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Lifetime Difficulty Experiences and Postpartum Depressive Symptoms: A Retrospective Cohort Study

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Title:

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Running title: Lifetime Difficulties and Postpartum Depressive Symptoms

Abstract

Purpose: To investigate whether adverse life experiences are associated with postpartum depressive symptoms at 1 month, and to examine dose–response relationships and specific types of adversity.

Methods: We conducted a retrospective cohort study at a tertiary perinatal center in Japan. Women who delivered at ≥22 weeks' gestation between 2018 and 2024 were eligible. At the first prenatal visit, women completed a routine questionnaire assessing adverse life experiences. For analysis, the experiences were grouped into seven categories. Postpartum depressive symptoms were assessed at the routine 1-month postpartum visit using the Edinburgh Postnatal Depression Scale (EPDS), with a score ≥9 indicating depressive symptoms. Multivariable logistic regression models were fitted to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs), adjusting for covariates.

Results: Among 6,559 women included in the primary analysis, 4,197 (63.1%) reported at least one adverse life experience. Postpartum depressive symptoms occurred in 7.2% of women with any adverse life experience compared with 4.5% of those with none. Any adverse life experience was associated with higher odds of postpartum depressive symptoms (aOR 1.55, 95% CI 1.24–1.96). A clear dose–response relationship was observed, with increasing odds of

postpartum depressive symptoms as the number of adverse experience categories increased (P for trend <0.001). Personal health problems were independently associated with postpartum depressive symptoms (aORs 1.60, 95% CI 1.16–2.20).

Conclusions: Adverse life experiences were associated with an increased risk of postpartum depressive symptoms in a dose-dependent manner. In particular, personal health problems were associated with postpartum depressive symptoms.

Article Highlights

- Lifetime difficulties predicted postpartum depressive symptoms at 1 month
- Risk increased dose-dependently with greater numbers of reported difficulties
- Health-related difficulties showed an independent association with symptoms
- Difficulties were coded from antenatal free-text responses on subjective burden
- Subjective appraisal may help identify women at risk for postpartum depression

Keywords: Postpartum depression; EPDS; Pregnancy; Psychological stress; Life adversity; Personal health problems

Introduction

Postpartum depression (PPD) is a major perinatal mental health condition that can substantially impair maternal well-being and family functioning, and can also have lasting consequences for mother–infant bonding, parenting, and child development.(Liu et al., 2022; Meaney, 2018; Stein et al., 2014; Stewart et al., 2016) Early identification of at-risk individuals during pregnancy is clinically important because it enables targeted monitoring, and timely psychosocial support may help mitigate the burden of PPD.(Dennis and Dowswell, 2013; O'Connor et al., 2016)

A growing body of evidence indicates that PPD is shaped not only by pregnancy-related factors but also by cumulative psychosocial adversities experienced across the life course.(Hutchens and Kearney, 2020; Qobadi et al., 2016) Previous studies have shown that adverse childhood experiences (ACEs) such as abuse and neglect are associated with an increased risk of PPD, highlighting the long-term vulnerability conferred by early-life stress.(Bränn et al., 2023; Fu et al., 2024; Racine et al., 2020) More recent research has extended this framework to adulthood, demonstrating that adult experiences such as interpersonal stress, intimate partner violence, sexual assault, economic hardship, and other traumatic events are independently associated with PPD.(Qobadi et al., 2016; Sørbø et al., 2014) From a clinical perspective, expanding the focus beyond

childhood adversity to lifetime adversity may improve risk stratification and inform more individualized support.

Despite accumulating evidence linking adverse experiences across the life course to PPD, several important gaps in the literature remain. First, most prior studies have focused on either ACEs or a limited set of adult stressors—most commonly violence or perinatal loss—without comprehensively capturing the broad range of psychosocial difficulties that women may experience throughout their lives.(Beydoun et al., 2012; Herbert et al., 2022) Second, many investigations have relied on predefined checklists in which women are asked to endorse investigator-selected items, which may overlook experiences that the women themselves would personally identify as adverse experiences.(Qobadi et al., 2016) To our knowledge, no studies have used free-text responses to elicit self-identified adverse life experiences and then mapped these narratives onto an analytic framework for quantitative evaluation. Third, relatively few studies have examined the independent contribution of different categories of adverse life experiences within a single analytical framework, making it difficult to identify which types of experiences are most strongly associated with PPD. (Kishore et al., 2018)

To address these gaps, we conducted a large single-center cohort study involving free-text responses obtained at antenatal intake to capture women’s self-identified adverse life experiences. These responses were systematically classified into seven predefined

categories encompassing family illness or loss, interpersonal problems, socioeconomic difficulties, health problems, reproductive or parenting-related difficulties, trauma or violence, and other difficulties. We subsequently examined the associations between each category and postpartum depressive symptoms at 1 month. By extending the perspective beyond childhood adversity and pregnancy-related stressors to encompass the full life course, and by incorporating women's subjective experiences into the assessment of psychosocial adversity, this study aimed to provide a more comprehensive and clinically applicable understanding of vulnerability to postpartum depressive symptoms.

Materials and Methods

Participants

This retrospective cohort study was conducted at the perinatal care center of Seirei Hamamatsu General Hospital, a tertiary regional perinatal center in Hamamatsu, Shizuoka, Japan, which provides comprehensive care for both low- and high-risk pregnancies. We reviewed the hospital's electronic medical records and identified all women who delivered at ≥22 weeks' gestation between January 2018 and December 2024 (N = 10,257). Among these, women without documentation of adverse life experiences at the antenatal intake (n = 841) were excluded. We further excluded women with missing postpartum depressive symptom data at 1 month postpartum (n =

2,857). The remaining 6,559 women constituted the primary analysis cohort. This cohort included women with complete data on adverse life experiences and postpartum depressive symptoms, regardless of missing covariate data, and was used for the primary analysis employing multiple imputation. As a sensitivity analysis, a complete-case analysis was performed that was restricted to women with complete data on the outcome and all prespecified covariates (n = 5,677). This study was approved by the Institutional Review Board of Seirei Hamamatsu General Hospital (Approval No.5056; January 20, 2026).

