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SUBSTANCE USE AND MENTAL HEALTH IN PREGNANT WOMEN DURING THE COVID-19 PANDEMIC

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Abstract

Objectives: We examined the prevalence of substance use as a coping mechanism and identified relationships between maternal mental health over time and use of substances to cope during the Coronavirus Disease 2019 (COVID-19) pandemic among pregnant women in the U.S.A.

Methods: Self-reported repeated measures from 83 pregnant women were collected online in April 2020 and May 2020. Women retrospectively reported their mental/emotional health before the pandemic, as well as depression, stress, and substance use as a result of the pandemic at both time points. Linear regression measured cross-sectional and longitudinal associations between mental health and substance use.

Results: Pre-COVID-19 reports of poorer mental/emotional health ($b = 0.46$) were significantly ($p < .05$) associated with number of substances used to cope with the pandemic. Elevated stress ($b = 0.35$) and depressive symptoms ($b = 0.27$) and poorer mental/emotional health ($b = 0.14$) in April were also significantly related to higher numbers of substances used in May ($p < .05$).

Conclusion: Pregnant women's psychological well-being may be a readily measured indicator of substance use risk during crises such as the COVID-19 pandemic. Interventions addressing increased stress and depression may also mitigate the emergence of greater substance use among pregnant women.

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No potential conflict of interest was reported by the author(s).

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Keywords

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INTRODUCTION

The onset of the Coronavirus Disease 2019 (COVID-19) pandemic resulted in many significant safety precautions (e.g. stay-at-home orders, closure of schools and businesses, and restriction of gatherings) that may have had the potential to increase feelings of isolation and adversely impact mental health (Caparros-Gonzalez & Alderdice, 2020).

According to the World Health Organization, the social determinants of health (SDH) are the 'conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life' (World Health Organization [WHO], 2021). The COVID-19 pandemic exerted a massive force on social factors and societal conditions which are SDH (Dias et al., 2020; Niles et al., 2020), impacting a breadth of determinants, such as food security, employment, access to care, and income, which have been shown to, in turn, impact risk for mental health difficulties through their impact on factors such as stress and high-risk behaviours such as substance use (Allen et al., 2014).

Early studies have identified high rates of psychological distress in adults as a result of isolation and uncertainty related to the pandemic, and recommendations have been made to place attention on vulnerable groups during this time (Qiu et al., 2020). This psychological distress also has the potential to increase the risk for substance use in vulnerable populations (Du et al., 2020). Prenatal psychological distress and substance use can have detrimental effects on maternal and foetal health (Cardwell, 2013) and pregnant women are considered a high-risk population during infectious disease outbreaks due to increased susceptibility to infection (Dashraath et al., 2020). Because little is known about the clinical manifestations of COVID-19 during pregnancy, pregnant women may be at heightened risk for psychological distress related to uncertainty. For instance, one study found that pregnant women in China experienced higher rates of depressive symptoms and thoughts of self-harm during the COVID-19 pandemic compared to their pre-pandemic rates (Wu et al., 2020). These mental health issues place both maternal and foetal health in jeopardy as some established effects of stress during pregnancy include impaired neurodevelopment, delayed cognitive and motor development, and impaired behaviour towards stressful conditions for the foetus (Fatima et al., 2017), as well as preterm birth (Hoffman et al., 2016) and low birth weight (Diego et al., 2006). Current guidelines developed by the American College of Obstetrics and Gynaecologists (ACOG) acknowledge perinatal depression and other mood disorders as significant medical complications both during pregnancy and postpartum, affecting one in seven women (ACOG, 2018). ACOG officially recommends that patients are screened at least once during the perinatal period for depression using a standardised screening tool and notes life stress as a risk factor for both prenatal and postpartum depression (ACOG, 2018). Indeed, early studies have shown that COVID-19 is a significant source of life stress for pregnant women (Preis et al., 2020a, 2020b).

