, and externalizing behavior (Bender et al., 2007). An initial field of research suggests that high levels of stress or related factors due to COVID-19 are associated with negative parenting. For example, greater parenting stress during the pandemic is associated with less involvement with children's activities (Spinelli, Lionetti, Setti, & Fasolo, 2020). Having more depressive symptoms or losing a job during the pandemic are related to psychological maltreatment among parents (Lawson, Piel, & Simon, 2020). Another recent study found that parents who reported greater impact of the COVID-19 pandemic also experienced higher levels of parenting stress, which was in turn associated with harsh parenting (Chung et al., 2020). Having high levels of caregiving stress (assessed during COVID-19 but not exclusive to that time period) was associated with psychological aggression, corporal punishment and neglect among grandparent caregivers (Xu, Wu, Jedwab, & Levkoff, 2020). Finally, higher levels of parental distress related to COVID-19 were associated with harsh discipline among parents in the Northeastern US (Connell & Strambler, 2021). Taken together, this emerging research suggests that children may be at enhanced risk of punitive parenting during the COVID-19 epidemic, due to increased parental stress.

1.2. Stress and alcohol use during COVID-19 pandemic

Parental stress related to COVID-19 could also contribute to an increase in alcohol consumption. The motivational model of alcohol use argues that one of the main motivations for drinking is to cope with negative emotions (Cooper, Frone, Russell, & Mudar, 1995). Previous research has found that stressful life events and past year stress are related to alcohol consumption and problematic drinking (Dawson, Grant, & Ruan, 2005; Keyes, Hatzenbuehler, & Hasin, 2011). Men and women may have greater desire to drink on days with more stressful events (Armeli, Carney, Tennen, Affleck, & O'Neil, 2000). The COVID-19 pandemic, which may have led to increased stress, may consequently increase alcohol use through coping-motivated drinking. Several recent studies support this possibility, as stress during the COVID-19 pandemic is associated with increased drinking (Neill et al., 2020; Rodriguez, Litt, & Stewart, 2020; Stanton et al., 2020). In addition, COVID-19-related distress is associated with drinking-related coping, which in turn is related to increased frequency and quantity of alcohol use (McPhee et al., 2020). While this previous research has examined general population samples, studies that have specifically investigated the role of parenting in alcohol consumption during COVID-19 suggest that parents may be at even higher risk of increased consumption. A study of Canadian drinkers found that having children at home was associated with drinking-related coping, which was in turn related to increased alcohol consumption and resultant problems (Wardell et al., 2020). Similarly, having a child in the home was positively related to the number of heavy drinking episodes and number of typical drinks (Rodriguez et al., 2020). The stresses of COVID-19 for parents, including virtual learning, increased childcare burden, and dealing with bored and under-stimulated children could thus lead parents to drinking-related coping.

1.3. Stress, alcohol and parenting during COVID-19 pandemic

The combination of increased parental stress and alcohol consumption during COVID-19 could heighten risk for punitive parenting. Greater frequency and quantity of drinking is associated with physical abuse, corporal punishment, and psychological aggression (Freisthler & Gruenewald, 2013; Kim, Pears, Fisher, Connelly, & Landsverk, 2010; Lee, Perron, Taylor, & Guterman, 2011). Alcohol use can limit behavioral inhibitions (Bjork & Gilman, 2014), potentially leading to use of punitive parenting at high levels of stress. As a result, frequent alcohol use could modify the association between parental stress and use of punitive parenting.

In this study, we examine associations between parental stress, drinking frequency, and punitive parenting in a sample of parents in Central Ohio. The study used cell-phone based ecological momentary assessment (EMA) to survey parents 42 times during a two-week period about their experiences and behaviors. The data were collected at the height of the shelter-in-place order in Ohio due to COVID-19, April-May of 2020. We explore the following: 1.) Do parents who report higher levels of stress through the data collection period

have higher odds of using punitive parenting?; 2.) Is the association between stress and punitive parenting modified by drinking frequency?