Outcome

The primary outcome was postpartum depressive symptoms assessed at the routine 1-month postpartum visit using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS is a validated 10-item self-administered questionnaire with total scores ranging from 0 to 30 that is widely used for screening depressive symptoms in the perinatal period. Consistent with validation studies conducted in Japan, an EPDS score ≥9 was used to define postpartum depressive symptoms. (Okano et al., 1996)

Exposure

At our institution, all women attending their first prenatal visit complete a standardized paper-based intake questionnaire as part of

routine antenatal care. The questionnaire includes a single item asking about major adverse life experiences, phrased as: *"Have you experienced any difficulties in your life?"* Women are asked to indicate either "yes" or "no", and those who select "yes" are instructed to briefly describe the experience(s) in free text within the parentheses. The questionnaire is completed by the woman herself while seated alone, without the presence of healthcare staff. Completed forms are subsequently collected by midwives and transcribed verbatim into the electronic medical record. For the present study, women were included in the analysis only if they explicitly selected either "yes" or "no" for this item. Women with missing responses were excluded because the presence or absence of adverse life experiences could not be determined. Among women who selected "yes," the free-text descriptions were reviewed and classified using qualitative content analysis into the following seven predefined categories, adapted from a previously reported framework (Qobadi et al., 2016)

(1) family illness or loss

(2) interpersonal problems (family, partner, or close relationships)

(3) socioeconomic difficulties (financial strain or work-related stress)

(4) personal health problems (physical or mental illness)

(5) reproductive or parenting-related difficulties (infertility treatment, pregnancy loss, childbirth, or childcare)

(6) violence or trauma (interpersonal violence or other traumatic

experiences)

(7) other difficulties

Each response could be assigned to more than one category if multiple distinct adverse experiences were described. Women who explicitly selected “no” were classified as having no reported adverse life experiences. In addition, we calculated a cumulative adverse experience hit count representing the total number of adverse experience categories endorsed by each woman. This count was categorized as 0, 1, or ≥2 for descriptive analyses and modeled as an ordinal variable to assess the dose–response relationships.

Reliability assessment

To evaluate the reliability of the seven-category classification of free-text lifetime difficulty narratives, we conducted inter-rater and intra-rater reliability analyses. For inter-rater reliability, a random 10% subsample of responses was independently reviewed and classified by an experienced midwife, who was blinded to the original coding and all clinical outcomes. Agreement between the primary coder and the midwife was assessed using percent agreement and Cohen’s kappa statistic, which quantifies agreement beyond chance. (McHugh, 2012; Viera and Garrett, 2005) To assess intra-rater reliability, the primary coder reclassified the same randomly selected subsample after a washout period of approximately one month, blinded to the initial ratings. Agreement between the two coding occasions was evaluated using percent agreement and Cohen’s kappa.

Covariates

Potential confounders were selected a priori based on clinical relevance and were extracted from the electronic medical records. These included maternal age at delivery (<25, 25–34, ≥35 years), body mass index before pregnancy (<18.5, 18.5–24.9, ≥25 kg/m^2), parity (0 or ≥1 previous births), single marital status (yes/no), employment (yes/no), history of mental illness (defined as any documented psychiatric diagnosis or psychotropic medication use before pregnancy; yes/no), infertility treatment (yes/no), current smoking during pregnancy (yes/no), and history of miscarriage (0 or ≥1).

Statistical analysis

We examined the associations between adverse life experiences and postpartum depressive symptoms at 1 month (EPDS ≥9). Descriptive statistics were used to summarize the proportion of women with postpartum depressive symptoms among those reporting each adverse experience category.

For each adverse experience category, crude odds ratios (ORs) and 95% confidence intervals (CIs) were estimated using logistic regression, comparing women who reported the adverse experience with those who did not. Multivariable logistic regression models were then fitted to obtain adjusted ORs and 95% CIs, controlling for all

prespecified covariates. To evaluate the dose–response relationship, the cumulative adverse experience hit count was modeled as an ordinal variable coded as 0, 1, and 2 (representing ≥2 difficulties), and the corresponding regression coefficient was used to test for linear trend. Because the outcome and several covariates contained missing values, the primary analysis was performed using multiple imputation by chained equations. The imputation model included the outcome, all exposure variables, and all covariates. Fifty imputed datasets were generated, analyzed separately, and combined using Rubin's rules. (White et al., 2011) As a sensitivity analysis, multivariable logistic regression analysis was repeated using a complete-case approach. All statistical analyses were performed using R software (ver. 4.2.3; R Foundation for Statistical Computing, Vienna, Austria). All tests were two-sided, and p values <0.05 were considered statistically significant.

Results

Study population

Between January 2018 and December 2024, a total of 10,257 women delivered at ≥22 weeks' gestation at our institution. Among them, 6,559 women with available data on adverse life experiences and postpartum depressive symptoms were included in the primary analysis (Figure 1). Of these, 4,197 women (63.1%) reported at least one adverse life experience, whereas 2,362 women (35.3%) reported

no such experience. Baseline characteristics stratified by the presence of adverse life experiences are shown in Table 1. Overall, maternal characteristics were broadly comparable between women with and without reported adverse life experiences. Compared with women without adverse life experiences, those reporting such experiences were slightly older and more likely to have a history of mental illness and infertility treatment, while other baseline characteristics were broadly similar. Missing data for baseline covariates were low (Supplementary Table S1).

Adverse life experiences and postpartum depressive symptoms

At the routine 1-month postpartum visit, postpartum depressive symptoms (EPDS ≥9) were identified in 409 women (6.2%). The prevalence of postpartum depressive symptoms was higher among women who reported any adverse life experience than among those who did not (7.2% [302/4,197] vs. 4.5% [107/2,362]; Table 2). In the crude analyses, adverse life experience was associated with increased odds of postpartum depressive symptoms (OR 1.63; 95% CI, 1.31–2.06). This association remained robust after adjusting for maternal age category, BMI category, parity, single marital status, employment, history of mental illness, infertility treatment, smoking during pregnancy, and prior miscarriage, with an adjusted OR of 1.55 (95% CI, 1.24–1.96) in the multiple imputation analysis (m = 50).