As pregnant women are experiencing disproportionate rates of stress and depressive symptoms as a result of the COVID-19 pandemic, there is concern that substance use will increase in this vulnerable population as a coping mechanism. Based on data from the 2017 National Survey on Drug Use and Health, prior to the pandemic, 8.5% of pregnant women used illicit drugs (7.1% used marijuana), 14.7% used tobacco products, and 11.5% used alcohol. One study of Canadian pregnant women found increased use of cannabis and tobacco related to COVID-19 stress, and that this substance use increase was more frequent in participants experiencing financial struggles, loss of employment, or stress about receiving poor prenatal care (Kar et al., 2020). While the impact of the COVID-19 pandemic on the mental health of pregnant women and rates of substance use has been examined in Canada (Kar et al., 2020), these effects have been largely influenced by individual government response. The Canadian government's response and policy enactment is very different from that of the U.S.A. One notable difference was the support offered by the Canadian government during the pandemic to people who use substances, including improving access to overdose prevention services and investing in resources for people most at risk for substance use (Public Health Agency of Canada, 2020). Because there was no similar assistance offered by the U.S. government, it is important to consider mental health and substance use in pregnant women in the U.S.A. specifically.

The goal of our study was to identify the extent to which pregnant women in the U.S.A. used substances to cope with the COVID-19 pandemic and how this practice was predicated by maternal psychological distress and environmental factors during this unprecedented time.

MATERIALS AND METHODS

Participants

Using the online survey platform Prolific (www.prolific.com), we recruited participants who self-identified as pregnant women. A total of $n = 83$ completed an online survey. Sixty-six (80%) of these women also completed a second survey, approximately one month later. Inclusion criteria were 18 years of age, English-speaking, currently pregnant, and living in the U.S.A. Participants were provided 1.90 USD as a thank you for their participation in each of the two time points of data collection. Each time point of data collection was open for 2 weeks; time 1 began on 20 April 2020 and time 2 began on 19 May 2020. This study was deemed as exempt by the Washington State University Institutional Review Board.

Measures

Our pre-specified covariates were age (continuous), race/ethnicity (0 = Hispanic, Black, Asian, multiple race; 1 = non-Hispanic White), annual household income (indicating whether the household income was above or below the U.S. median; 0 = less than 25,000 USD–\$74,999 USD; 1 = 75,000 USD and higher), and current employment status (0 = not employed; 1 = employed at least part time). The Perceived Stress Scale (PSS; Cohen, 1988) was selected to measure the degree to which situations in the participants' lives are appraised as stressful, modified for this study to reflect the last 2 weeks of perceived stress rather than the last month. Participants responded to 10 items using a 5-point Likert scale (0

= never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often) with higher scores indicating higher levels of perceived stress.

To measure depressive symptomology, participants responded to the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) a depression screening tool that has been validated in pregnant women (Rubertsson et al., 2011). This tool was modified to reflect the last 2 weeks rather than the last 7 days. Participants responded to nine items about how they were feeling as it related to depressive symptoms. Because this survey was anonymous, the EPDS item reflecting suicidality was removed because the study team would not be able to intervene should someone endorse that item. Each item on the EPDS has four Likert-style response options. For example, the question 'I have been anxious or worried for no good reason', had response options of 0 = No, not at all, 1 = Hardly ever, 2 = Yes, sometimes, 3 = Yes, very often. Six items were reverse coded prior to totalling scores, with scores above 12 identifying participants who were likely to be suffering from a depressive illness of varying severity (Cox et al., 1987).

To gain perspective on mental/emotional health prior to the beginning of the pandemic, as well as at the two data collection time points, we used participant retrospective report of their mental health before they were affected by the pandemic, with the first time point being collected less than 2 months after the U.S. President first declared that the COVID-19 outbreak constituted a national emergency, that is, 13 March 2020. The question 'How would you rate your overall Mental/Emotional health before the Coronavirus/COVID-19 pandemic?' from the CoRoNaVirus Health Impact Survey (CRISIS) V0.1 Adult Self-Report Baseline Form (King et al., 2020). For each of the time points, these questions were modified to 'currently' rather than 'before the Coronavirus/COVID-19 pandemic'. Response options for the mental health questions were Likert scales that ranged from 1 = excellent to 5 = poor.

