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Adverse childhood experiences and adult alcohol use during pregnancy — 41 U.S. jurisdictions, 2019–2023

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Abstract

Introduction: Adverse childhood experiences (ACEs) are preventable, potentially traumatic events that occur in childhood. Alcohol use during pregnancy can result in miscarriage, stillbirth, preterm birth, and a range of lifelong behavioral, intellectual, and physical disabilities in the child. Limited research has examined the relationship between ACEs and alcohol use in pregnancy; available studies might not reflect current trends in this relationship.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer

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CRedit authorship contribution statement

Shawn A. Thomas: Writing – review & editing, Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Nicholas P. Deputy:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization. **Amy Board:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization. **Clark H. Denny:** Writing – review & editing, Writing – original draft, Validation, Methodology, Conceptualization. **Angie S. Guinn:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Kathryn Miele:** Writing – review & editing, Writing – original draft, Conceptualization. **Janae Dunkley:** Writing – review & editing, Writing – original draft, Conceptualization. **Shin Y. Kim:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ypmed.2025.108219>.

Methods: Using 2019–2023 Behavioral Risk Factor Surveillance System data from 41 U.S. jurisdictions, the prevalence of self-reported current alcohol use among pregnant persons aged 18–49 years ($N = 2371$) was estimated by ACEs and selected characteristics. We calculated unadjusted and adjusted prevalence ratios (aPR) for the relationship between ACEs and alcohol use during pregnancy.

Results: The prevalence of current alcohol use was 16.2 % (95 % CI = 11.5–20.9) among pregnant persons who reported experiencing four or more ACEs, and 8.6 % (95 % CI = 5.7–11.5) among those who reported no ACEs. When adjusting for sociodemographic characteristics, pregnant persons who reported four or more ACEs were more likely to report current alcohol use compared to those who reported no ACEs (aPR = 1.8, 95 % CI = 1.1–2.9). Individually, pregnant persons who experienced emotional abuse (aPR = 1.9, 95 % CI = 1.3–2.7) and witnessed intimate partner violence (aPR = 1.6, 95 % CI = 1.1–2.4) were more likely to use alcohol during pregnancy compared to pregnant persons who did not report experiencing these ACEs.

Conclusions: Higher ACE exposure was associated with alcohol use during pregnancy. Steps can be taken to mitigate their potential harms. Clinical and community-level interventions can address ACEs, which might reduce alcohol use during pregnancy.

Keywords

Childhood trauma; Alcohol use; Pregnancy; Adverse childhood experiences

1. Introduction

Adverse childhood experiences (ACEs) are preventable, potentially traumatic childhood (0–17 years of age) events including neglect, abuse, experiencing or witnessing violence in the home or community, or having a family member attempt or die by suicide (Merrick et al., 2019). Also included are aspects of a child's environment that can undermine their sense of safety, stability, and bonding, such as living in a household where a parent is negatively affected by alcohol or other substance use or mental health condition, or when a child experiences instability because of separation from a parent or caregiver. ACEs often co-occur, and their accumulation is associated with a range of adverse behavioral, health, and social outcomes that can last into adulthood, including depression, lower education and earnings potential, chronic diseases, and alcohol and other substance use disorders (Merrick et al., 2019; Chung et al., 2010).

Alcohol use during pregnancy can cause adverse birth outcomes including miscarriage, stillbirth and preterm birth, and a range of lifelong behavioral, intellectual, and physical disabilities for the child (Dejong et al., 2019). The prevalence of alcohol use during pregnancy increased from 9.2 % in 2011 to 11.3 % in 2018 (Denny et al., 2020). Previous studies have found that ACEs are associated with higher odds of alcohol use during pregnancy, but had limited generalizability, not reflective of current alcohol use during pregnancy patterns, and focused on cumulative ACE scores (Chung et al., 2010; Frankenberger et al., 2015). Specifically, one study found that the total number of ACEs experienced was related to alcohol use during pregnancy in a dose-response manner; however, this study only assessed cumulative ACEs among a clinical sample of pregnant