2. Methods

Study Design. We conducted a geographic ecological momentary assessment (gEMA) with 342 parents living in Central Ohio during the initial stay-at-home order for COVID-19. This multi-level study includes observations (Level 1) within individuals (Level 2). IRB approval was obtained by [blinded for review]. Study participants were recruited through social media websites and word of mouth (e.g. friends told other friends about the study). Those interested in participating were asked to complete a short online screening survey so we could assess eligibility. Participants needed to have at least one child between the ages of 2 and 12, have custody of that child at least 50 % of the time, live in a seven county area in central Ohio, speak English, be 18 years or older, and use a smart cellular telephone with GPS capability. Parents with more than one child in the target age range were asked to pick a focal child (i.e. the child with the most recent birthday) and answer questions about that child specifically. We contacted participants via email or text to set up a time to complete the informed consent process via telephone. Participants were asked to provide verbal consent.

We asked participants to undertake three activities as part of the study: (1) complete a 30–45 minute online survey at baseline; (2) complete EMA surveys by answering 3–5 questions during three time periods (10 a.m., 3 p.m., and 9 p.m.) each day for fourteen days using an app downloaded to their cellular telephone; and (3) allow us to geotrack their movements over the fourteen day time period with that same app. The baseline survey collected information on parenting behaviors, stress, alcohol use and demographics about the family, the parent, and the focal child. EMA surveys asked parents about their current stress level, their location when completing the survey, whether their child was with the parent since the last survey, and, if present, whether they had used two punitive or two non-punitive behaviors. Given the stay-at-home order, geographic variability in movement was likely considerably lower than during more usual circumstances. We do not include those geographic data in this study. Data collection occurred between April 13, 2020 and May 27, 2020. Ohio's stay-at-home orders began on March 24, 2020 and most businesses were opened with restrictions by May 12, 2020.

Participants were given incentives based on their level of involvement throughout the study. Those who completed the baseline survey and downloaded the app received a \$50 incentive. Two parents had cellular telephones that were running versions of operating systems that were too old to download the app; while they received the \$50 for completing the baseline survey, they did not participate in the remaining study activities. For each ecological momentary assessment (EMA) completed, participants earned \$1. Completing all three assessment in a day resulted in an additional \$2, for a daily total of \$5. If they completed 90 % of all EMA surveys, they were eligible for an additional \$10. Ninety-one percent of the participants completed more than 90 % of all EMA surveys. Participants who

Table 1
Descriptive Statistics for Individual-Level Covariates (n = 329).

Individual Characteristics	% or mean (sd)	Sample n
Frequency of Alcohol Use		
Abstained from alcohol past 12 months	10.0 %	33
Drank at least once a year	24.3 %	80
Drank at least once a month	18.5 %	61
Drank at least once a week	47.1 %	155
Caregiver Biological Sex		
Male	7.3 %	24
Female	92.7 %	305
Marital Status		
Single/Widowed/Divorced	14.0 %	46
Married or living in marriage-like relationship	86.0 %	283
Parent Education		
Some college or less	23.7 %	78
Bachelor's Degree	34.7 %	114
Graduate Degree	41.6 %	137
Child Biological Sex		
Male	56.5 %	186
Female	43.5 %	143
Focal Child Age	6.18 (3.05)	329
Child Race/Ethnicity		
White	77.5 %	255
African American/Black	12.5 %	41
Other Race or Ethnicity	10.0 %	33
Number of Children	2.14 (0.96)	329

allowed their location to be tracked every day during the 14-day study period received an additional \$20. The total possible incentive that could be received was \$150.

2.1. Participants

We had 629 individuals complete our screening survey. Of those, 479 met the eligibility criteria for the study. We enrolled 342 individuals into the study (71.40 % of those eligible). The primary reasons for not enrolling participants in the study included no follow up by the participant after completing the initial screening, inability to find a time to complete the consent process, and potential participants not keeping their informed consent appointments. Of the 342 parents that provided verbal informed consent and did enroll in the study, nine did not complete any study activities, two parents completed only the ecological momentary assessments, and one completed only the baseline survey. In our analytic sample, we also removed one case with missing data on our alcohol use measure. Our final number of participants in this study was 329 parents. These parents completed 12,099 daily assessments, an average of 36.8 (or 88 %) of the 42 assessments. Our participants in the study are primarily female (92.7 %), highly educated (41.6 % have a graduate degree), and drink alcohol weekly (47.1 %) as shown in [Table 1](#).