For coping behaviours, participants were asked, 'To cope with social distancing, isolation, or stress related to COVID-19, are you doing any of the following?' with a checklist of items following that they could endorse, including smoking more cigarettes, vaping more, drinking alcohol, using prescription medications that are not prescribed to me, using more of my opioid medications than my doctor prescribed, using cannabis or marijuana and using kratom (Centers for Disease Control and Prevention). To create our substance use outcome variable, we summed the number of endorsements each participant made for these substance-related coping mechanisms. The summed variable ranged from 0 to 6.

Analytic strategy

Means (M) and standard deviations (SD) were calculated for continuous variables and frequencies and percentages were calculated for nominal/checklist variables. Missing data were minimal. We had no missing data on the pre-COVID or time 1 mental/emotional health item. One participant (1.2%) did not respond to all of the EPDS items and four participants (4.8%) did not respond to all the PSS items.

Pearson correlation coefficients were used to examine crude bivariate relationships for mental health, EPDS and PSS over time. Due to the skewed nature of the substance use

variable, correlations for substance use were calculated using Spearman's rho. Analysis of variance F-tests was used to test change in mental health over three time points (pre-COVID, time 1 and time 2). T-tests were used to test change over time in PSS and EPDS means from time 1 to time 2. A Wilcoxon test was used to test change in number of substances used to cope during the pandemic (time 1 vs. time 2).

Separate multiple regressions were conducted for each of the following variables, to examine their relationships with substance use during the COVID-19 pandemic, controlling for demographic variables of age, race/ethnicity, income, and employment status: EPDS, PSS and mental/emotional health. All analyses used an alpha of 0.05 and were conducted in SPSS (IBM Corp., Released 2020) and Mplus (Muthen & Muthen, 1998–2017). Regressions utilised full information maximum likelihood, which uses all data available to estimate the model. Linear regression models were used to determine associations between mental health variables and substance use in pregnant women during the COVID-19 pandemic (Table 4). Separate models were run for each of the primary independent variables of interest as multicollinearity was found between the EPDS and PSS at both time 1, $r(83) = 0.86$, and time 2 $r(66) = 0.91$.

RESULTS

Sample characteristics

Table 1 summarises the sample characteristics and descriptive results. Our time 1 sample consisted of 83 pregnant women with an M (SD) age of 30.42, 5.41 and of diverse race/ethnicity: 70% non-Hispanic White, 11% Black, 6% Asian, 6% Latino/Hispanic, 7% mixed race. Sixty-five per cent of the women who responded were employed either part- or full-time and 29 states were represented in the sample. Total household income before taxes in the past 12 months indicated that 57% of our sample had a household income of \$75,000. Of the 83 women that completed time 1, we were able to follow 66 to gather time 2 data. Over 90% of the participants reported that recommendations for social distancing had caused them some degree of stress. At time 1, 14.5% (12) of our sample reported using at least one substance to cope with the pandemic, and at time 2 nearly 14% (9) of the remaining sample did. For participants who reported using substances to cope, the maximum number of substances endorsed was three, at either time point.

Each participant who reported using substances to cope during their current pregnancy also reported using the same substance(s) prior to their current pregnancy. When asked how many days per week, on average, they used each of the following substances, participants reported the following: smoking (M= 6.5, SD = 1, range 5–7), vaping (M= 6, SD = 0), alcohol (M= 3.4, SD = 2.9, range 1–7), prescription medications not prescribed to me (M = 5.5, SD = 2.1, range 4–7), cannabis (M= 3.4, SD = 2.6, range 1–7).