Results were consistent in the complete-case sensitivity analysis (n = 5,677), yielding an adjusted OR of 1.61 (95% CI, 1.26–2.07; Supplementary Table S2).

Number of adverse experience categories and dose–response relationship

We next examined the association between the number of adverse experience categories and postpartum depressive symptoms (Table 3). The prevalence of postpartum depressive symptoms increased in a stepwise manner according to the number of reported adverse experience categories: 4.5% (107/2,362) among women reporting no adverse life experience, 7.0% (260/3,716) among those with one adverse experience category, and 8.7% (42/481) among those with two or more categories. Using women with no reported adverse experience as the reference group, the crude ORs for postpartum depressive symptoms were 1.59 (95% CI, 1.26–2.01) for one adverse experience category and 2.02 (95% CI, 1.38–2.90) for two or more categories. After multivariable adjustment with multiple imputation, the corresponding adjusted ORs were 1.51 (95% CI, 1.20–1.91) and 1.89 (95% CI, 1.29–2.76), respectively. Modeling the number of adverse life experience categories as an ordinal variable (0, 1, ≥2) demonstrated a clear dose–response relationship, with a statistically significant linear trend (P for trend <0.001).

Adverse experience categories

Inter-rater reliability between the first author and a midwife was high, with an exact agreement of 85.5% and a Cohen's kappa of 0.83 (95% CI, 0.79–0.87).

Intra-rater reliability, assessed by reclassification after a time interval of approximately one month, was also high, with an exact agreement of 87.1% and a Cohen's kappa of 0.85 (95% CI, 0.81–0.88). The associations between specific adverse experience categories and postpartum depressive symptoms are summarized in Figure 2 and Supplementary Table S3. Among the seven adverse experience categories examined, personal health problems showed the strongest association with postpartum depressive symptoms (adjusted OR 1.60; 95% CI, 1.16–2.20). Experiences of violence or trauma were also associated with higher odds, although the CI was wide (adjusted OR 1.80; 95% CI, 0.83–3.91), reflecting limited sample size. Other categories—including family illness or loss, interpersonal problems, socioeconomic difficulties, and reproductive or parenting-related difficulties—showed modest but non-significant associations after adjustment. Overall, the forest plot illustrates heterogeneity in effect sizes across difficulty types, alongside a consistent pattern of increased risk with cumulative exposure.

Discussion and Conclusions

In this large single-center cohort study, we found that adverse life experiences were significantly associated with postpartum depressive symptoms at 1 month. Women who reported any adverse life experience had a higher risk of postpartum depressive symptoms than those without such experiences, and a clear dose–response relationship was observed, with risk increasing as the number of adverse experience categories increased. When individual adverse experience categories were examined, personal health problems emerged as the only category independently associated with postpartum depressive symptoms after multivariable adjustment.

These findings are broadly consistent with prior research demonstrating that psychosocial difficulties experienced across the life course are associated with an increased risk of PPD. (Patil et al., 2021; Qobadi et al., 2016) Previous studies have reported associations between PPD and adverse experiences such as interpersonal stress, violence, economic hardship, and other stressful life events occurring in adulthood or during childhood.(Beydoun et al., 2012; Choi et al., 2017; Hutchens and Kearney, 2020; Sørbø et al., 2014) In line with these reports, the women in our cohort who reported any adverse life experience were at elevated risk of PPD compared with those who reported none. Our results also align with earlier evidence supporting a dose–response relationship between cumulative adversity and PPD. Several studies have shown that an accumulation of stressful or adverse life events confers greater

vulnerability than any single exposure alone. (Guintivano et al., 2018; Williams et al., 2025) Similarly, we observed a stepwise increase in postpartum depressive symptoms with an increasing number of adverse experience categories, reinforcing the concept that cumulative psychosocial burden plays a central role in shaping vulnerability to PPD.

Several mechanisms may explain these associations. First, the accumulation of adverse life experiences may reflect a heightened psychological vulnerability or reduced stress resilience, lowering the threshold for depressive symptoms during the postpartum period—a time characterized by profound physical, emotional, and social demands.(Hammen et al., 2000; McEwen and Stellar, 1993) Pregnancy and early parenting may reactivate prior vulnerabilities, particularly when adaptive coping resources are strained. In this context, adverse life experiences may function as a marker of underlying susceptibility rather than as isolated precipitants. (Epifanio et al., 2015) Second, the subjective experience of “adversity” itself may be clinically meaningful. Adversities perceived as particularly distressing may serve as surrogate markers for psychological fragility, limited coping capacity, or insufficient social support. (Qobadi et al., 2016) Experiences such as loss, financial strain, or interpersonal problems may indirectly capture the broader contexts of chronic stress or social vulnerability that increase the risk of PPD, even if their independent effects attenuate after

multivariable adjustment. Notably, among the seven adverse experience categories examined, personal health problems were the only category that remained independently associated with postpartum depressive symptoms. Our finding that health-related problems were independently associated with postpartum depressive symptoms is broadly consistent with prior research linking chronic physical conditions and perinatal mental illness. Population-based cohort studies and meta-analytic evidence suggest that a range of chronic conditions such as asthma and autoimmune diseases as well as the cumulative burden of comorbidity are associated with a higher risk of PPD, a vulnerability further amplified by socioeconomic adversity.(Aker et al., 2022; Bränn et al., 2024; Brown et al., 2018; Brown et al., 2019; Faulkner et al., 2020) However, an important distinction lies in how health-related adversity was operationalized. Although previous studies typically used diagnostic labels or the presence of chronic illness to define exposure, the present study focused on whether the women themselves identified health-related experiences as significant adverse life experiences. This subjective appraisal may capture dimensions of illness burden, including perceived severity, functional impairment, and emotional impact, that are not fully reflected by diagnostic labels alone. These findings suggest that, beyond documenting comorbidities, asking whether a woman perceives past or ongoing health problems as a major adverse life experience may provide clinically meaningful information for

identifying the risk of PPD. In contrast, some interpersonal or socioeconomic difficulties may be more context-dependent and buffered over time, which could partly explain why associations for other categories attenuated after adjustment.