2.2. Measures

We used the Dimensions of Discipline (DD; [Straus & Fauchier, 2007](#)) to assess punitive and non-punitive parenting behaviors. Our dependent variable is an ordinal variable that corresponds to the use of parenting practices at a given observation period, where 0 = no behaviors listed, 1 = non-punitive parenting behavior used, 2 = punitive parenting behavior used. Each observation period included two punitive and two non-punitive parenting behaviors. The DD has 13 punitive and 13 non-punitive parenting behaviors. Punitive parenting items included those such as ‘shout or yell at the child’ or ‘take away this child’s allowance, toys, or other privileges because of misbehavior’. Non-punitive discipline parenting behaviors included ‘praise this child for finally stopping bad behavior or for behaving well’ and ‘show or demonstrate the right thing to do to this child’. These behaviors were randomized into 42 blocks of questions (corresponding to each of the daily observation periods across the 14 days). During 6.5 % of assessments, parents report using punitive parenting techniques while they used non-punitive techniques in 42.9 % of the assessments. These blocks were then randomized for each participant. [Table 2](#) shows the number of times during each daily observation period each question was asked. Each survey item was asked, on average, 2,056 times (with a range of 1,582 to 2,558). Each item was asked between 517 and 859 times during a particular assessment time. Parents were only asked these questions if they indicated that they had been with their child at any time since the previous survey. For example, in the 9 p.m. survey, that means they were asked to record ‘yes’ to any of the punitive parenting items they engaged in with the focal child since the 3 p.m. survey, even if they are not with their child at the exact moment they complete the survey (e.g., child is in bed when answering the 9 p.m. survey). Parents reported being home with the focal child in 91.4 % of assessments. Given that the punitive parenting behaviors measured do not meet the threshold for clinical child abuse, no

Table 2
Dimension of Discipline Survey Items and Number of Times Each Item was Asked by Time of Survey.

Non-Punitive Survey Items	10 a.m.	3 p.m.	9 p.m.
Check on them so that you could tell them they were doing a good job	768	735	768
Check on them to see if they were misbehaving	746	759	713
Deliberately not pay attention when they misbehaved	615	620	666
Explain to them what the rules are to try to prevent them repeating misbehavior	638	635	674
Give them money or other things for finally stopping bad behavior or for behaving well	626	593	621
Give them something else they might like to do instead of what they were doing wrong	746	781	687
Let them misbehave so that they would have to deal with the results	644	679	579
Make them apologize or say they were sorry for misbehavior	751	757	740
Make them do something to make up for some misbehavior; for example, pay for a broken window	647	619	619
Praise them for finally stopping bad behavior or for behaving well	714	732	757
Put them in “time out” or send them to their room for a period of time	626	623	630
Show them or demonstrate the right thing to do	694	620	662
Tell them that you were watching or checking to see if they did something	737	749	752
Punitive Survey Items			
Give them extra chores as a consequence	620	651	608
Ground them or restrict their activities outside the home because of misbehavior	628	638	620
Hold back affection by acting cold or not giving hugs or kisses	727	751	730
Send them to bed without a meal	524	517	541
Shake or grab them to get their attention	640	657	579
Shout or yell at them	759	743	748
Spank, slap, smack, or swat them	636	630	647
Take away their allowance, toys, or other privileges because of misbehavior	758	748	739
Tell them that they are lazy, sloppy, thoughtless, or some other name like that when they behaved badly	735	747	725
Try to make them feel ashamed or guilty	665	629	660
Use a paddle, hairbrush, belt, or other object	641	621	641
Wash their mouth out with soap, put hot sauce on their tongue, or something similar	763	727	771
Withhold their allowance, toys, or other privileges until they did what you wanted them to do	856	843	859

allegations of harm were made to child protective services agencies.

One of our primary independent variables was at-the-moment stress asked during each daily observation period. This one-item question asked individuals to rate their stress level on a scale of one to ten. This measure has been shown to be highly correlated ($\rho = .682$) with the 10-item Perceived Stress Scale (American Psychological Association, 2014) and has strong face validity. The average stress level reported by our parents was 3.26 ($\sigma = 2.13$).