Longitudinal regressions

The number of substances used to cope at time 1 was significantly correlated with pre-COVID and time 1 mental/emotional health ($p < 0.01$ for both) and time 1 PSS ($p < 0.01$). Time 2 number of substances used to cope was significantly correlated with Pre-COVID and

time 1 mental/emotional health ($p < 0.01$ and $p < 0.05$, respectively), time 1 PSS and EPDS ($P < 0.05$ for both), and time 1 number of substances used ($p < 0.01$) (Table 2).

As can be seen in Table 3, mental health (M [SD]) (pre-COVID = 2.22 [0.96], time 1 = 3.00 [1.25], time 2 = 3.05 [1.22]) means significantly increased from the pre-COVID time frame to the first time point in April 2020, where higher scores indicate worse mental health. There was no significant change in the number of substances used to cope during the pandemic nor in PSS and EPDS means from March to April 2020.

Cross-sectional regressions

Cross-sectional regressions (controlling for demographic variables of age, ethnicity, income and employment status) indicated statistically significant positive relationships between women's ratings of mental/emotional health ($b = 0.31$, $p = 0.002$), PSS ($b = 0.30$, $p = 0.003$) and EPDS ($b = 0.27$, $p = 0.007$) with number of substances used to cope at time 1. Cross-sectional regressions for time 2 follow the same pattern, showing significant positive relationships between women's ratings of mental/emotional health ($b = 0.26$, $P = 0.004$), PSS ($b = 0.28$, $p = 0.015$) and EPDS ($b = 0.26$, $p = 0.025$) with number of substances used to cope (Table 4).

After controlling for demographic variables of age, ethnicity, income and employment status, results of regressions over time indicated a statistically significant positive relationship between women's reports of pre-COVID-19 pandemic mental/emotional health ($b = 0.46$, $p < 0.001$ and the outcome of the number of substances used to cope. Regression results also indicated a statistically significant positive relationships between women's time 1 scores on the PSS ($b = 0.35$, $p = 0.002$) and EPDS ($b = 0.27$, $p = 0.021$), as well as their self-report of mental/emotional health at time 1 ($b = 0.14$, $p = 0.004$) and with the number of substances used at time 2 (Table 5).

DISCUSSION

Pregnant women may be particularly vulnerable to the health impacts of the COVID-19 pandemic including associated psychological distress and increased substance use. Our survey was conducted less than 2 months after the U.S. President first declared that the COVID-19 outbreak constituted a national emergency, a time of massive flux in SDH. It revealed that pregnant women's self-report of mental/emotional health prior to the COVID-19 pandemic was predictive of the number of substances they used to cope at both our first and second waves. of data collection during the pandemic. It revealed that this same single-item measurement was significantly associated with the number of substances used to cope cross-sectionally at time 1 and more predictive than the other variables examined. This study also showed that participants' ratings of stress, depression, and substance use remained consistently poor over time during the pandemic and that their mental/emotional health got progressively worse. Potential effects of these levels of stress can be harmful to both mother and the foetus as they are related to both short-term (e.g. pre-term birth and intrauterine growth restrictions) and long-term negative impacts (e.g. hypertension, obesity, type II diabetes) (Crespi & Denver, 2005). The single item mental/emotional health self-report measure we used in this study could easily be administered at prenatal appointments

and provide important insight into who may be most at-risk for using substances to cope during a national crisis or natural disaster. This information can inform care of at risk pregnant women that may benefit from additional resources and interventions to mitigate risk to themselves and their newborns.

