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Alcohol consumption after pregnancy awareness and the additive effect of pregnancy-related anxiety and child abuse

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Abstract
This study examined whether pregnant women alter their alcohol consumption upon pregnancy awareness and any additive effect of a maternal history of child abuse and pregnancy-related anxiety in predicting antenatal alcohol consumption. Pregnant women ($N = 548$, $M = 31.44$, $SD = 4.58$) completed an online survey consisting of the Pregnancy-related Anxiety Scale, Adverse Childhood Experience Questionnaire, questions on alcohol consumption and demographics. The Wilcoxon test examined difference scores between pre-pregnancy awareness and post-awareness drinking. More women reduced or ceased drinking after pregnancy awareness ($M = 0.15$, $SD = 1.03$) than before pregnancy recognition ($M = 3.12$, $SD = 3.91$). Only two women increased their alcohol consumption, with 140 reporting no change. In the hierarchical regression analysis, child abuse was not significant in the model, whereas pregnancy-related anxiety predicted alcohol consumption, with pre-pregnancy drinking the strongest predictor. There was no significant interaction effect between pregnancy-related anxiety and child abuse. While limited by a cross-sectional design and single questions to assess alcohol intake, our findings are consistent with extant literature. Findings related to child abuse were not significant, and likely due to low prevalence in the sample, Despite this, we further established that pregnancy-related anxiety remains a significant predictor of antenatal drinking regardless of how much alcohol a woman may consume pre-pregnancy. This relationship may be explained by drinking used to cope with pregnancy-related anxieties. While current guidelines recommend alcohol screening, many women may not accurately report their alcohol intake screening for pregnancy-related anxiety may provide an avenue to identify women more at risk of drinking during pregnancy.

Keywords Pregnancy-related anxiety · Pregnancy · Alcohol consumption · Prenatal development · Child abuse

Introduction

In 1973 Nadelson described pregnancy as a stressful time requiring various adaptations and developmental phases. Some 50 years later, these stressors and adaptations remain, with some pregnant women showing a greater vulnerability to mood disorders (Wenzel, 2011). This vulnerability may be due to increased pregnancy-specific concerns that women can experience (Bayrampour et al., 2016) encapsulated by pregnancy-related anxiety (Brunton et al., 2019). This anxiety, which is distinct from other mood disorders (Anderson et al., 2019; Brunton et al., 2019; Huizink et al., 2004), has a reported prevalence as high as 32% in some countries (Wang et al., 2021) and various related adverse outcomes (e.g., preterm birth) and antecedents (e.g., parity). One predictor of pregnancy-related anxiety that has received scant attention is child abuse (Brunton et al., 2020; Özşahin, 2020). Child abuse is linked to adverse pregnancy outcomes (Smith et al., 2016), yet few studies have examined child abuse and pregnancy-related anxiety and their additive effect on expectant mothers. Adverse outcomes consistently associated with child abuse, such as increased alcohol consumption (Halpern et al., 2018), can impact a pregnant woman's well-being. Therefore, it is conceivable that child abuse survivors who experience pregnancy-related anxiety may be at increased risk for poor health behaviours such as alcohol consumption

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during pregnancy, more so than women who have experienced only one of these phenomena.