Our second primary independent variable was frequency of alcohol use. The baseline survey asked parents how often they had at least one alcoholic drink in the past twelve months. Responses included ‘every day,’ ‘nearly every day,’ ‘once or twice a week,’ ‘about once a month,’ ‘less than once a month but at least once a year,’ ‘never during the last twelve months, but had a drink before that,’ and ‘never had a drink of alcohol in my life.’ These were recoded into four mutually exclusive categories: weekly drinkers, monthly drinkers, yearly drinkers, and abstainers. Frequency of drinking, as opposed to drinking volume, has regularly been shown to be related to punitive parenting, such as corporal punishment or physical abuse (Freisthler, 2011; Freisthler & Gruenewald, 2013). Ninety percent of our parents report having at least one alcoholic drink in the past 12 months. This is higher than previous studies of parents (Freisthler, 2011; Freisthler & Wolf, 2016).

Observation-level control variables included the parent’s location when they completed the survey. Although we asked about a variety of locations (e.g., home, store, restaurant, etc.), the majority of the observations occurred at home, likely due to the stay-at-home orders. Thus, we recoded the variables where 1 = home and 0 = not at home. We also included the trigger time of day for when the observation was completed (10 a.m., 3 p.m. or 9 p.m.).

Individual characteristics used as control variables include biological sex of the parent, marital status of the parent, and parent’s education. The latter was recoded to ‘some college or less,’ ‘Bachelor’s degree,’ and ‘graduate degree’ given the highly educated nature of the sample. Characteristics of the focal child included biological sex, age, and race/ethnicity (recoded as ‘White,’ ‘African American/Black,’ and ‘Other race or ethnicity.’ Number of children in the household was also included.

2.3. Data analysis procedures

We conducted one-way ANOVA and chi-square bivariate analyses of the parenting behaviors and the assessment-level variables. We analyzed these data using multilevel models, where 42 at-the-moment assessments (Level 1) were nested within individuals (Level 2). As described above, the observations were measured using ecological momentary analysis. Data on individuals were obtained using an on-line baseline survey. We use multi-level modeling procedures to address intraclass correlations that occur when we nest observations within individuals. Essentially, an individual’s behaviors at the various observation points are likely to be similar. This allows us to adjust for those correlations in our models. In our null model, the intraclass correlation was .231.

Our outcome was an ordinal variable that depicted use of discipline during the current observation time period. Thus, the outcome had three ordinal categories for each observation: (1) no discipline behaviors; (2) non-punitive discipline; and (3) punitive discipline. We ran five models: (1) observation (Level 1) variables only; (2) observation variables with drinking behaviors at Level 2; (3) all variables in Model 2, with an addition of the alcohol by stress interaction variables; (4) Model 2 variables and the full complement of demographic variables at Level 2; and (5) Model 4 plus the alcohol use by stress interaction variables.

3. Results

Bivariate results can be found in Table 3. Stress was significantly related to use of the three parenting conditions [$F(2, 12208) = 202.737, p < .001$]. Parents who reported using punitive parenting reported an average level of stress of 4.55 ($\sigma = 2.46$) in comparison

Table 3
Descriptive and Bivariate Statistics for At-the-Moment Stress, Location, and Time of Day by Types of Discipline Used for 329 Parents during 12,099 Daily Assessments (n = 12099).

	Full Sample % or mean (sd)	No Discipline % or mean (sd)	Non-Punitive % or mean (sd)	Punitive % or mean (sd)	Test Statistic
Use of Discipline					
None of those listed	50.6 %				
Non-punitive	42.9 %				
Punitive	6.5 %				
Assessment-Level Covariates					
Stress	3.26 (2.13)	3.00 (1.98)	3.37 (2.16)	4.55 (2.46)	$F = 202.737^{**}$
Location (reference: not at home)					$\chi^2 = 7.751$
At non-home location (e.g., work, store)	10.5 %	10.8 %	10.4 %	9.3 %	
Home	89.5 %	89.2 %	89.6 %	90.7 %	
Time of Day (reference: 10 a.m.)					$\chi^2 = 26.952^{**}$
10:00 a.m.	33.4 %	35.2	32.4	26.9	
3:00 p.m.	32.0 %	31.0	32.8	33.9	
9:00 p.m.	34.6 %	33.8	34.8	39.3	

sd = standard deviation.