Of the variables collected at time 1, the PSS was most strongly related to the number of substances used to cope at time 2, followed by EPDS and mental/emotional health. The women in our sample reported higher levels of perceived stress on the PSS than the non-pregnant norming sample for the scale (Bergink et al., 2011) and a median level (mdn = 18) slightly higher than a sample of 219 pregnant women exposed to Hurricane Katrina (mdn = 16) (Solivan et al., 2015). In comparison to several normative samples of pregnant women, our sample reported much higher levels of depressive symptoms (Bergink et al., 2011; Eberhard-Gran et al., 2004). In a sample of 301 pregnant women exposed to Hurricane Katrina, 14.4% met the threshold for possible clinical depression (Xiong et al., 2010) and among a sample of 398 pregnant women exposed to varying degrees of intimate partner and neighbourhood violence, nearly a third met this threshold (Barcelona de Mendoza et al., 2018). These percentages pale in comparison to our sample's reporting, wherein over 46% of the sample met a cut-off of 12 at the first data collection time point (about a month in to the COVID-19 pandemic), indicating that they are likely to be suffering from a depressive illness of varying severity. We found a relationship between participants' reports of elevated perceived stress and depression at the first time point in April 2020 and reports of using substances to cope with social distancing, isolation, or stress related to COVID-19 at the second time point, a month later. Thus, stress and depression may be additional risk factors for reliance on substance use to cope with the challenges and uncertainty of crises like the COVID-19 pandemic.

According to the 2018 U.S. National Survey on Drug use and Health, 5.4% of pregnant women stated that they used illicit substances in the past month, 9.9% used alcohol and 11.6% smoked cigarettes (McCance-Katz, 2019), summing to over half a million women using teratogenic substances during pregnancy. As many times women use substances during only part of their pregnancy, this 'past month' point prevalence could underestimate use. Our sample of women did not report whether or not they smoked cigarettes but rather whether they had smoked cigarettes more as a coping mechanism. Five per cent had increased their smoking and 2% reported increasing their vaping. Two per cent reported using alcohol and 14% reported using illicit substances or inappropriately using prescribed medications.

It is imperative that healthcare providers consistently assess for mental/emotional health, stress and depression using screening tools, such as the EPDS, PSS and even one-item scales, such as the one used in this study, as a baseline of emotional well-being and to assess changes over time. Undiagnosed or untreated perinatal depression and mental health disorders may have severe adverse effects on both mother and baby, including an increased risk of maternal substance abuse (Yazici et al., 2015). Evaluating perinatal depression and mental health early and throughout the pregnancy can help clinicians identify and prioritise the risks of developing depression during this period. This can also help providers gain a better understanding of the patient's goals to improve or sustain their mental health. Equally

important is an assessment of risk factors of perinatal depression, such as childcare stress, lack of social support, unintended pregnancy, or domestic violence. Although maternal depression is the primary risk factor of substance use during pregnancy, healthcare providers should be aware of the additional risk factors for substance use, including stressors such as socioeconomic factors or single parenting during a pandemic. Encouraging patients to attend to their mental health and seek out assistance and educating them on the signs and symptoms of perinatal depression early on in the pregnancy is also imperative. This can better prepare the patient to seek help when they are experiencing feelings such as persistent sadness, worthlessness, anxiety, insomnia, or thoughts of suicide that interfere with the ability to function normally. This will better equip expecting mothers with the tools necessary to assess their mental health status at home and contact their provider for potential treatment if necessary.

STRENGTHS AND LIMITATIONS

For this study, we were able to gather a longitudinal sample of pregnant women during the COVID-19 pandemic, whose demographics, while not representative of the U.S. population, represented a range of ages, incomes, and employment statuses. Extrapolation of the results to the U.S. population at large should take into consideration the small sample size of this study and results should be interpreted as preliminary. Due to the rapid onset and unpredictability of the pandemic, we were unable to collect pre-COVID-19 measures of PSS and EPDS and we relied on participant retrospective reports of their mental/emotional health and substance use before the pandemic. Thus, this study may also be limited by the use of self-report measures and the use of retrospective recall of mental and emotional states. In addition, 20.5% of our sample was lost to attrition at the second time point of data collection, reducing our power to detect modest associations and after collecting the data we realised that we screened in ‘pregnant women’ from the Prolific site, when not all pregnant people may have identified as women and thus this study may not represent part of the pregnant population in the U.S.A. We also expect that mental health, coping, and substance use rates may fluctuate based on shelter-in-place orders, rates of COVID-19 cases and deaths, gestational age of the foetus, number of pregnancies and pregnancy risk experienced by the pregnant person, as well as access to critical resources, such as food and toiletries in each respective community. And while some states and/or counties rapidly declared shelter-in-place orders, at the time of this study, many areas had not placed any restrictions on residents. Despite these limitations, this study provides valuable insight into relationships between mental health and substance use of pregnant women in the U.S.A. during the COVID-19 pandemic. It is strengthened by the use of standardised measures of stress and depression. It is also strengthened by the geographic diversity of the sample, with representation from 29 states within the U.S.A.