people that were low-income, young, and African American, and therefore had limited generalizability (Chung et al., 2010). Another study focused on data from a single U.S. state in 2010 and also found a dose-response relationship between number of ACEs and alcohol use during pregnancy; these results are specific to a single jurisdiction and might not reflect recent patterns in alcohol use during pregnancy, which has increased (Denny et al., 2020; Frankenberger et al., 2015). Using more recent, population-based data from multiple states that represent the entire state's population to understand the role ACEs play in alcohol use during pregnancy can inform ways to mitigate the effects of ACEs. This study aimed to analyze data from 41 U.S. jurisdictions during 2019–2023 to 1) estimate the prevalence of alcohol use during pregnancy by ACEs and 2) examine associations between ACEs and alcohol use during pregnancy.

2. Materials and methods

2.1. Data source

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual cross-sectional telephone survey of adults that collects data on health-related risk behaviors and chronic health conditions from all 50 states, the District of Columbia, and three U.S. territories (Centers for Disease Control and Prevention, 2019a). We analyzed 2019–2023 BRFSS data for 2371 pregnant persons, irrespective of gender identity, from 41 U.S. jurisdictions that participated in an optional ACEs BRFSS module (Supplemental Table 1). BRFSS data is publicly available on the Centers for Disease Control and Prevention's (CDC) website (Centers for Disease Control and Prevention, 2019a).

2.2. Measures

Current alcohol use was defined as consumption of one or more alcoholic drinks during the past 30 days (Gosdin et al., 2022). The survey includes 11 questions to assess eight types of ACEs, which include: physical abuse, sexual abuse, emotional abuse, witnessing intimate partner violence, household substance use, household mental health conditions, incarceration of a household member, and parental separation or divorce (CDC, 2020). The number of ACEs was categorized into three categories (0, 1–3, and 4+) based on sample size and previous literature assessing ACEs and substance use during pregnancy (Frankenberger et al., 2015).

Demographic characteristics that were examined are as follows: age (18–24, 25–29, 30–34, 34–49), race and ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic; Other, non-Hispanic), education (high school or less, some college, college degree), employment status (employed or not employed), and marital status (married or not married). Two other characteristics that have been previously linked to alcohol use were examined: having a usual health care provider (yes or no) (Okoro et al., 2017), and experiencing frequent mental distress (yes or no) (Gosdin et al., 2022). Having a usual health care provider was ascertained by response to the question, “Do you have one person you think of as your personal doctor or health care provider?” Participants who answered “no” were asked, “Is there more than one, or is there no person who you think of as your personal doctor or health care provider?” Responses were dichotomized into one or more health care provider as

“yes” or none as “no” (Okoro et al., 2017). Frequent mental distress was defined as reporting ≥ 14 days of poor mental health in the past 30 days (Gosdin et al., 2022).

2.3. Statistical analysis

Prevalence and 95 % CIs of current alcohol use during pregnancy were estimated overall, by sociodemographic and other characteristics, and by ACEs. Chi-squared tests compared characteristics between people who reported current alcohol use and those who did not report current alcohol use, with $p < 0.05$ indicating statistical significance. Unadjusted prevalence ratios (PR) and 95 % CIs were estimated using Poisson regression to assess relationships between individual ACEs and cumulative ACE score with current alcohol use. Adjusted prevalence ratios (aPR) and 95 % CIs controlling for age and race and ethnicity were also estimated; consistent with previous literature, variables on the causal pathway between ACEs and alcohol use during pregnancy were not included in models to avoid controlling for intermediates (Merrick et al., 2019). Data were weighted to represent state-level population estimates. Statistical significance was determined by non-overlapping CIs. SAS (version 9.4; SAS Institute) was used for statistical analyses and accounted for the complex sample design. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (e.g., 45C.F.R. part 46, 21C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.).

