

Association of Antenatal Education Attendance with Early Postpartum Edinburgh Postnatal Depression Scale (EPDS) Scores: A Retrospective Observational Study

Doğum Öncesi Eğitime Katılımın Erken Edinburgh Doğum Sonrası Depresyon Ölçeği Puanlarıyla İlişkisi: Retrospektif Gözlemsel Bir Çalışma

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ABSTRACT

Aim: This study aimed to evaluate the association between attendance at an institutional antenatal education program and early postpartum depressive symptom burden assessed using the Edinburgh Postnatal Depression Scale (EPDS).

Materials and Methods: This retrospective study included women who completed antenatal follow-up and delivery. Women who attended at least one theoretical antenatal education session were included in the antenatal education group. EPDS was recorded within the first 24 hours postpartum as part of routine assessment. High EPDS risk was defined as EPDS ≥ 13 .

Results: The cohort included 170 women, with 85 women in each group. Median EPDS score was lower in the antenatal education group than in the control group (7 vs 14, $p < 0.001$). High EPDS risk was recorded in 12 women (14.1%) in the antenatal education group and 70 women (82.4%) in the control group ($p < 0.001$). Vaginal delivery was more frequent among women who attended antenatal education (68.2% vs 45.9%, $p = 0.003$). After adjustment, antenatal education attendance remained independently associated with lower odds of high EPDS risk (adjusted OR, 0.034; 95% CI, 0.013-0.090; $p < 0.001$) and a lower continuous EPDS score (adjusted β , -6.654; 95% CI, -7.644 to -5.664; $p < 0.001$).

Conclusion: Antenatal education attendance was associated with lower early postpartum EPDS scores, lower high EPDS risk, and a higher vaginal delivery rate. Because EPDS was assessed within the first 24 hours postpartum and the study was non-randomized, the findings should be interpreted as an association with early postpartum depressive symptom burden rather than as proof of a causal preventive effect on clinically diagnosed postpartum depression.

Keywords: Antenatal education; Edinburgh Postnatal Depression Scale; postpartum depression risk; pregnancy school; vaginal delivery; cesarean section

ÖZ

Amaç: Bu çalışma, kurumsal bir doğum öncesi eğitim programına katılım ile Edinburgh Doğum Sonrası Depresyon Ölçeği (EPDS) kullanılarak değerlendirilen erken doğum sonrası depresif semptom yükü arasındaki ilişkiyi değerlendirmeyi amaçlamıştır.

Gereç ve Yöntemler: Bu retrospektif çalışma, doğum öncesi takibini ve doğumunu tamamlayan kadınları içermiştir. En az bir teorik doğum öncesi eğitim seansına katılan kadınlar doğum öncesi eğitim grubuna dahil edilmiştir. EPDS, rutin değerlendirmenin bir parçası olarak doğumdan sonraki ilk 24 saat içinde kaydedilmiştir. Yüksek EPDS riski, EPDS ≥ 13 olarak tanımlanmıştır.

Sonuçlar: Kohort, her grupta 85 kadın olmak üzere toplam 170 kadını içermiştir. Medyan EPDS puanı, doğum öncesi eğitim grubunda kontrol grubuna göre daha düşüktü (7'ye karşı 14, $p < 0,001$). Doğum öncesi eğitim grubunda 12 kadında (%14,1) ve kontrol grubunda 70 kadında (%82,4) yüksek EPDS riski kaydedilmiştir ($p < 0,001$). Doğum öncesi eğitim alan kadınlarda vajinal doğum daha sık görülmüştür (%68,2'ye karşı %45,9, $p = 0,003$). Düzeltme yapıldıktan sonra, doğum öncesi eğitime katılım, yüksek EPDS riski olasılığının daha düşük olmasıyla (düzeltilmiş OR, 0,034; %95 CI, 0,013-0,090; $p < 0,001$) ve sürekli EPDS skorunun daha düşük olmasıyla (düzeltilmiş β , -6,654; %95 CI, -7,644 ila -5,664; $p < 0,001$) bağımsız olarak ilişkili kalmıştır.