Child abuse is a global issue with estimates of its occurrence ranging from 7 to 24% in developed countries (e.g., Australia, North America) and 14-33% in developing countries with variability likely due to differing definitions of abuse (Moody et al., 2018). The relationship between child abuse and poor outcomes in the general population is well established. These include, for example, increased substance use/abuse, a higher risk of chronic disease such as liver cancer, and a greater risk of physical injury or harm while under the influence of alcohol (AIHW, 2020; Felitti et al., 1998). Also, individuals with poor mental health are more likely to drink at risky levels (AIHW, 2020; Leeb et al., 2011). These alcohol consumption linked outcomes are concerning when applied to pregnant women. For instance, when pregnant, consuming alcohol at higher levels may place the mother and child at risk of harm, whether through physical injury or teratogens introduced into the prenatal environment. However, research findings regarding the association between child abuse and antenatal alcohol consumption are inconsistent. For example, Racine et al. (2020) did not identify any direct association between physical, sexual, or emotional child abuse and moderate to high alcohol use despite finding that that women with dysfunctional childhood backgrounds were three times more likely to use alcohol in pregnancy compared to women with no such history. Similarly, Osofsky et al. (2021) did not find an association between child maltreatment and alcohol use. However, the review conducted by Skagerström et al. (2011) identified exposure to abuse or violence as predictive of pregnancy drinking in three studies. These inconsistent findings may reflect methodological differences such as studies conducted as part of antenatal care, (i.e., Racine et al. and Osofsky et al.), which may be confounded by social desirability leading to inaccurate estimates of alcohol consumption. Despite these conflicting findings, in the general population, previous victimization has been linked to increased alcohol use over time (Brunton & Dryer, 2021) and a greater likelihood of addiction (Wilson, 2010). Therefore, it is conceivable that similar findings exist in pregnant populations.

In addition to studies examining child abuse and alcohol consumption during pregnancy, others have examined pregnancy-related anxiety as a predictor of alcohol consumption during pregnancy. Arch (2013), using an online survey and a sample of 311 pregnant women, found that pregnancy-related anxiety was the strongest predictor of drinking alcohol during pregnancy. Beijers et al. (2014) found that pregnancy-specific stressful events increased the risk of alcohol use substantially (OR = 13.4). In contrast, Westerneng et al. (2017) did not find a significant association between pregnancy-related anxiety and alcohol consumption however, only 11% of their sample reported using alcohol which may have impacted the ability to detect an effect. While research concerning alcohol and pregnancy-related anxiety is limited, associations between mental health and pregnancy drinking are known (Skagerström et al., 2011) indicating that this is a potential area of concern.

The reasons that pregnant women may consume alcohol, therefore, could be related to previous childhood trauma or efforts to cope with current anxieties concerning their pregnancy. Research shows that consuming alcohol, even at low levels, can negatively affect the growth and development of the fetus and contribute to spontaneous abortion, low birth weight and preterm birth (AIHW, 2020; Andersen et al., 2012). Longer-term impacts on the child include congenital disabilities and malformation, lower IQ scores and concerningly fetal alcohol spectrum syndrome that has a long-term sequela for the child (Keegan et al., 2010; Lewis et al., 2012). Moreover, the critical periods of development when these teratogens are more harmful are in the early weeks after conception, when some women are unaware of their pregnancy. Given the potential harm, alcohol poses to the mother and developing fetus, most developed countries advocate a zero-tolerance approach to alcohol consumption during pregnancy (CDC, 2021; NHMRC, 2020; NHS, 2020). For example, current guidelines in Australia recommend an early discussion on alcohol consumption, including highlighting the potential risks involved (Department of Health, 2020). Similarly, United Kingdom (UK) guidelines (NICE, 2020) recommend asking about substance use; however, neither guideline advocates formal screening. Nevertheless, pre-pregnancy drinking is a key predictor of pregnancy drinking (Skagerström et al., 2011).

The current study

Pregnancy can be a time of increased susceptibility to mood disorders. One such disorder is pregnancy-related anxiety, a specific anxiety linked to poor health behaviours (Westerneng et al., 2017). Pregnant women with a history of childhood abuse are more likely to smoke, abuse alcohol, and use drugs than pregnant women who have not suffered this abuse (Leeners et al., 2006). However, to our knowledge, few studies have explored if pregnant women alter their alcohol consumption after pregnancy awareness. Moreover, no studies have examined if there is an additive effect on alcohol consumption for women who experience child abuse and pregnancy-related anxiety. Given that both pregnancy-related anxiety and child abuse independently predict alcohol consumption, it is conceivable that together they may be an additive risk.