** $p < .001$.

to those who reported no discipline, $m = 3.00$ ($\sigma = 1.98$), and those who reported non-punitive discipline, $m = 3.37$ ($\sigma = 2.16$). Location of where the survey was completed (home or place other than home) was not related to use of punitive parenting in the bivariate analysis, $X^2(2, N = 12099) = 7.751, p = .417$. Time of day when the survey was initiated was significantly related to use of punitive discipline by parents, $X^2(4, N = 12099) = 26.952, p < .001$. Specifically, punitive discipline was reported more frequently in the 9:00 p.m. and 3:00 p.m. assessments as compared to the 10:00 a.m. assessment.

Model 1 presents the results of the assessment-level variables only (see Table 4). In this model, parents reporting higher levels of stress also report using punitive parenting practices $OR = 1.157$ (95 % $CI = 1.131, 1.183$). Punitive parenting behaviors occurred significantly more frequently during the afternoon and evening survey time periods and when they completed the assessment at home (compared to another location). In Model 2, we add our alcohol frequency variables as Level 2 (within individual). Here, monthly drinkers were more likely to use punitive parenting compared to non-drinkers $OR = 1.593$ (95 % $CI = 1.084, 2.342$), while the previous assessment-level variables retain significance as in Model 1. Finally, in Model 3, we add our stress * drinking frequency interactions. We find that parents who report drinking monthly $OR = 1.109$ (95 % $CI = 1.010, 1.217$) or weekly $OR = 1.116$ (95 % $CI = 1.029, 1.210$) have higher odds of reporting using punitive discipline at higher levels of stress, in comparison to abstainers.

In the final two models, we add individual-level demographic control variables (see Table 5). Model 4, which adds demographic variables to the observation-level variables and drinking frequency, show that married parents had lower odds of using punitive parenting $OR = 0.683$ (95 % $CI = 0.511, 0.914$), as did parents of older children $OR = 0.905$ (95 % $CI = 0.877, 0.934$). In this model, stress $OR = 1.149$ (95 % $CI = 1.123, 1.176$) was positively related to the outcome, with higher stress related to higher odds of use of punitive parenting during an EMA period. In addition, parents had higher odds of reporting use of punitive parenting at the 3:00 p.m. survey $OR = 1.230$ (95 % $CI = 1.123, 1.347$) and the 9:00 p.m. survey $OR = 1.255$ (95 % $CI = 1.146, 1.373$) in comparison to the 10:00 a.m. survey. The drinking frequency variables were not significant in this model.

In Model 5, we add the stress * drinking behavior interactions. Here, we see similar patterns to Model 3, where drinking frequency moderates the association between stress and punitive parenting such that monthly $OR = 1.114$ (95 % $CI = 1.016, 1.222$) and weekly drinkers $OR = 1.116$ (95 % $CI = 1.130, 1.209$) had higher odds of reporting punitive parenting discipline techniques when reporting higher levels of at-the-moment stress, as compared to abstainers. Figs. 1 and 2 show these interaction effects comparing monthly drinkers to abstainers (Fig. 1) and weekly drinkers to abstainers (Fig. 2).

4. Discussion

Our study is unique in examining associations between stress, alcohol use, and punitive parenting during the COVID-19 pandemic. We extend current literature by investigating whether associations between parental stress and punitive parenting are modified by drinking, and controlled for demographic variables. Our study is consequently well-suited to present initial information about potential areas of intervention for parents experiencing stress due to the worldwide pandemic.

Similar to previous studies, higher levels of stress were positively associated with use of punitive parenting (Holden & Banez, 1996; Liu et al., 2020; Rodriguez & Richardson, 2007). This association was significant even though our sample reported lower average levels of stress than other community samples of non-parents and parents during COVID-19 (APA, 2020). However, this study asked

Table 4
Multilevel Ordinal Model Assessing Relationship of At-the-Moment Stress and Frequency of Alcohol Use on Use of Parenting Practices for 329 Parents during 12,099 Daily Assessments.