From a clinical perspective, these findings suggest that simple screening for adverse life experiences in early pregnancy may help identify women at increased risk for postpartum depressive symptoms. Importantly, our results indicate that the risk assessment should extend beyond merely documenting the medical history to include women’s own perceptions of which experiences they found most difficult. In particular, careful attention to self-identified health-related problems—both physical and mental—might provide clinically actionable insights. Although systematic assessment of adverse life experiences is not routinely implemented in most obstetric settings, our findings suggest that incorporating a brief, patient-centered inquiry into psychosocial difficulties alongside standard medical history taking holds the potential to enhance antenatal risk assessment. Asking not only about the presence of past illnesses or life events, but also about whether women perceived these experiences as particularly difficult, might provide clinically relevant information with minimal additional burden. Women who report multiple adverse life experiences or health-related problems may benefit from closer monitoring, early psychosocial support, or referral within a stepped-care framework.

Our results also have implications for future research. Longitudinal studies are needed to examine how the timing, persistence, and perceived burden of adverse life experiences influence perinatal mental health trajectories. Further work should also investigate the interactions between adverse life experiences and protective factors such as social support, coping strategies, and access to healthcare, which might moderate risk. In addition, interventional studies are warranted to determine whether targeted support for women with substantial adverse life experiences, particularly those related to personal health, can reduce the incidence or severity of postpartum depressive symptoms.

The strengths of this study include the large sample size drawn from a regional tertiary perinatal center caring for both low- and high-risk pregnancies, the use of routinely collected clinical data, and the comprehensive assessment of adverse life experiences across multiple categories. Importantly, adverse life experiences were elicited using free-text responses at antenatal intake, enabling women to describe experiences they personally perceived as difficult, rather than restricting responses to predefined event lists. To enhance the reliability of difficulty classification, narratives were independently categorized by multiple reviewers, and both inter- and intra-rater agreement was high. In addition, because adverse life experiences were assessed during early pregnancy—prior to the onset of PPD—the risk of differential recall bias related to postpartum

mood status was minimized. We evaluated both the presence and cumulative burden of adverse life experiences and applied multiple imputation to address missing data, thereby enhancing the statistical power and reducing potential bias. The consistency of findings across the crude and adjusted models, together with the clear dose–response relationship observed, supports the robustness of the main results.

However, several limitations should also be acknowledged. Adverse life experiences were assessed using self-reported questionnaire data, which are potentially subject to recall bias or underreporting. The severity, timing, and duration of individual difficulties were not captured, limiting differentiation between resolved and ongoing stressors. In addition, although ACEs are well-established risk factors for PPD, they were not systematically assessed using validated instruments in this study. As a result, we were unable to disentangle the independent or interactive effects of adversity in childhood and adulthood. The analyses of specific adverse experience categories were exploratory, and the possibility of chance findings due to multiple comparisons cannot be excluded, and thus the category-specific results should be interpreted with caution. Postpartum depressive symptoms were defined using an EPDS cutoff rather than diagnostic interviews, and some misclassification is possible. As a single-center study conducted in Japan, generalizability to other populations and healthcare settings may be limited. Finally,

because this was a cross-sectional observational study, causal inference is not possible, and residual confounding by unmeasured psychosocial factors cannot be ruled out.

In summary, adverse life experiences were associated with an increased risk of postpartum depressive symptoms at 1 month in a dose-dependent manner. Among the specific adverse experience categories, personal health problems remained independently associated with postpartum depressive symptoms after multivariable adjustment. Incorporating an assessment of adverse life experiences—particularly health-related problems—into routine antenatal care may provide a simple and clinically meaningful approach to early identification of women at risk for postpartum depressive symptoms as well as the development of targeted preventive strategies.

Statements and Declarations

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest: The authors declare that they have no conflicts of interest.

Ethics approval: This study was approved by the Institutional Review Board of Seirei Hamamatsu General Hospital (Approval No.5056; January 20, 2026) and was conducted in accordance with the Declaration of Helsinki.

Clinical trial number: Not applicable.

Consent to participate: The requirement for written informed consent was waived by the Institutional Review Board owing to the retrospective design and use of de-identified data, with an opt-out opportunity posted on the hospital website.

Consent for publication: Not applicable.

Availability of data and materials: Individual-level data are not publicly available because of institutional data use restrictions and the inclusion of sensitive patient information. De-identified summary data and analysis code are available from the corresponding author upon reasonable request.

References:

Aker, A.M., Vigod, S.N., Dennis, C.L., Kaster, T., Brown, H.K., 2022. The association between asthma and perinatal mental illness: a population-based cohort study. Int J Epidemiol. 51, 964-973. https://doi.org/10.1093/ije/dyab160.

Beydoun, H.A., Beydoun, M.A., Kaufman, J.S., Lo, B., Zonderman, A.B., 2012. Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: a systematic review and meta-analysis. Soc Sci Med. 75, 959-975. https://doi.org/10.1016/j.socscimed.2012.04.025.

Bränn, E., Chen, Y., Song, H., László, K.D., D'Onofrio, B.M., Hysaj, E., Almqvist, C., Larsson, H., Lichtenstein, P., Valdimarsdottir, U.A., Lu, D., 2024. Bidirectional association between autoimmune disease and perinatal depression: a nationwide study with sibling comparison. Mol Psychiatry. 29, 602-610. https://doi.org/10.1038/s41380-023-02351-1.

Bränn, E., Vaina, A., Daníelsdóttir, H.B., Thordardottir, E.B., Yang, Q., Jakobsdóttir, J., Aspelund, T., Hauksdóttir, A., Valdimarsdóttir, U.A., Lu, D., 2023. Association between adverse childhood experiences and perinatal depressive symptoms: a cross-sectional analysis of 16,831 women in Iceland. Arch Womens Ment Health. 26, 839-849. https://doi.org/10.1007/s00737-023-01369-2.

Brown, H.K., Qazilbash, A., Rahim, N., Dennis, C.L., Vigod, S.N., 2018. Chronic Medical Conditions and Peripartum Mental Illness: A Systematic Review and Meta-Analysis. Am J Epidemiol. 187, 2060-2068. https://doi.org/10.1093/aje/kwy080.