This study had two aims. First, to examine whether Australian pregnant women alter their alcohol consumption after pregnancy awareness. Second, to examine if child abuse and pregnancy-related anxiety predict alcohol consumption

during pregnancy. The interaction between child abuse and pregnancy-related anxiety will examine any additive effect. We expect that child abuse and pregnancy-related anxiety will predict greater alcohol consumption. We also expect these variables will interact such that women with a child abuse history and higher levels of pregnancy-related anxiety will have greater consumption of alcohol during pregnancy.

Methods

Participants

Eligibility criteria included being over 18 years old and currently pregnant. As per ethics requirements, women who self-reported that their health professional had diagnosed them as a high-risk pregnancy were excluded. Initially, 615 participants responded, two responses did not meet the eligibility criteria, 64 did not complete any measures, and one case was suspected of spurious responding (e.g., consuming 100 drinks per week); these were deleted. The sample characteristics were consistent with the broader population of Australian pregnant women, similar in age with the majority Australian-born, but with some under-representation by Indigenous women (AIHW, 2020).

Procedure

Following ethics approval, the online survey was advertised on Facebook, specifically requesting participation by pregnant women. The demographic data also requested information on pregnancy (i.e., gestational weeks) that served as an additional check that participants were pregnant. A small incentive to participate in the form of a draw to win gift vouchers were provided. Given the vulnerability of the sample, the survey was not randomized to allow forewarning of sensitive questions.

Materials

The online survey consisted of the following scales presented in the order below.

Pregnancy-related anxiety scale (PrAS, Brunton et al., 2018) The 32-item PrAS assesses pregnancy-related anxiety. Items are rated on a 4-point scale from 1 (*not at all*) to 4 (*very often*). The scale has eight sub-scales: childbirth concerns, body image concerns, attitudes towards childbirth, worry about self, baby concerns, acceptance of pregnancy, avoidance, and attitudes towards medical staff. Higher scores indicate greater pregnancy-related anxiety. The PrAS has demonstrated validity and excellent internal consistency, $\alpha = .92$. (Brunton et al., 2021). Internal consistency for the current study was $\omega = .92$.

Adverse childhood experience questionnaire (ACE, Felitti et al., 1998) The study utilized the original 17-item ACE questionnaire that assesses child abuse (physical, sexual, psychological) and household dysfunction (e.g., living with domestic violence) during the first 18 years of life. All items have a preamble "Did a parent or other adult in the household "and are rated from 0 (*never*) to 4 (*more than ten times*). The ACE items can be used to examine child abuse by excluding the household dysfunction items; this is supported by the scale's factor structure (Ford et al., 2014). Alternatively, the ACE summary score can be used to gain an overall picture of exposure to adverse childhood experiences. For this study, we examined child abuse using physical abuse (2 items, e.g., Often or very often push, grab, shove or slap you?), sexual abuse (4 items, e.g., Touch or fondle you in a sexual way?), and psychological abuse (2-items, e.g., Often or very often swear at, insult, or put your down?) items. The remaining nine items cover four areas of dysfunction in a household (i.e., living with substance abuse, mental illness, domestic violence, and criminal behavior). The child abuse items were summated and analyzed as a continuous variable consistent with previous studies (e.g., Giano et al., 2020). For comparison purposes, we conducted supplementary analyses using the ACE summary score (i.e., all 17 items). The summary score is calculated by counting the number of times an item is positively endorsed and therefore ranges from 0 to 17. Internal consistency for the current study for the child abuse items was excellent, $\omega = 0.83$.

Alcohol consumption Two questions adapted from Hanna et al. (1994) assessed alcohol consumption. The first question ascertained the amount of alcohol consumed before pregnancy (On average, how many alcoholic beverages per week did you consume during the three months before you conceived?). The second question was similarly worded but asked about the amount consumed since awareness of conception. A brief explanation of a standard drink size was provided (i.e., one standard drink is approximately half a glass of wine (100 ml), 285 ml of full-strength beer or 30 ml of distilled spirits). Alcohol consumption was analyzed as a continuous variable. Where participants stated a range for alcohol consumption, these were averaged (e.g., 1-2 drinks per week = 1.5 drinks per week).