Sonuç: Doğum öncesi eğitime katılım, erken postpartum EPDS skorlarının daha düşük olması, yüksek EPDS riskinin daha düşük olması ve vajinal doğum oranının daha yüksek olmasıyla ilişkilidir. EPDS, doğumdan sonraki ilk 24 saat içinde değerlendirildiği ve çalışma rastgeleleştirilmediği için, bulgular klinik olarak teşhis edilmiş doğum sonrası depresyon üzerinde nedensel bir önleyici etki kanıtı olarak değil, erken doğum sonrası depresif semptom yükü ile bir ilişki olarak yorumlanmalıdır.

Anahtar Kelimeler: Doğum öncesi eğitim; Edinburgh Postpartum Depresyon Ölçeği; postpartum depresyon riski; gebelik okulu; vajinal doğum; sezaryen

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INTRODUCTION

Postpartum depressive symptoms are among the most clinically relevant mental health problems of the perinatal period. They may affect maternal wellbeing, mother-infant interaction, breastfeeding, and infant developmental outcomes, particularly when symptoms remain unrecognized or untreated [1,2]. For this reason, current perinatal care increasingly emphasizes early identification of depressive symptoms during pregnancy and after birth, together with appropriate referral and follow-up pathways [3].

Antenatal education is an important component of woman-centred antenatal care. These programs aim to prepare women for pregnancy, childbirth, breastfeeding, postpartum recovery, and early parenthood, while also supporting informed decision-making and reducing uncertainty about birth [4]. Antenatal education has also been discussed as a non-clinical strategy that may contribute to reducing unnecessary cesarean deliveries by addressing childbirth-related fear, expectations, and preferences [5]. Recent systematic reviews and meta-analyses suggest that antenatal education can improve childbirth self-efficacy, reduce fear of childbirth, and support vaginal birth; however, heterogeneity in program content, duration, delivery format, and outcome assessment remains substantial [6-8].

The effect of antenatal education on postpartum depressive symptoms is less certain. Some intervention studies have reported lower depressive symptom scores after structured antenatal education or psychoeducation-based programs, whereas other studies have found no significant or only transient effects on postpartum Edinburgh Postnatal Depression Scale (EPDS) outcomes [9-14]. These inconsistent findings indicate that the relationship between antenatal education and postpartum mental health may depend on the psychological content of the program, participant characteristics, social support, timing of assessment, and local healthcare context.

The present study aimed to evaluate the association between attendance at an institutional antenatal education program and early postpartum depressive symptom burden among women who completed antenatal follow-up and delivery at a tertiary obstetric center. The primary objective was to compare EPDS scores and high EPDS risk between women who attended antenatal education and those who did not. Secondary objectives were to examine mode of delivery, selected obstetric and neonatal outcomes, and program-related factors within the antenatal education group.

MATERIALS AND METHODS

Study design and setting

This retrospective observational study was conducted at the obstetrics clinic at tertiary center. Data were obtained from routine hospital records of women who received antenatal follow-up and delivered at the study center between January 1, 2025 and December 31, 2025. The study evaluated the association between attendance at the institutional antenatal education program and early postpartum Edinburgh Postnatal Depression Scale (EPDS) outcomes. No additional intervention, examination, laboratory test, questionnaire, or patient contact was performed for the purposes of the study.

Ethical considerations

The study protocol was approved by the Local Ethics Committee (approval no: AESH-BADEK2-2026-372; approval date: May 5, 2026). The study was conducted in accordance with the principles of the Declaration of Helsinki and local regulations for retrospective clinical research. Written informed consent was not required in accordance with the retrospective design and ethics committee approval. All data were anonymized before analysis, and no directly identifying information was included in the dataset or manuscript.

Study population and sampling strategy

The study population consisted of women aged 18 years or older who completed antenatal follow-up and delivery at the study center and had an EPDS result recorded within the first 24 hours postpartum. Women were eligible if they had a singleton pregnancy, available data on antenatal education attendance, and available obstetric and neonatal outcome data. Women with major maternal or fetal pathology, chronic systemic disease, inflammatory disease, chronic medication use, multiple pregnancy, fetal congenital or chromosomal anomaly, smoking or alcohol use, or delivery outside the study center were excluded.