	Model 1		Model 2		Model 3	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
Constant	0.024	(0.019, 0.029)**	0.019	(0.013, 0.026)**	0.024	(0.016, 0.036)**
Observation-Level Variables (Level 1)						
At-the-Moment Stress	1.157	(1.131, 1.183)**	1.157	(1.131, 1.184)**	1.065	(0.989, 1.146)
Location (reference: not at home)						
Home	1.161	(1.020, 1.322)*	1.161	(1.020, 1.322)*	1.161	(1.020, 1.322)*
Time of Day (reference: 10 a.m.)						
3:00 p.m.	1.228	(1.121, 1.345)**	1.228	(1.121, 1.344)**	1.228	(1.121, 1.344)**
9:00 p.m.	1.255	(1.147, 1.374)**	1.255	(1.147, 1.374)**	1.255	(1.147, 1.374)**
Individual Characteristics (Level 2)						
Frequency of Alcohol Use (reference: Abstainer)						
Yearly			1.371	(0.947, 1.985)	1.151	(0.726, 1.826)
Monthly			1.593	(1.084, 2.342)*	1.159	(0.717, 1.873)
Weekly			1.170	(0.830, 1.648)	0.826	(0.538, 1.268)
Cross-level Interactions						
Stress * Yearly Alcohol Use					1.061	(0.975, 1.155)
Stress * Monthly Alcohol Use					1.109	(1.010, 1.217)*
Stress * Weekly Alcohol Use					1.116	(1.029, 1.210)**

OR = Odds Ratio; CI = Confidence Interval.

* $p < .05$.

** $p < .001$.

Table 5
Multilevel Ordinal Model Assessing Relationship of At-the-Moment Stress and Frequency of Alcohol Use Controlling for Individual Characteristics on Use of Parenting Practices for 329 Parents during 12,099 Daily Assessments.

	Model 4		Model 5	
	OR	95 % CI	OR	95 % CI
Constant	0.061	(0.033, 0.113)**	0.082	(0.042, 0.157)**
Observation-Level Variables (Level 1)				
Stress	1.149	(1.123, 1.176)**	1.057	(0.983, 1.137)
Location (reference: not at home)				
Home	1.164	(1.023, 1.325)*	1.163	(1.022, 1.324)*
Time of Day (reference: 10 a.m.)				
3:00 p.m.	1.230	(1.123, 1.347)**	1.232	(1.126, 1.350)**
9:00 p.m.	1.255	(1.146, 1.373)**	1.263	(1.153, 1.382)**
Individual Characteristics (Level 2)				
Frequency of Alcohol Use (reference: Abstainer)				
Yearly	1.295	(0.920, 1.823)	1.093	(0.705, 1.695)
Monthly	1.428	(0.995, 2.049)	1.022	(0.646, 1.619)
Weekly	1.158	(0.840, 1.596)	0.818	(0.543, 1.231)
Female Caregiver	0.797	(0.558, 1.139)	0.805	(0.564, 1.149)
Marital Status reference: Single/Widowed/Divorced)				
Married or living in marriage-like relationship	0.683	(0.511, 0.914)*	0.675	(0.504, 0.903)*
Parent Education (reference: Some college or less)				
Bachelor's Degree	0.845	(0.666, 1.145)	0.840	(0.650, 1.085)
Graduate Degree	0.841	(0.654, 1.082)	0.831	(0.646, 1.070)
Male child	1.009	(0.840, 1.212)	1.001	(0.833, 1.202)
Focal Child Age	0.905	(0.877, 0.934)**	0.904	(0.877, 0.933)**
Child Race/Ethnicity (reference: White)				
African American/Black	1.168	(0.877, 1.555)	1.155	(0.867, 1.537)
Other Race or Ethnicity	1.350	(0.996, 1.829)	1.326	(0.978, 1.797)
Number of Children	1.046	(0.948, 1.154)	1.042	(0.944, 1.150)
Cross-Level Interactions				
Stress * Yearly Alcohol Use			1.059	(0.973, 1.151)
Stress * Monthly Alcohol Use			1.114	(1.016, 1.222)*
Stress * Weekly Alcohol Use			1.116	(1.030, 1.209)**

OR = Odds Ratio; CI = Confidence Interval.