CONCLUSION

This study aimed to determine the extent to which pregnant women in the U.S.A. used substances to cope with the COVID-19 pandemic and evaluate the relationships between maternal psychological distress and substance use during this unprecedented time. We found significant relationships between participants’ self-reported mental/emotional

health, stress and depressive symptoms and substance use. This may be due to added stress and uncertainty of the pandemic, along with other concerns, such as untreated perinatal depression symptoms or a history of substance use. Healthcare providers have the opportunity to buffer the negative effects of the COVID-19 crisis (Caparros-Gonzalez & Alderdice, 2020). We recommend that they prioritise addressing psychosocial needs to lower the risk of pregnant people using substances to cope with the stressors of the ongoing pandemic. Regular long-term interventions should be put in place to assist those with substance use disorders to prevent relapse and withdrawal symptoms. Public health interventions, such as health promotion groups or classes, could be beneficial to assist pregnant women in maintaining healthy lifestyles, stress management, coping effectively with negative emotions, and seeking psychological assistance, which can all help identify additional risk factors and prevent addiction through further intervention (Du et al., 2020). Expecting mothers should learn early signs of increased stress to better prepare for any intense emotions to follow and when to contact a mental healthcare specialist. Building a strong support system can ensure women feel safe asking for help and be provided additional emotional support during stressful times.

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Table 1.

Participant characterisation (Time 1 n = 83, Time 2 n = 66)

	n (%)
Age *M(SD)	30.42 (5.4)
Race/Ethnicity Origin	
White	58 (69.9)
Black	9 (10.8)
Asian	5 (6.0)
American Indian/Alaskan Native	0 (0.0)
Latino/Hispanic	5 (6.0)
Mixed	6 (7.2)
Employment	
Part-time or Full-time	54 (65.1)
Not formally employed	29 (34.9)
Income	
<\$75,000/year	35 (53.0)
\$75,000/year	26 (39.4)
Have recommendations for socially distancing caused stress for you?	
Not at all	7 (8.4)
A little	26 (31.3)
Somewhat	31 (37.3)
A lot	19 (22.9)
Number of participants endorsing the following: time 1	
Using at least one substance used to cope	12 (14.5)
Smoking more cigarettes	4 (4.8)
Vaping more	1 (1.2)
Drinking alcohol	5 (6.0)
Using prescription medications that are NOT prescribed to me	2 (2.4)
Using more of my opioid medications than my doctor prescribed	0 (0.0)
Using cannabis or marijuana	7 (8.4)
Number of participants endorsing the following: time 2	
Using at least one substance used to cope	9 (14.0)
Smoking more cigarettes	3 (4.5)
Vaping more	1 (1.5)
Drinking alcohol	1 (1.5)
Using prescription medications that are NOT prescribed to me	2 (3.0)
Using more of my opioid medications than my doctor prescribed	2 (3.0)
Using cannabis or marijuana	4 (6.1)

All measurements are taken from time 1 data collection unless otherwise noted.

Table 2.