Women were allocated to the antenatal education group if they had attended at least one theoretical session of the institutional antenatal education program. The control group was selected using a 1:1 consecutive sampling strategy. A consecutive sample of 85 eligible antenatal education attendees was selected in chronological order during the study period. For each included attendee, the next consecutive eligible non-attendee who delivered at the same center was selected as a control.

Antenatal education program

The institutional antenatal education program was organized as a structured program for pregnant women followed at the study center. According to the institutional protocol, the program included a five-week schedule with a total of 7.5 hours of theoretical education. In

the present retrospective analysis, antenatal education attendance was defined as participation in at least one 30-minute theoretical education session. Within the antenatal education group, additional program-related variables were recorded, including gestational week at program initiation, number of attended sessions, partner participation, exercise participation, and number of exercise sessions.

Data collection

Data were extracted retrospectively from electronic medical records and standardized patient follow-up forms. Maternal variables included age, gravida, parity, abortion history, and number of living children. Obstetric and neonatal variables included gestational age at delivery, mode of delivery, cesarean section indication, birth weight, 1-minute and 5-minute Apgar scores, preterm birth status, and episiotomy among women with vaginal delivery. Program-related variables were recorded only for women in the antenatal education group.

Outcome measures

The primary outcome was the EPDS score recorded within the first 24 hours postpartum as part of routine postpartum assessment. The EPDS is a 10-item self-report screening scale developed to identify depressive symptoms in the postnatal period, with total scores ranging from 0 to 30 [15]. The EPDS is a screening instrument and should not be interpreted as a diagnostic tool for postpartum depression [16]. The Turkish version of the EPDS has been validated among postpartum women [17]. In the present study, EPDS was analyzed both as a continuous variable and as a binary high-risk outcome using a cut-off score of ≥ 13 .

Because EPDS was administered within the first 24 hours after delivery, the outcome was interpreted as early postpartum depressive symptom burden or high EPDS risk rather than clinically diagnosed postpartum depression. This distinction is important because very early postpartum EPDS scores may be influenced by acute delivery-related stress, pain, fatigue, and sleep deprivation, although early scores may still help identify women requiring closer follow-up [18].

Secondary outcomes included mode of delivery, cesarean section rate, vaginal delivery rate, episiotomy among women with vaginal delivery, and program-related associations with EPDS scores within the antenatal education group.

Sample size

An a priori sample size calculation was performed using data from Badrin et al., who evaluated the effects of a guided antenatal education support program on postnatal depression among first-time mothers [10]. Based on the reported EPDS means and

standard deviations in the intervention and control groups, the calculated effect size was Cohen's $d=0.579$. Using G*Power version 3.1.9.7, with a two-tailed independent samples t-test, $\alpha=0.05$, power=0.95, and equal group allocation, at least 79 women per group AND minimum total sample size of 158 participants were required [19]. The final study sample of 170 women, with 85 women in each group, exceeded this requirement.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were assessed for distributional characteristics using normality tests and visual inspection. Because most continuous variables did not meet normality assumptions, between-group comparisons were performed using the Mann-Whitney U test. Continuous variables are presented as median (Q1-Q3). Categorical variables are summarized as counts and percentages and were compared using Pearson's chi-square test or Fisher's exact test, depending on expected cell counts.

The primary outcome was the EPDS score. EPDS was analyzed as a continuous outcome and as a binary high-risk outcome using a cut-off value of ≥ 13 . Because EPDS was recorded within the first 24 hours after delivery, the findings were interpreted as early postpartum depressive symptom burden and high EPDS risk rather than as a definitive clinical diagnosis of postpartum depression.