* $p < .05$.

** $p < .001$.

individuals to rate their average level of stress in the past month, while our finding represents an average of scores taken across multiple assessments and days and referring to a short time frame (e.g. 6 h). As a result it is unknown whether our lower average stress score is due to lower stress in our sample or measurement differences. In addition, our findings support other preliminary research indicating an association between parental stress and harsh parenting during COVID-19 (Chung et al., 2020; Xu et al., 2020). Strategies to mitigate stress might be particularly impactful for parents sheltering-in-place with children.

Our study was also able to measure associations between time of day and use of parenting. Specifically, afternoon and evening were related to greater odds of punitive parenting versus mornings. It could be that parents and children grow more fatigued during the day, resulting in irritability and a higher chance of negative interactions. As afternoons and evenings could also coincide with when parents are more likely to drink alcohol, these times could represent periods in particular need of intervention.

Although frequency of alcohol use was associated with punitive parenting in an initial model, this association was not statistically significant in the presence of demographic covariates. However, we did find that frequency of alcohol use modified the association between stress and punitive parenting. Parents who had greater levels of stress and drank either monthly or weekly had higher odds of punitive parenting than parents with greater levels of stress who abstain from alcohol. This suggests that the presence of alcohol may be an accelerant in the use of punitive parenting for parents experiencing stress. This is particularly worrisome given that research suggests greater alcohol use overall (Neill et al., 2020; Rodriguez et al., 2020; Stanton et al., 2020) and by parents (Rodriguez et al., 2020; Wardell et al., 2020) during the COVID-19 pandemic.

Our study is the first known study during a shelter-in-place order to investigate these associations. Our findings suggest that parents who drink alcohol may be in particular need of supports and stress reduction. This implication is in direct contrast to social media memes which extol alcohol as a solution to COVID-19 related parenting stress (e.g. the Twitter hashtag #covidparenting), and appear to be mimicked by alcohol industry advertisements in Australia (Leung, Connor, Hides, & Hall, 2020). These seemingly light-hearted messages, such as "mommy needs a drink" do not take into account the preponderance of evidence that alcohol contributes to negative parenting (Freisthler & Gruenewald, 2013; Kim et al., 2010; Lee, Perron, Taylor, & Guterman, 2011). In addition, as our research

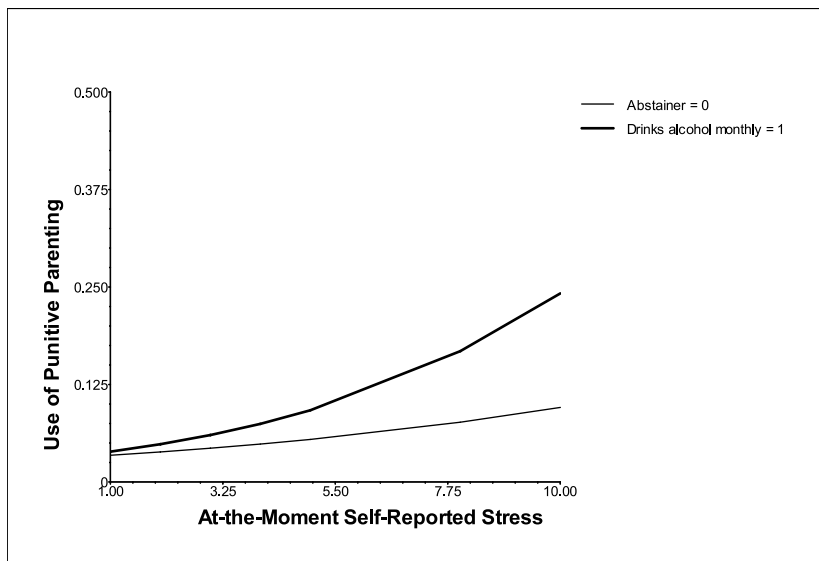


Fig. 1. Interaction between monthly alcohol use (vs. abstinence) and at-the-moment self-reported stress on use of punitive parenting.