Brown, H.K., Wilton, A.S., Ray, J.G., Dennis, C.L., Guttmann, A., Vigod, S.N., 2019. Chronic physical conditions and risk for perinatal mental illness: A population-based retrospective cohort study. PLoS Med. 16, e1002864. https://doi.org/10.1371/journal.pmed.1002864.

Choi, K.W., Sikkema, K.J., Vythilingum, B., Geerts, L., Faure, S.C., Watt, M.H., Roos, A., Stein, D.J., 2017. Maternal childhood trauma, postpartum depression, and infant outcomes: Avoidant affective processing as a potential mechanism. J Affect Disord. 211, 107-115. https://doi.org/10.1016/j.jad.2017.01.004.

Dennis, C.L., Dowswell, T., 2013. Psychosocial and psychological interventions for preventing postpartum depression. Cochrane Database Syst Rev. 2013, Cd001134. https://doi.org/10.1002/14651858.CD001134.pub3.

Epifanio, M.S., Genna, V., De Luca, C., Roccella, M., La Grutta, S., 2015. Paternal and Maternal Transition to Parenthood: The Risk of Postpartum Depression and Parenting Stress. Pediatr Rep. 7, 5872. https://doi.org/10.4081/pr.2015.5872.

Faulkner, M.R., Barker, L.C., Vigod, S.N., Dennis, C.L., Brown, H.K., 2020. Collective impact of chronic medical conditions and poverty on perinatal mental illness: population-based cohort study. J Epidemiol Community Health. 74, 158-163. https://doi.org/10.1136/jech-2019-212714.

Fu, C., Li, C., Wan, X., Yang, Y., Zhang, S., Hu, J., 2024. The Relationship Between Adverse Childhood Experiences and Postpartum Depression: A Systematic Review and Meta-Analysis. Trauma Violence Abuse. 25, 3066-3081. https://doi.org/10.1177/15248380241235639.

Guintivano, J., Sullivan, P.F., Stuebe, A.M., Penders, T., Thorp, J., Rubinow, D.R., Meltzer-Brody, S., 2018. Adverse life events, psychiatric history, and biological predictors of postpartum depression in an ethnically diverse sample of postpartum women. Psychol Med. 48, 1190-1200. https://doi.org/10.1017/S0033291717002641.

Hammen, C., Henry, R., Daley, S.E., 2000. Depression and sensitization to stressors among young women as a function of childhood adversity. J Consult Clin Psychol. 68, 782-787.

Herbert, D., Young, K., Pietrusińska, M., MacBeth, A., 2022. The mental health impact of perinatal loss: A systematic review and meta-analysis. J Affect Disord. 297, 118-129. https://doi.org/10.1016/j.jad.2021.10.026.

Hutchens, B.F., Kearney, J., 2020. Risk Factors for Postpartum Depression: An Umbrella Review. J Midwifery Womens Health. 65, 96-108. https://doi.org/10.1111/jmwh.13067.

Kishore, M.T., Satyanarayana, V., Ananthanpillai, S.T., Desai, G., Bhaskarapillai, B., Thippeswamy, H., Chandra, P.S., 2018. Life events and depressive symptoms among pregnant women in India: Moderating role of resilience and social support. Int J Soc Psychiatry. 64, 570-577. https://doi.org/10.1177/0020764018789193.

Liu, X., Wang, S., Wang, G., 2022. Prevalence and Risk Factors of Postpartum Depression in Women: A Systematic Review and Meta-analysis. J Clin Nurs. 31, 2665-2677. https://doi.org/10.1111/jocn.16121.

McEwen, B.S., Stellar, E., 1993. Stress and the individual. Mechanisms leading to disease. Arch Intern Med. 153, 2093-2101.

McHugh, M.L., 2012. Interrater reliability: the kappa statistic. Biochem Med (Zagreb). 22, 276-282.

Meaney, M.J., 2018. Perinatal Maternal Depressive Symptoms as an Issue for Population Health. Am J Psychiatry. 175, 1084-1093. https://doi.org/10.1176/appi.ajp.2018.17091031.

O'Connor, E., Rossom, R.C., Henninger, M., Groom, H.C., Burda, B.U., 2016. Primary Care Screening for and Treatment of Depression in Pregnant and Postpartum Women: Evidence Report and

583 Systematic Review for the US Preventive Services Task Force.
584 Jama. 315, 388-406. https://doi.org/10.1001/jama.2015.18948.
585 Okano, T., Murata, M., Masuji, A., Tamaki, R., Nomura, J., Miyaoka, H.,
586 Kitamura, T., 1996. Validation and reliability of Japanese version
587 of the EPDS (Edinburgh Postnatal Depression Scale). Arch
588 Psychiatr Diagn Clin Eval. 7, 525-533.
589 Patil, D.M., Bajaj, A., Supraja, T.A., Chandra, P., Satyanarayana, V.A.,
590 2021. Lifetime traumatic experiences and postpartum
591 depressive symptoms in a cohort of women in South India. Arch
592 Womens Ment Health. 24, 687-692.
593 https://doi.org/10.1007/s00737-021-01111-w.
594 Qobadi, M., Collier, C., Zhang, L., 2016. The Effect of Stressful Life
595 Events on Postpartum Depression: Findings from the 2009-2011
596 Mississippi Pregnancy Risk Assessment Monitoring System.
597 Matern Child Health J. 20, 164-172.
598 https://doi.org/10.1007/s10995-016-2028-7.
599 Racine, N., Zumwalt, K., McDonald, S., Tough, S., Madigan, S., 2020.
600 Perinatal depression: The role of maternal adverse childhood
601 experiences and social support. J Affect Disord. 263, 576-581.
602 https://doi.org/10.1016/j.jad.2019.11.030.
603 Sørbø, M.F., Grimstad, H., Bjørngaard, J.H., Lukasse, M., Schei, B.,
604 2014. Adult physical, sexual, and emotional abuse and
605 postpartum depression, a population based, prospective study
606 of 53,065 women in the Norwegian Mother and Child Cohort
607 Study. BMC Pregnancy Childbirth. 14, 316.
608 https://doi.org/10.1186/1471-2393-14-316.
609 Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A.,
610 McCallum, M., Howard, L.M., Pariante, C.M., 2014. Effects of
611 perinatal mental disorders on the fetus and child. Lancet. 384,
612 1800-1819. https://doi.org/10.1016/s0140-6736(14)61277-0.
613 Stewart, D.E., Solomon, C.G., Vigod, S., 2016. Postpartum Depression.
614 New England Journal of Medicine. 375, 2177-2186.
615 https://doi.org/10.1056/NEJMcp1607649.
616 Viera, A.J., Garrett, J.M., 2005. Understanding interobserver
617 agreement: the kappa statistic. Fam Med. 37, 360-363.
618 White, I.R., Royston, P., Wood, A.M., 2011. Multiple imputation using
619 chained equations: Issues and guidance for practice. Stat Med.
620 30, 377-399. https://doi.org/10.1002/sim.4067.
621 Williams, M., Iacob, E., Kausler, R., Simonsen, S.E., Aderibigbe, T.,
622 Latendresse, G., 2025. Number of significant life events and
623 perinatal depression in a diverse rural population: A brief report
624 of a cross-sectional study. Womens Health (Lond). 21,
625 17455057251338368.
626 https://doi.org/10.1177/17455057251338368.