Demographics Participants provided their age, weeks pregnant, marital status, education, birth order of the current baby, country of birth, and cultural background.

Data analysis

The survey was administered on the Qualtrics platform, and data were analyzed using SPSS (v28). G*Power3 (Faul et al., 2007) determined a minimum sample of 160 for a medium effect size, β = .95. Internal consistency was estimated with McDonald's ω, which provides a more unbiased estimate than Cronbach's alpha (Zinbarg et al., 2005).

Alcohol consumption after pregnancy awareness We first examined whether women report decreased alcohol use after pregnancy awareness by examining the difference scores for pre-pregnancy and pregnancy drinking. Wilcoxon signed-rank test determined if there was a significant difference between the pre-and post-scores. Monte Carlo samples (10,000) were used for this non-parametric analysis.

Additive effect of pregnancy-related anxiety and child abuse Hierarchical multiple regression examined child abuse and pregnancy-related anxiety as predictors of antenatal alcohol consumption and any interaction between the predictors. Pre-pregnancy alcohol use was added to the model (second step) to examine its influence. All analyses included age, parity, gestation, education, and cultural background as covariates based on their known association with the predictors and outcome variables (VanderWeele, 2019). Bootstrap resamples (1000) with bias-corrected confidence intervals were used for the parametric analyses.

Results

The final sample consisted of 548 women ($M = 31.44$, $SD = 4.58$, $N = 519$, missing age data = 28) who were on average in mid-pregnancy ($M_{gestation} = 23.91$, $SD = 9.73$), partnered, employed, well educated, and multiparous (see Table 1).

Less than 10% of the data was missing (90.71% complete data). Little's MCAR test confirmed that data was randomly missing ($\chi^2 = 505.17$, $df = 486$, $p = .265$), therefore, multiple imputation replaced missing values. On average, participants consumed 3.12 ($SD = 3.91$) standard drinks pre-pregnancy (range 0-30). After pregnancy recognition they consumed on average 0.15 drinks ($SD = 1.03$, range = 0-14). Around 20% of the sample reported no instances of child abuse (21.3%), 15.0% reported 1 instance, 16.0% reported 2 instances, 14.1% reported 3 occurrences, 19.3% reported 4 instances with 14.3% reporting 5 or more occurrences of child abuse. The ACE summary score ranged from 0 to 17 ($Mdn = 4.00$, $SD = 3.59$). Pregnancy-related anxiety was positively skewed ($M = 60.36$, $SD = 14.37$, range 34-113). Correlations between child abuse, pregnancy-related anxiety and demographic variables are shown in Table 2. As can be seen child abuse and pregnancy-related anxiety were moderately correlated whereas all other correlations were low or non-significant.

Table 1 Sample Demographics

Demographic	Frequency	Demographic	Frequency
Relationship status [a]		Employment [c]	
Married/defacto/ dating	499 (91.0%)	Employed	446 (81.3%)
Single	14 (2.6%)	Homemaker	11 (2.0%)
Divorced/separated	4 (0.7%)	Student	6 (1.1%)
		Unemployed	56 (10.2%)
Parity [b]		Education [a]	
1st child	364 (66.3%)	High school	38 (6.72%)
2nd child	104 (18.9%)	Tafe/diploma	101 (18.4%)
3rd child	35 (6.4%)	Undergraduate	193 (35.2%)
≥4th child	18 (3.3%)	Postgraduate	187 (34.1%)
Country of birth [a]		Cultural background [d]	
Australia	408 (74.5%)	Australian/anglo	395 (72.1%)
United Kingdom	25 (4.6%)	Indigenous Aust.	6 (1.1%)
America	21 (3.8%)	European	32 (5.8%)
New Zealand	12 (2.2%)	Mixed	18 (3.3%)
Other	51 (9.3%)	Other	51 (9.3%)

Missing data, a = 31, b = 28, c = 29, d = 46. Employed = full or part-time, casual or self-employed

Alcohol consumption after pregnancy awareness

As shown in Table 3, prior to pregnancy, most women consumed alcohol weekly, with less than 25.0% abstaining. However, over 90.0% of women reported abstaining from alcohol after pregnancy awareness.