Correlation coefficients between measures over time

	Pre-COVID			Time 1			Time 2			
	Mental health	Substances used	PSS	Mental health	Substances used	PSS	Mental health	Substances used	PSS	
Pre-COVID	Mental health	–								
Time 1	Substances used	0.286**	–							
	Mental health	0.649**	0.290**	–						
	EPDS	0.360**	0.010	0.704**	–					
Time 2	PSS	0.277*	0.289**	0.662**	0.862**	–				
	Substances used	0.367**	0.668**	0.246*	0.245*	0.376*	–			
	Mental health	0.459**	0.232	0.780**	0.726**	0.692**	0.169	–		
	EPDS	0.296*	0.167	0.681**	0.838**	0.776**	0.229	0.808**	–	
	PSS	0.340**	0.167	0.647**	0.806**	0.797**	0.205	0.815**	0.914**	–

Pearson's correlation coefficients are reported with the exception of relationships with substance use, of which Spearman's rho is reported. PSS = Perceived Stress Scale. EPDS = Edinburgh Postnatal Depression Scale.

*
p < 0.05,

**
p < 0.01.

Descriptive and inferential statistical testing changes over time in mental health and substances used to cope with isolation during the COVID-19 pandemic.

Table 3.

	Pre-COVID	Time 1 (March, 2020)	Time 2 (April, 2020)	Test statistic
	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	
Mental health	2.22 (0.96)	3.00 (1.25)	3.05 (1.22)	F = 28.19*
Substance use to cope	–	0.23 (0.61)	0.18 (0.52)	W = -0.65
PSS	–	18.84 (8.52)	18.36 (9.72)	T = 0.63
EPDS	–	10.69 (6.18)	10.23 (6.21)	T = 1.05

M = mean, *SD* = standard deviation, PSS = Perceived Stress Scale, EPDS = Edinburgh Postnatal Depression Scale. Repeated Measures ANOVA were used for mental health. Wilcoxon test was used for substance use due to non-normality of the data. T-tests were used for PSS and EPDS.

* $p < .05$

Cross-sectional associations between mental health measures and number of substances used to cope by pregnant people, by time point.

Table 4.

Measure/Covariate	Standardised			Unstandardised		
	β	95% CI	B	95% CI	B	95% CI
Time 1: Mental and Emotional Health	0.31	0.11–0.50**	0.15	0.05–0.25**		
Age	-0.12	-0.33–0.08	-0.01	-0.04–0.01		
Race/Ethnicity	0.05	-0.16–0.26	0.07	-0.21–0.35		
Income	-0.25	-0.46–0.04*	-0.31	-0.58 – -0.05*		
Employment Status	0.10	-0.11–0.31	-0.13	-0.14–0.41		
Time 1: Perceived Stress Scale	0.30	0.10–0.49**	0.02	0.01–0.04**		
Age	-0.14	-0.35–0.07	-0.02	-0.04–0.01		
Race/Ethnicity	0.02	-0.18–0.23	0.03	-0.25–0.32		
Income	-0.21	-0.43–0.00	-0.26	-0.53–0.09		
Employment Status	0.06	-0.15–0.28	0.08	-0.20–0.37		
Time 1: Edinburg Postnatal Depression Scale	0.27	0.07–0.47**	0.03	0.01–0.05*		
Age	-0.13	-0.33–0.08	-0.01	-0.04–0.01		
Race/Ethnicity	0.05	-0.16–0.26	0.07	-0.22–0.35		
Income	-0.23	-0.45–0.02*	-0.29	-0.56–0.02*		
Employment Status	-0.12	-0.10–0.33	0.15	-0.13–0.43		
Time 2: Perceived Stress Scale	0.28	0.06–0.51*	0.02	-0.00–0.03*		
Age	0.14	-0.11–0.38	0.01	-0.01–0.03		
Race/Ethnicity	0.00	-0.23–0.24	0.00	-0.27–0.28		
Income	-0.20	-0.45–0.04	-0.22	-0.49–0.05		
Employment Status	-0.13	-0.38–0.13	-0.14	-0.41–0.14		
Time 2: Edinburg Postnatal Depression Scale	0.26	0.03–0.49*	0.02	0.00–0.04*		
Age	0.09	-0.15–0.34	0.01	-0.01–0.03		
Race/Ethnicity	0.02	-0.22–0.26	0.03	-0.25–0.31		
Income	-0.17	-0.42–0.08	-0.19	-0.46–0.08		