Figure1. Flow chart of study population selection.

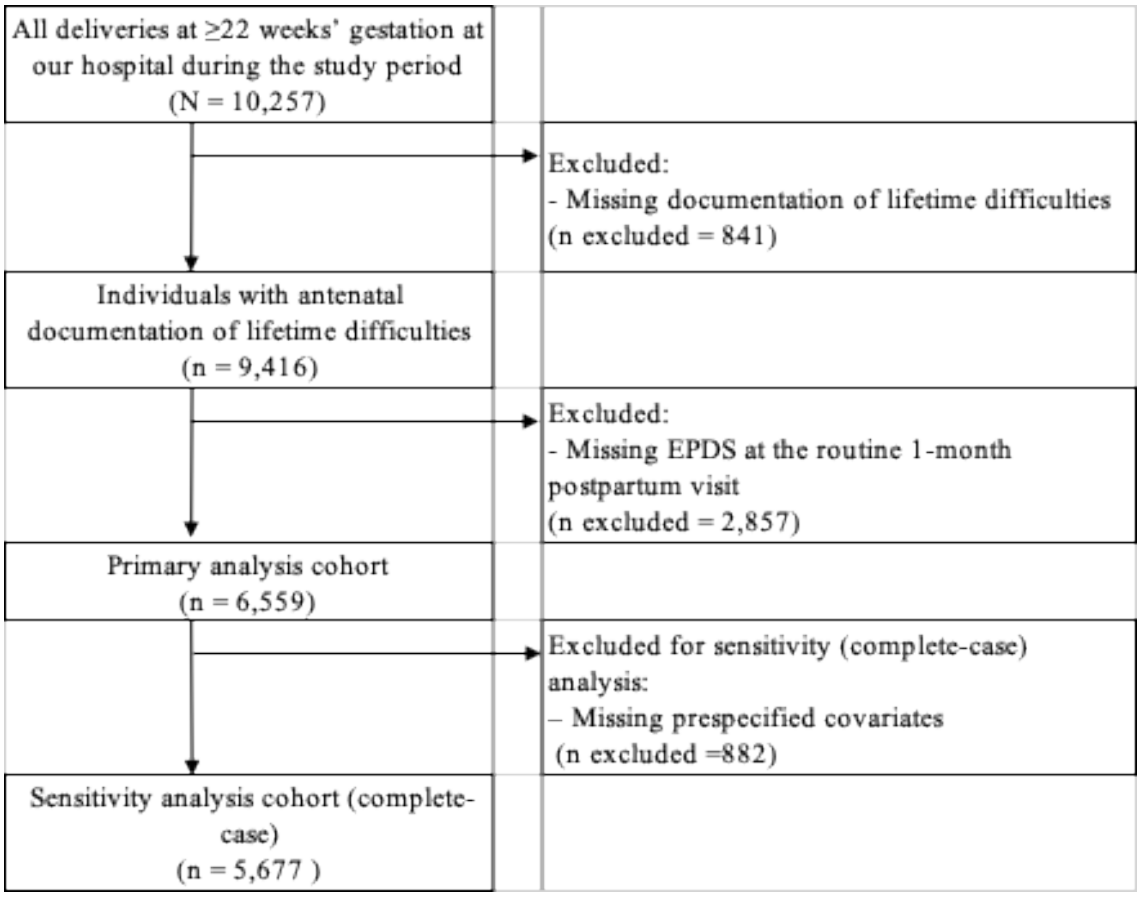


Figure 2. Types of lifetime difficulties and postpartum depressive symptoms at 1 month postpartum (EPDS ≥9).
Forest plot showing adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for postpartum depressive symptoms at 1 month postpartum according to types of lifetime difficulties.
Each point represents the adjusted OR derived from multivariable logistic regression, and horizontal bars indicate 95% CIs.
Numbers next to each category indicate the number of women with postpartum depressive symptoms divided by the total number of women reporting that difficulty type (%).
Adjusted estimates were obtained using multiple imputation for missing covariates and outcome data (m = 50) and pooled using Rubin's rules. Models were adjusted for maternal age category (<25, 25–34, ≥35), body mass index category (<18.5, 18.5–24.9, ≥25), parity (0/≥1), single status, employment, history of mental illness, infertility treatment, current smoking during pregnancy, and prior miscarriage (0/≥1).