Multivariable logistic regression was used to evaluate the independent association between antenatal education attendance and high EPDS risk. The model was adjusted for maternal age, gravida, parity, gestational age at delivery, neonatal birth weight scaled per 100 g, and mode of delivery. Results are presented as adjusted odds ratios (ORs) with 95% confidence intervals (CIs). A separate multivariable linear regression model was fitted for continuous EPDS score using the same adjustment set, and results are reported as adjusted β coefficients with 95% CIs.

Program-related analyses were performed within the antenatal education group only. Gestational week at program initiation, number of attended sessions, partner participation, exercise participation, and number of exercise sessions were summarized descriptively. Associations between continuous program-related variables and EPDS score were evaluated using Spearman's rank correlation. Cesarean section indications were summarized descriptively among women who underwent cesarean delivery. No imputation was performed for missing data. All statistical tests were two-sided, and $p<0.05$ was considered statistically significant.

RESULTS

Study population and baseline characteristics

The final analytic cohort included 170 women with available Edinburgh Postnatal Depression Scale (EPDS) data, comprising 85 women in the antenatal education group and 85 women in the control group. The two groups were therefore equal in size. Baseline characteristics, obstetric variables, neonatal outcomes, delivery mode, and EPDS outcomes are summarized in Table 1.

Women who attended antenatal education were younger than controls (median age, 27 vs 30 years; $p<0.001$). Gravida, parity, and abortion history also differed between groups, with lower values in the antenatal education group (all $p\leq0.003$). Gestational age at delivery, neonatal birth weight, 5-minute Apgar score, and preterm birth frequency did not differ significantly between groups. The 1-minute Apgar score was higher in the antenatal education group (median, 8 vs 8; $p=0.003$), although the absolute values in both groups were within a clinically reassuring range.

EPDS outcomes and mode of delivery

EPDS scores were substantially lower among women who attended antenatal education. The median (Q1-Q3) EPDS score was 7 (4-10) in the antenatal education group and 14 (13-16) in the control group ($p<0.001$). High EPDS risk (EPDS ≥ 13) was recorded in 12 of

85 women (14.1%) in the antenatal education group and in 70 of 85 women (82.4%) in the control group ($p<0.001$).

Mode of delivery also differed between groups. Vaginal delivery was more frequent in the antenatal education group than in the control group (68.2% vs 45.9%), whereas cesarean delivery was less frequent (31.8% vs 54.1%; $p=0.003$). Among women with vaginal delivery and available episiotomy data, episiotomy frequency did not differ significantly between groups (93.0% vs 100.0%; $p=0.144$).

Multivariable analyses

After adjustment for maternal age, gravida, parity, gestational age at delivery, neonatal birth weight, and mode of delivery, antenatal education attendance remained independently associated with lower odds of high EPDS risk (adjusted OR, 0.034; 95% CI, 0.013-0.090; $p<0.001$) (Table 2). None of the other covariates in the model reached statistical significance.

In the multivariable linear regression model, antenatal education attendance was associated with a 6.65-point lower EPDS score (adjusted β coefficient, -6.654; 95% CI, -7.644 to -5.664; $p<0.001$) (Table 3). Gestational age at delivery was also inversely associated with EPDS score (adjusted β coefficient, -0.536; 95% CI, -1.035 to -0.037; $p=0.035$). Other covariates were not statistically significant in the adjusted linear model.

Table 1. Comparison of baseline characteristics, obstetric-neonatal variables, delivery mode, and EPDS outcomes according to antenatal education attendance

Variable	Antenatal education (n=85)	Control (n=85)	p value
Age, years	27 (22-30)	30 (26-35)	<0.001
Gravida	1 (1-2)	2 (1-3)	<0.001
Parity	0 (0-1)	0 (0-1)	0.003
Abortions	0 (0-0)	1 (0-1)	<0.001
Living children	0 (0-0)	0 (0-1)	0.416
Gestational age at delivery, weeks	39 (39-40)	40 (39-40)	0.161
Birth weight, g	3330 (3090-3620)	3480 (3160-3760)	0.135
1-minute Apgar score	8 (8-9)	8 (8-8)	0.003
5-minute Apgar score	10 (9-10)	10 (9-10)	0.087
Preterm birth (<37 weeks)	3 (3.5%)	0 (0.0%)	0.246
Mode of delivery, vaginal / cesarean	58 (68.2%) / 27 (31.8%)	39 (45.9%) / 46 (54.1%)	0.003
Episiotomy among vaginal deliveries	53/57 (93.0%)	39/39 (100.0%)	0.144
EPDS score	7 (4-10)	14 (13-16)	<0.001
High EPDS risk (EPDS ≥ 13)	12 (14.1%)	70 (82.4%)	<0.001