3. Results

The overall prevalence of current alcohol use among pregnant persons was 12.2 %. Among those reporting frequent mental distress, prevalence of alcohol use during pregnancy was 31.2 %, compared with 9.3 % among those not reporting frequent mental distress ($P < 0.001$). The prevalence of alcohol use during pregnancy was 16.2 % among those reporting 4+ ACEs, 12.7 % among those reporting 1–3 ACEs, and 8.6 % among those reporting no ACEs ($P = 0.002$) (Table 1).

Pregnant persons who reported experiencing 4+ ACEs had increased prevalence of alcohol use during pregnancy compared to those who reported no ACEs (aPR = 1.8, 95 % CI = 1.1–2.9). People who reported experiencing emotional abuse (aPR = 1.9, 95 % CI = 1.3–2.7) and witnessing intimate partner violence (aPR = 1.6, 95 % CI = 1.1–2.4) had a higher prevalence of alcohol use during pregnancy compared to those who did not report experiencing those ACEs (Table 2).

4. Discussion

Using data from 41 jurisdictions, this study showed that high ACE exposure was associated with increased prevalence of alcohol use during pregnancy, with these findings are consistent with previous studies exploring ACEs and alcohol use during pregnancy but was conducted on a larger scale across 41 U.S. jurisdictions from 2019 to 2023 and incorporated individual ACEs. Taken together, these results suggest clinical and population-based steps might be needed to mitigate the effects of ACEs (Chung et al., 2010; Dejong et al., 2019; Denny et al., 2020; Frankenberger et al., 2015).

The perinatal period is an opportunity when clinicians can help address adversity and trauma, including ACEs. The American College of Obstetricians and Gynecologists (ACOG) recommends universally screening for trauma and applying a trauma-informed care approach, even if a history of trauma is not disclosed; this approach is grounded in understanding and responding to the impact of trauma, incorporating this knowledge into care delivery, and creating opportunities for patients to rebuild a sense of control in their care (Caring for Patients Who Have Experienced Trauma, 2021). Components of a trauma-informed care approach include seeking permission before initiating physical contact with a patient, thoroughly explaining examinations, and allowing a patient to stop the examination if they want to, all of which can lessen anxiety and encourage active patient involvement in their own care (Caring for Patients Who Have Experienced Trauma, 2021). A trauma-informed care approach also includes referrals when trauma-specific services cannot be delivered in primary or perinatal care. Pairing trauma-informed care with alcohol screening and brief intervention provides a patient-centered approach that can facilitate linkage to services and support, such as substance use and mental health treatment, to address the holistic needs of the patient (CDC, 2020; Luong et al., 2023).

Population-based approaches can be implemented outside of health care systems to lessen immediate and long-term harms of ACEs, frequent mental distress, and substance use. Approaches such as public education campaigns that promote creation of safe, stable, nurturing relationships and environments for all children have been effective in preventing ACEs (Centers for Disease Control and Prevention, 2019b). Furthermore, services for persons who experience childhood adversity, including crisis intervention, housing support, and social support services, can reduce harms associated with ACEs (Centers for Disease Control and Prevention, 2019b).

Previous studies did not assess specific ACEs in relation to subsequent alcohol use during pregnancy; this study found that experiencing emotional abuse and witnessing intimate partner violence during childhood was associated with alcohol use during pregnancy. Previous studies have found associations between ACEs, psychological distress, and substance use (Gosdin et al., 2022; Strine et al., 2012). Persons exposed to childhood traumas such as physical or emotional abuse might be more likely to report earlier onset of depression and experience psychological distress, which in turn might increase use of alcohol (Strine et al., 2012). Universal screening for depression or anxiety is recommended by ACOG and the United States Preventive Services Task Force for all women during primary and perinatal care, which can increase access to mental and behavioral health services, if needed (Implementing Perinatal Mental Health Screening, 2024). Additionally, a family-centered treatment approach that incorporates evidence-based substance use disorder treatment with services such as childcare, mental health services, and medical services can address the intersections of substance use, mental health, and ACE exposure (Centers for Disease Control and Prevention, 2019b).