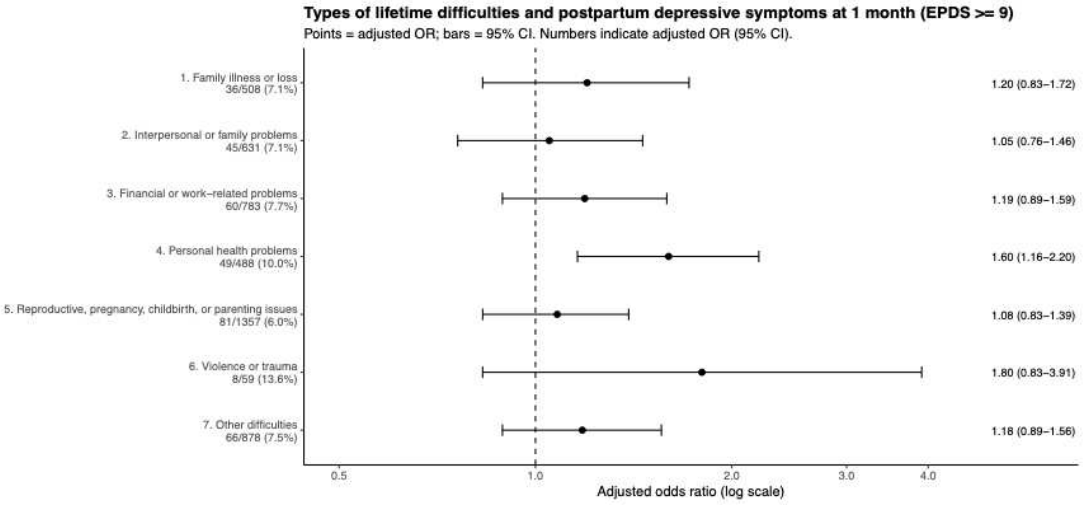


Table 1. Baseline characteristics by lifetime difficulty experience (difficulty present vs absent)

Variable	Total (N=6,559)	Difficulty present (n=4,197, 63.1%)	Difficulty absent (n=2,362, 35.3%)
Category	n (%)	n (%)	n (%)
Age (years)			
<25	364 (5.6)	206 (4.9)	158 (6.7)
25–34	4,033 (61.5)	2,558 (61.0)	1,475 (62.5)
≥35	2,160 (32.9)	1,432 (34.1)	728 (30.8)
BMI (kg/m²)			
<18.5	1,156 (17.6)	737 (17.6)	419 (17.8)
18.5-24.9	4,554 (69.5)	2,945 (70.2)	1,609 (68.2)
≥25	841 (12.8)	511 (12.2)	330 (14.0)
Parity			
Primipara	3,540 (54.0)	2,242 (53.4)	1,298 (55.0)
Multipara	3,018 (46.0)	1,955 (46.6)	1,063 (45.0)
Single status	110 (1.8)	63 (1.6)	47 (2.1)
Employment	4,625 (75.6)	2,976 (75.8)	1,649 (75.2)
Miscarriage history	1,196 (18.2)	789 (18.8)	407 (17.2)
Infertility treatment	1,322 (20.3)	910 (21.9)	412 (17.6)

History of mental illness	263 (4.0)	212 (5.1)	51 (2.2)
Current smoking during pregnancy	138 (2.1)	96 (2.3)	42 (1.8)

Abbreviations: BMI, body mass index

Table 2. Association between lifetime difficulty experience and postpartum depressive symptoms at 1 month postpartum: primary analysis using multiple imputation (m = 50; n = 6,559).

Lifetime Difficulty	Postpartum depressive symptoms cases/Total No. (%)	Crude OR (95% CI)	†Adjusted OR (95% CI)
Yes	302/4,197 (7.2)	1.63 (1.31-2.06)	1.55 (1.24-1.96)
No	107/2,362 (4.5)	1 [Reference]	1 [Reference]

†Adjusted estimates from multivariable logistic regression, with multiple imputation of missing covariates and outcome (m = 50; pooled using Rubin’s rules). Models adjusted for age category (<25, 25–34, ≥35), BMI category (<18.5, 18.5–24.9, ≥25), parity (0/≥1), single status (yes/no), employment (yes/no), history of mental illness (yes/no), infertility treatment (yes/no), current smoking during pregnancy (yes/no), and prior miscarriage (0/≥1).

Table 3. Association between the number of lifetime difficulty experiences and postpartum depressive symptoms at 1 month postpartum: primary analysis using multiple imputation (m = 50; n = 6,559).

Number of lifetime difficulty experiences	Postpartum depressive symptoms cases/Total No. (%)	Crude OR (95% CI)	†Adjusted OR (95% CI)	P for trend
0	107/2,362 (4.5)	Ref.	Ref.	< 0.001
1	260/3,716 (7.0)	1.59 (1.26–2.01)	1.51 (1.20–1.91)	
≥2	42/481 (8.7)	2.02 (1.38–2.90)	1.89 (1.29–2.76)	

†Adjusted for maternal age category (<25, 25–34, ≥35), body mass index category (<18.5, 18.5–24.9, ≥25), parity (0/≥1), single status, employment, history of mental illness, infertility treatment, current smoking during pregnancy, and prior miscarriage. Missing data were handled using multiple imputation (m = 50), and estimates were pooled using Rubin’s rules.