Measure/Covariate	Standardised		Unstandardised	
	β	95% CI	B	95% CI
Employment Status	-0.12	-0.38–0.13	-0.13	-0.41–0.15
Time 2: Mental and Emotional Health	0.26	0.03–0.50*	0.12	0.01–0.22*
Age	0.10	-0.14–0.35	0.01	-0.01–0.03
Race/Ethnicity	0.01	-0.23–0.25	0.02	-0.27–0.30
Income	-0.17	-0.42–0.08	-0.18	-0.45–0.09
Employment Status	-0.13	-0.38–0.13	-0.14	-0.43–0.14

Standardised regression coefficients are reported for direct comparison of strength of relationship between the mental health variables and number of substances used. Unstandardised regression coefficients reflect the difference in number of substances used for each 1 unit increase in the scale score. Linear regression was used to determine the longitudinal associations while controlling for age, ethnicity, race, income and employment status.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

Associations between mental health measures and number of substances used to cope by pregnant people, over time (Time 1 n = 83, Time 2 n = 66).

Table 5.

Measure/Covariate	Standardised			Unstandardised		
	β	95% CI	B	95% CI	B	95% CI
Pre-COVID Mental/Emotional Health with Time 1	0.41	0.22–0.59***	0.23	0.12–0.35***		
Substance Use						
Age	-0.20	-0.39–0.00	-0.02	-0.05–0.00		
Race/Ethnicity	0.10	-0.10–0.30	0.13	-0.14–0.40		
Income	-0.26	-0.46 – -0.06*	-0.32	-0.58–0.07*		
Employment Status	0.16	-0.04–0.37	0.21	-0.05–0.48		
Pre-COVID Mental/Emotional Health with Time 2	0.46	0.25–0.67***	0.25	0.13–0.37***		
Substance Use						
Age	0.00	-0.23–0.23	0.00	-0.02–0.02		
Race/Ethnicity	0.14	-0.09–0.37	0.16	-0.11–0.44		
Income	-0.18	-0.41–0.05	-0.19	-0.44–0.06		
Employment Status	-0.04	-0.28–0.19	-0.05	-0.31–0.21		
Time 1 Mental and Emotional Health with Time 2	0.14	0.04–0.24**	0.14	0.11–0.56**		
Substance Use						
Age	0.09	-0.15–0.33	0.01	-0.01–0.03		
Race/Ethnicity	0.08	-0.16–0.32	0.10	-0.19–0.38		
Income	-0.09	-0.44–0.05	-0.21	-0.48–0.05		
Employment Status	-0.20	-0.34–0.15	-0.10	-0.37–0.17		
Time 1 Perceived Stress Scale with Time 2 Substance Use	0.35	0.13–0.57**	0.02	0.01–0.04**		
Substance Use						
Age	0.10	-0.15–0.34	0.01	-0.01–0.03		
Race/Ethnicity	0.01	-0.23–0.25	0.01	-0.27–0.29		
Income	-0.11	-0.36–0.14	-0.12	-0.39–0.15		
Employment Status	-0.16	-0.41–0.09	-0.18	-0.46–0.10		
Time 1 Edinburg Postnatal Depression Scale with Time 2 Substance Use	0.27	0.04–0.50*	0.02	0.00–0.04*		

Measure/Covariate	Standardised		Unstandardised	
	β	95% CI	B	95% CI
Age	0.10	-0.15–0.35	0.01	-0.01–0.03
Race/Ethnicity	0.04	-0.21–0.28	0.04	-0.24–0.33
Income	-0.16	-0.41–0.09	-0.17	-0.44–0.10
Employment Status	-0.10	-0.36–0.16	-0.11	-0.39–0.17

Standardised regression coefficients are reported for direct comparison of strength of relationship between the mental health variables and substances use. Unstandardised regression coefficients reflect the difference in number of substances used for each 1 unit increase in the scale score. Linear regression was used to determine the longitudinal associations while controlling for age, ethnicity, race, income and employment status.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.