This study has strengths and limitations. This study was strengthened by the use of a large dataset representative of 41 U.S. jurisdictions, enhancing the generalizability of our findings compared to previous studies that rely on data from one jurisdiction or clinical center (Chung et al., 2010; Frankenberger et al., 2015). Additionally, this analysis not only

operationalized between number of ACEs, but also the type of ACEs, finding specifically that emotional abuse and witnessing intimate partner violence were associated with higher prevalence of alcohol use compared to those who didn't have those ACEs, providing a more comprehensive understanding of individual ACEs and allowing identification of emotional abuse and intimate partner violence as being associated with alcohol use during pregnancy. As for limitations, questions about ACEs and alcohol use during pregnancy might be subject to recall or social desirability bias. The COVID-19 pandemic might have influenced findings because of challenges with data collection or changes in alcohol use. Current alcohol use might not reflect alcohol use patterns throughout pregnancy. Lastly, results are only applicable to the jurisdictions from which data were available.

5. Conclusions

Higher ACE exposure, particularly exposure to emotional abuse and intimate partner violence as a child, were associated with alcohol use during pregnancy. Steps can be taken to mitigate the negative effects of ACEs and alcohol use during pregnancy that might result in adverse maternal and child health outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

Data from the Behavioral Risk Factor Surveillance System is publicly available and can be retrieved here: https://www.cdc.gov/brfss/annual_data/annual_data.htm#:~:text=Access%20the%20survey%20data%20and%20documentation%20for%20any

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Table 1

Characteristics and prevalence of current alcohol use among pregnant persons aged 18–49 years ($N = 2371$)— Behavioral Risk Factor Surveillance System, 41 jurisdictions, United States, 2019–2023.

Characteristic	Weighted %	95 % CI	Weighted %	95 % CI	p-value ^b
Overall sample distribution					
Age group, years					0.004
18–24	24.5	21.7–27.2	14.7	10.5–19.0	
25–29	25.0	21.2–28.7	9.8	5.3–14.2	
30–34	29.2	26.0–32.4	8.2	5.5–10.9	
35–49	21.4	18.3–24.5	17.9	12.9–22.8	
Race and ethnicity					0.339
White, non-Hispanic	50.8	47.6–54.1	12.9	10.1–15.6	
Black, non-Hispanic	12.8	11.0–14.7	15.8 ^c	9.5–22.2	
Hispanic	26.9	23.5–30.3	10.3	6.6–14.0	
Other, non-Hispanic ^d	9.5	7.6–11.4	10.1 ^c	4.6–15.5	
Highest level of education attained					0.042
High school diploma or less	39.7	36.0–43.5	9.1	5.9–12.3	
Some college	30.5	26.6–34.3	14.0	10.2–17.9	
College degree	29.8	26.8–32.8	14.8	11.2–18.4	
Employment status					<0.001
Employed	61.4	57.9–64.8	14.9	12.0–17.7	
Not employed	38.6	35.2–42.1	8.4	5.9–10.9	
Marital status					<0.001
Married	55.5	51.9–59.0	8.3	6.3–10.4	
Not married	44.5	41.0–48.1	17.2	13.5–20.8	
Has a usual health care provider ^e					0.863
Yes	78.2	74.9–81.5	12.2	10.0–14.5	
No	21.8	18.5–25.1	12.6	8.3–16.9	
Frequent mental distress ^f					<0.001
Yes	14.2	11.8–16.6	31.2	21.7–40.7	