Alcohol consumption difference scores were examined using a Wilcoxon signed-rank test and 10,000 Monte Carlo samples. The assumption of a symmetrical distribution of the difference scores was met.

Relative to pre-pregnancy consumption, 370 participants reduced their drinking (sum of ranks = 69,041.00), two participants increased consumption (sum of ranks = 337.00), and 140 participants reported the same level of alcohol intake pre-and post-conception (i.e., 124 remained at zero, 15 consumed <10 drinks/week, and four consumed >10 drinks/week). Therefore, more women reduced (or ceased) drinking after pregnancy awareness, $z = -18.32$ (corrected for ties), N – Ties = 372, $p < .001$ (two-tailed). By Cohen's conventions (1988) this effect was large, $r = 0.95$.

Additive effects of pregnancy-related anxiety and child abuse

Using Hierarchical Multiple Linear Regression, child abuse, pregnancy-related anxiety (PrAS), and covariates (i.e., age,

Table 2 Correlations between pregnancy-related anxiety, child abuse and demographic variables

	Pregnancy-related Anxiety	Child Abuse	Age	Gestation	Birth order	Employment	Education	Relationship status
Child Abuse	.31**							
Age	.17**	−.14**						
Gestation	−.07	−.04	.07					
Birth order	−.09*	.07	.31**	.00				
Employment	.14**	.13**	−.16**	.02	.20**			
Education	−.09*	−.18**	.28**	.01	−.08	−.23**		
Relationship status	−.11*	−.12**	.10*	.06	−.01	−.15**	.20**	
Cultural background	.06	.05	.14**	−.01	−.04	.05	.15**	.02

Note. *N* ranged from 502 to 549. Significance denoted as * $p < .05$, ** $p < 0.01$ (2-tailed)

Table 3 Weekly alcohol consumption

Weekly consumption	Before pregnancy	After pregnancy
No alcohol	123 (24.0%)	483 (94.3%)
≤ 10 drinks per week	341 (66.6%)	25 (4.9%)
> 10 drinks per week	48 (9.4%)	4 (0.8%)

Drinks = one standard drink being approximately half a glass of wine (100 ml), 285 ml of full strength beer or 30 ml of distilled spirits

parity, gestation, education, and cultural background) were entered as predictors of alcohol intake during pregnancy in the first step. Pre-pregnancy drinking was added as a predictor in the second step.

Small correlations among predictors and covariates (none exceeding $r = .31$) indicated no multicollinearity (Table 2). In addition, to the PrAS, all covariates were positively skewed, but this should not unduly influence the results given the relatively large sample size and resampling used. Three influential multivariate outliers were deleted.

As reported in Table 4, in step one, the predictors (i.e., child abuse, PrAS, and covariates) accounted for 2.7% of the variance in alcohol consumption during pregnancy ($R^2 = .03$, $F(7, 504) = 2.01$, $p = .05$). The PrAS was the only significant predictor of alcohol consumption during pregnancy, uniquely explaining 1.99% of the variance in alcohol consumption. In step two, when pre-pregnancy drinking was added, it accounted for an additional 5.8% of the variance in pregnancy drinking, $R^2 = .09$, $F(8, 503) = 5.81$, $p < .001$. The PrAS uniquely explained 1.80% of the variance. Pre-pregnancy drinking was the strongest predictor of alcohol consumption during pregnancy, accounting for 5.76% of the unique variance. Overall, the combined effect was small ($f^2 = .09$), with the predictor variables explaining 8.5% of the variance. Despite child abuse not being a significant predictor, an interaction was explored as the inclusion of all predictors in the main model can dilute individual effects; however, the interaction between child abuse and pregnancy-related anxiety was not significant ($p = .60$).