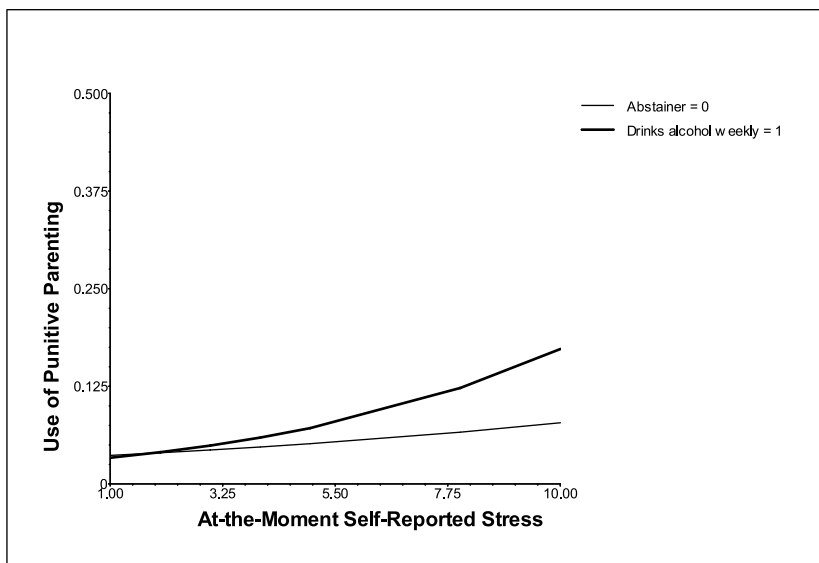


Fig. 2. Interaction between weekly alcohol use (vs. abstinence) and at-the-moment self-reported stress on use of punitive parenting.

suggests that alcohol use increases risk of punitive parenting during times of stress, messages that encourage alcohol as a parental coping mechanism may further instigate negative effects on children.

4.1. Limitations

Our study has several limitations, the most significant one being our use of a convenience sample that limits generalizability. All of the data used in this study were self-report, and thus potentially biased due to stigma surrounding alcohol use or parenting behaviors. Although our study is a methodological improvement to many in our ability to measure at-the-moment stress and parenting behaviors, our alcohol measures were not measured during the EMA surveys, leaving us without a clear picture of temporal mechanisms between stress, alcohol, and punitive parenting. Our drinking categories of weekly and monthly are broad. A more nuanced measure of alcohol use that includes either a continuous variable related to frequency or measures that combine frequency and quantity might allow us to tease out how stress affects use of punitive parenting. Our measures of punitive parenting included several different parenting behaviors, which may vary in severity. In addition, our study has limited racial and ethnic diversity, are primarily mothers, and highly educated. Although women appear to shouldering much of the burden related to child care, the lack of information from fathers and

from a more diverse sample is a limitation of this study. Finally, our study only includes assessments during the pandemic. These associations might exist outside of stay-at-home pandemic restrictions.

4.2. Implications & conclusion

A large segment of parents may be at higher risk of punitive parenting due to potential greater levels of stress and alcohol use during the COVID-19 pandemic. Our findings indicate that parents should be provided with resources that reduce stress and enhance coping, particularly in the afternoon or evening. Our study methodology, which required downloading an app and completing multiple EMA surveys, suggests that parents are able to engage with smartphone-based materials. Smartphone applications could consequently be used as interventions against punitive parenting, and be targeted for times or places where parents are more likely to use punitive parenting. Potential interventions could include mindfulness or breathing reminders, resources for extra support, or education about alcohol use when experiencing stress. Our findings could also be useful to educators, medical providers, and social service agencies who work with families and could screen parents for alcohol use. Finally, larger public education campaigns could be created to counteract the #covidparenting and #winemoms messages that alcohol is a natural and humorous response to parenting stress by informing the public of the potential risks of alcohol use when experiencing stress. These measures could help prevent further punitive parenting in the current COVID-19 pandemic as well as other natural disasters or high stressors in the future.

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