Characteristic	Weighted %	95 % CI	Weighted %	95 % CI	p-value ^b
No	85.8	83.4–88.2	9.3	7.7–10.9	
Number of adverse childhood experiences (ACEs) experienced					0.002
0	30.5	27.5–33.5	8.6	5.7–11.5	
1–3	45.5	41.6–49.4	12.7	9.4–15.9	
4+	24.0	20.1–27.8	16.2	11.5–20.9	
Individual types of ACEs					0.006
Experienced sexual abuse					
Yes	18.2	16.0–20.3	18.1	13.4–22.7	
No	81.8	79.7–84.0	11.4	9.0–13.7	
Experienced physical abuse					0.080
Yes	25.1	21.2–28.9	15.3	10.9–19.8	
No	74.9	71.1–78.8	11.1	8.8–13.4	
Experienced emotional abuse					<0.001
Yes	38.3	34.4–42.2	17.4	12.9–21.9	
No	61.7	57.8–65.6	9.1	7.1–11.1	
Mental health condition in household					0.064
Yes	27.5	23.8–31.2	15.4	10.8–19.9	
No	72.5	68.8–76.2	10.9	8.7–13.2	
Substance use in household					0.256
Yes	29.0	25.8–32.3	14.0	9.8–18.2	
No	71.0	67.7–74.2	11.3	9.0–13.7	
Household member incarcerated					0.155
Yes	15.7	12.5–19.0	15.7	10.0–21.4	
No	84.3	81.0–87.5	11.6	9.4–13.8	
Witnessed intimate partner violence					0.009
Yes	19.5	16.5–22.6	17.9	12.6–23.3	
No	80.5	77.4–83.5	11.1	8.9–13.4	
Parental separation or divorce					0.306
Yes	42.5	38.6–46.4	13.2	9.9–16.5	
No	57.5	53.6–61.4	11.1	8.6–13.6	

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e Current alcohol use defined as consuming at least one alcoholic drink in the past 30 days.

q Chi-squared test comparing characteristic between people who reported current alcohol use and those who did not report current alcohol use. Italicized indicates statistical significance with $p < 0.05$.

c Estimate might be unstable because the relative standard error is 0.2–0.3.

d Includes native American or Alaskan native, non-Hispanic, native Hawaiian/other Pacific islander, non-Hispanic, Asian, non-Hispanic, other race, non-Hispanic, or multi-racial, non-Hispanic.

e Having a usual health care provider was ascertained by response to the question, “do you have one person you think of as your personal doctor or health care provider?” participants who answered “no” were asked, “is there more than one, or is there no person who you think of as your personal doctor or health care provider?” responses were dichotomized into one or more (yes) or none (no).

f Frequent mental distress defined as reporting ≥ 14 days of poor mental health in the past 30 days.

Table 2

Unadjusted and adjusted prevalence ratios (PRs) for the relationship between adverse childhood experiences (ACEs) and reported current alcohol use during pregnancy — Behavioral Risk Factor Surveillance System, 41 jurisdictions, United States, 2019–2023.

		<u>Current alcohol use^a</u>		<u>Current alcohol use^a</u>
	Unadjusted PR	95 % CI	Adjusted PR ^b	95 % CI
Number of ACEs experienced				
0	Ref	-	Ref	-
1–3	1.5	0.9–2.3	1.4	0.9–2.1
4+	1.9	1.2–3.1	1.8	1.1–2.9
Individual types of ACEs				
Experienced sexual abuse				
Yes	1.6	1.1–2.4	1.4	0.9–2.1
No	Ref	-	Ref	-
Experienced physical abuse				
Yes	1.4	0.9–2.1	1.4	0.9–2.1
No	Ref	-	Ref	-
Experienced emotional abuse				
Yes	1.9	1.3–2.7	1.9	1.3–2.7
No	Ref	-	Ref	-
Mental health condition in household				
Yes	1.4	0.9–2.1	1.4	0.9–2.1
No	Ref	-	Ref	-
Substance use in household				
Yes	1.2	0.8–1.8	1.2	0.8–1.7
No	Ref	-	Ref	-
Household member incarcerated				
Yes	1.3	0.8–2.2	1.2	0.7–2.1
No	Ref	-	Ref	-
Witnessed intimate partner violence				
Yes	1.6	1.1–2.4	1.6	1.1–2.4
No	Ref	-	Ref	-
Parental separation or divorce				
Yes	1.2	0.8–1.7	1.1	0.8–1.6
No	Ref	-	Ref	-

^aCurrent alcohol use defined as consuming at least one alcoholic drink in the past 30 days.

^bAdjusted for the effects of age, race and ethnicity.