To further explore the impact of adverse childhood experiences, we conducted the same analyses using the ACE Summary score (calculated using all 17 dichotomously scored (yes/no) items to indicate the presence or absence of adverse childhood experiences). Similar results were obtained including no significant interaction and are provided in Supplementary Table 1.

Discussion

This study examined whether pregnant women alter their alcohol consumption after pregnancy awareness and if child abuse and pregnancy-related anxiety predict alcohol consumption during pregnancy. An important finding of this study is that women reduce their alcohol intake upon awareness that they are pregnant. Indeed over 90.0% of the women in this sample ceased drinking altogether, consistent with the recommended guidelines in Australia (i.e., no safe level of alcohol intake during pregnancy). Concerningly, however, was the level of alcohol consumption pre-pregnancy with nearly 10% of the sample consuming more than 10 standard drinks per week exceeding recommended guidelines for adult consumption (i.e., < 10 standard drinks per week, NHMRC, 2020). Given that pre-pregnancy drinking could encompass the first critical weeks after conception, when women may not be aware that they are pregnant, this poses a significant risk to the prenatal development of the fetus. Moreover, when surveyed during pregnancy, women are known to under-report their current and previous alcohol consumption, with retrospective reports seen as more accurate (May & Gossage, 2011). Therefore, these figures, while concerning, may also be conservative.

Our findings that pregnancy-related anxiety is a significant predictor of alcohol consumption are consistent with

Table 4 Hierarchical multiple regression, predicting antenatal alcohol consumption

	Unstandardized Coefficients			Standardized Coefficients		
	B	SE	95.0% CI	β	t	p value
Model 1						
PrAS	0.01	0.01	0.01, 0.02	0.15	3.21	.001
Child Abuse	−0.01	0.01	−0.02, 0.01	−0.03	−0.57	.569
Age	3.59	0.01	−0.02, 0.02	0.00	0.01	.997
Gestation	0.01	0.01	−0.01, 0.01	0.02	0.51	.611
Parity	0.06	0.06	−0.06, 0.18	0.04	0.94	.346
Education	0.09	0.05	−0.02, 0.19	0.08	1.65	.100
Culture	−0.02	0.01	−0.04, 0.01	−0.06	−1.23	.218
Constant	−0.84	0.42	−1.68, −0.01		−1.99	.047
Model 2						
PrAS	0.01	0.01	0.01, 0.02	0.14	3.15	.002
Child Abuse	−0.01	0.01	−0.02, 0.01	−0.03	−0.54	.589
Age	−0.01	0.01	−0.03, 0.02	−0.03	−0.54	.590
Gestation	0.01	0.01	−0.01, 0.01	0.02	0.39	.699
Parity	0.06	0.06	−0.06, 0.17	0.04	0.94	.346
Education	0.08	0.05	−0.02, 0.18	0.07	1.50	.134
Culture	−0.01	0.01	−0.03, 0.02	−0.03	−0.58	.562
Pre-preg alc.	0.06	0.01	0.04, 0.09	0.24	5.62	<.001
Constant	−0.80	0.41	−1.61, 0.01		−1.95	.052

The birth order of the baby determined parity. *CI* confidence intervals, *SE* stand error. Pre-preg alc. = the reported weekly consumption of alcohol prior to pregnancy

Arch (2013). However, we provide deeper insights by controlling for pre-pregnancy drinking in the analyses which showed that the difference in the magnitude of the effect was only slightly attenuated. This finding indicates that regardless of how much a woman may drink pre-pregnancy, pregnancy-related anxiety remains a significant contributor to her drinking behavior antenatally. One reason for this finding may be related to avoidant coping. Women with pregnancy-specific fears and concerns may consume alcohol to lessen or numb their distress (Blalock et al., 2011). This is consistent with findings from non-pregnant samples that have observed correlations between childhood trauma (abuse and neglect) and increased substance use and psychological distress (Min et al., 2007), indicating that greater use of avoidant coping is associated with increased substance use and distress. Therefore, it is plausible that pregnant women with a history of childhood abuse could use substances to cope if their pregnancy is stressful. Yali and Lobel's (Yali & Lobel, 1999) research examining pregnancy-specific distress noted that 20% of the women they sampled admitted smoking or drinking during pregnancy to relax or calm their nerves. Therefore, consistent with our findings, experiencing adverse mental health during pregnancy would likely increase the likelihood of consuming these substances as a means of coping.