Figures

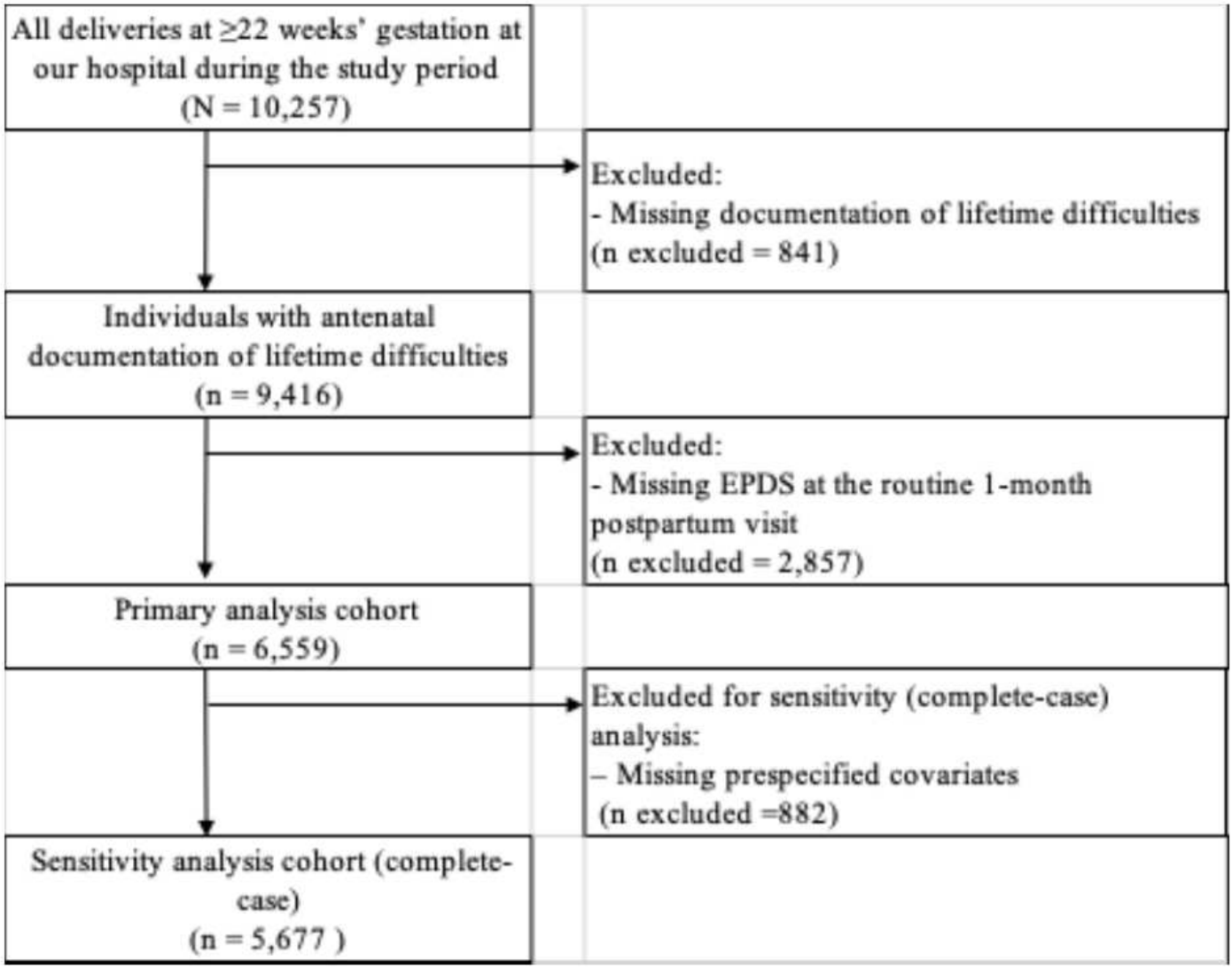


Figure 1

Flow chart of study population selection.

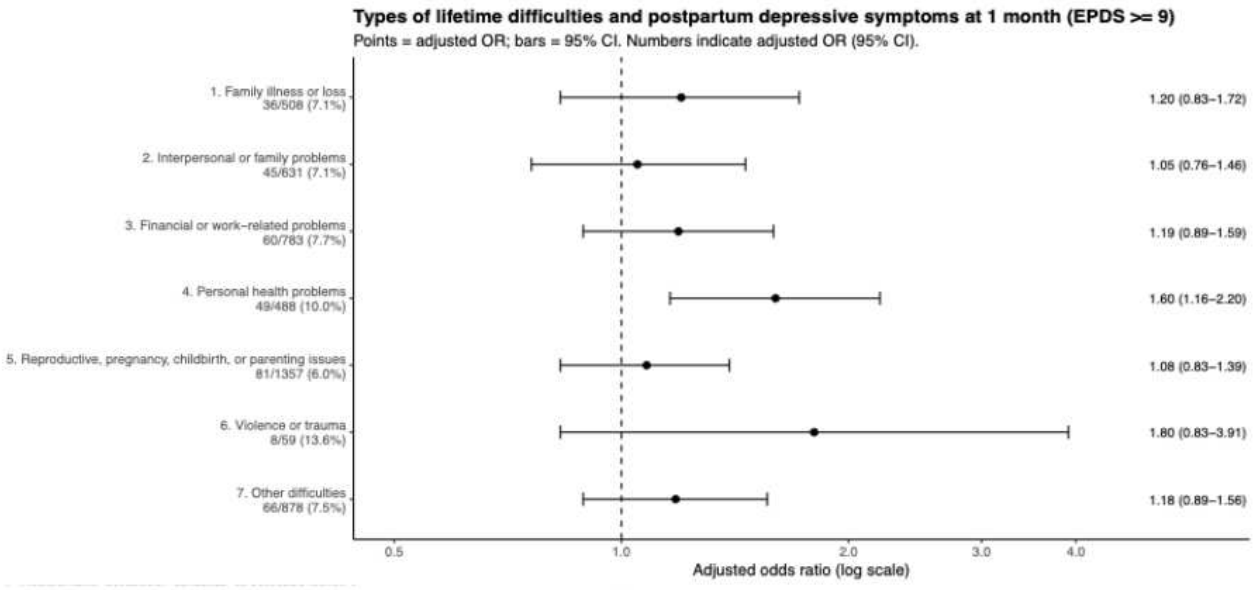


Figure 2

Types of lifetime difficulties and postpartum depressive symptoms at 1 month postpartum (EPDS ≥9).

Forest plot showing adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for postpartum depressive symptoms at 1 month postpartum according to types of lifetime difficulties. Each point represents the adjusted OR derived from multivariable logistic regression, and horizontal bars indicate 95% CIs. Numbers next to each category indicate the number of women with postpartum depressive symptoms divided by the total number of women reporting that difficulty type (%). Adjusted estimates were obtained using multiple imputation for missing covariates and outcome data (m = 50) and pooled using Rubin's rules. Models were adjusted for maternal age category (<25, 25–34, ≥35), body mass index category (<18.5, 18.5–24.9, ≥25), parity (0/≥1), single status, employment, history of mental illness, infertility treatment, current smoking during pregnancy, and prior miscarriage (0/≥1).

Supplementary Files

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- SupplementaryTable01262.docx