Pre-pregnancy alcohol consumption was the strongest predictor of consumption of alcohol during pregnancy; this finding is an important consideration in prenatal care. While current guidelines recommend informal screening for alcohol consumption early in pregnancy, many women may under-report their consumption to avoid shame or stigmatization (May & Gossage, 2011). In addition, retrospective studies report significantly higher levels of antenatal alcohol consumption, indicating that women are more truthful and accurate when reporting their prenatal consumption, postnatally. This finding highlights not only the need for greater screening for antenatal risk factors (e.g., alcohol consumption and maternal child abuse) known to increase psychological distress during pregnancy in routine antenatal care delivery, but more importantly, that this screening occurs within a trusting relationship between the clinician (e.g., midwives) and client where sensitive conversations can facilitate truthful and accurate information (Austin, 2014; NICE, 2020). In Australia, this relationship is best established within midwife led continuity care of models. Moreover, Gitsels-van der Wal et al. (2019) identified that reasons that contribute to the frequency women attend prenatal consultations include exposure to sexual violence, and psychosocial problems where the latter includes issues that affected the daily functioning of pregnant women such as pregnancy-related anxiety. Therefore, the antennal screening conducted in antenatal routine care needs to include screening for depression and anxiety (including pregnancy-related anxiety).

To the best of our knowledge, this study is the first to examine the additive effect of child abuse and pregnancy-related anxiety on alcohol consumption. While the child abuse findings were not significant, this should be cautiously interpreted. Our sample did not have a high prevalence of child abuse, which may have impacted our results. Indeed, the inconsistency of our findings with some previous studies (e.g., Skagerström et al., 2011) and studies conducted with the general population suggest this (e.g., Brunton & Dryer, 2021). The current findings may also indicate that the impact of child abuse and alcohol intake is mediated through a third variable, such as psychological unwellness; this is an area for future research.

Limitations

Despite the strengths of this study (e.g., the use of retrospective recall for alcohol consumption, large sample), the following limitations should be noted. First, the findings may be limited in generalisability as Indigenous women were underrepresented in the sample and through self-selection bias by the social media recruitment process, which may have attracted participants with higher alcohol consumption. Generalizability to other countries' populations should also be cautiously made. The use of a single question limited the measure of pre-pregnancy and pregnancy alcohol consumption; future studies using a more comprehensive measure are needed. The retrospective assessment of child abuse is also a limitation, given some survivors may have inaccurate recall or tendencies toward non-disclosure (Asmussen et al., 2020; McElvaney, 2015). The study was also a cross-sectional design which limits its ability to make causal inferences; longitudinal examinations are needed. Finally, our sample was positively skewed with respect to child abuse and pregnancy-related anxiety; this may have limited the sensitivity of the analyses.

Conclusion

Pre-pregnancy alcohol consumption is a significant concern, given its potential to introduce harmful teratogens into the prenatal environment prior to pregnancy awareness. In addition, pregnant women with pregnancy-specific fears and worries may be more vulnerable to increased antenatal alcohol consumption as they may use alcohol to cope with their anxiety. This points to the need for continued campaigns to increase awareness of the harmful effects of alcohol, both pre-pregnancy and during pregnancy. While current Australian guidelines recommend a discussion on consumption and associated risks there are no formal screening requirements (Department of Health, 2020). Moreover, while screening for alcohol consumption during pregnancy is recommended, screening for pregnancy-related anxiety may provide a more fruitful avenue to identify women more at risk of drinking during pregnancy.

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Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval Ethical approval was granted by the institutional ethics board and participants provided informed consent.

Competing interests The authors declare that there are no competing interests. No external funding was received for this project.

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