Note. Values are presented as median (Q1-Q3) or n (%), as appropriate. Continuous variables were compared using the Mann-Whitney U test. Categorical variables were compared using the Pearson chi-square test or Fisher exact test, as appropriate. For mode of delivery, the p value refers to the overall comparison of vaginal versus cesarean delivery. Episiotomy percentages are calculated among vaginal deliveries with available episiotomy data. EPDS, Edinburgh Postnatal Depression Scale; Q1, first quartile; Q3, third quartile.

Table 2. Multivariable logistic regression for high EPDS risk (EPDS ≥ 13)

Variable	Adjusted OR	95% CI	p value
Antenatal education attendance (yes vs no)	0.034	0.013-0.090	<0.001
Age, years	1.040	0.955-1.131	0.370
Gravida	1.193	0.603-2.360	0.613
Parity	1.037	0.449-2.398	0.932
Gestational age at delivery, weeks	0.798	0.535-1.190	0.269
Birth weight, per 100 g	0.999	0.879-1.135	0.985
Cesarean vs vaginal delivery	0.592	0.233-1.500	0.269

Note. The dependent variable was high EPDS risk, defined as EPDS ≥ 13 . The model was fitted using multivariable logistic regression and adjusted for all variables listed in the table. OR, odds ratio; CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale.

Table 3. Multivariable linear regression for continuous EPDS score.

Variable	Adjusted β coefficient	95% CI	p value
Antenatal education attendance (yes vs no)	-6.654	-7.644 to -5.664	<0.001
Age, years	0.098	-0.004 to 0.201	0.061
Gravida	0.335	-0.237 to 0.907	0.252
Parity	0.110	-0.553 to 0.772	0.745
Gestational age at delivery, weeks	-0.536	-1.035 to -0.037	0.035
Birth weight, per 100 g	-0.012	-0.139 to 0.114	0.849
Cesarean vs vaginal delivery	-0.044	-1.003 to 0.916	0.929

Note. The dependent variable was continuous EPDS score. The model was fitted using multivariable linear regression and adjusted for all variables listed in the table. Adjusted β coefficients are reported. CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale.

Program-related analyses within the antenatal education group

Within the antenatal education group, the median (Q1-Q3) gestational week at program initiation was 28 weeks (24-30), and the median number of attended sessions was 3 (2-4). Partner participation was recorded in 36 of 85 women (42.4%), and exercise participation was recorded in 62 of 85 women (72.9%). No statistically significant correlations were observed between EPDS score and gestational week at program initiation, number of attended sessions, or number of exercise sessions (Table 4).

Cesarean section indications

The most common cesarean section indications in the antenatal education group were previous cesarean section (25.9%), fetal distress (22.2%), and suspected macrosomia (18.5%). In the

Table 4. Correlation analyses between program-related variables and EPDS score within the antenatal education group

Program-related variable	Spearman rho	p value
Gestational week at program initiation (n=85)	-0.010	0.926
Number of attended sessions (n=85)	0.098	0.374
Number of exercise sessions (n=85)	0.011	0.917

Note. Spearman rank correlation was used to assess associations between continuous program-related variables and EPDS score. These analyses were exploratory and restricted to women who attended antenatal education. EPDS, Edinburgh Postnatal Depression Scale.

control group, the most common indications were fetal distress (23.9%), failure to progress/arrest of labor (21.7%), and previous cesarean section (19.6%) (Table 5).

Table 5. Cesarean section indications

Cesarean indication	Antenatal education CS (n=27)	Control CS (n=46)
Cephalopelvic disproportion	1 (3.7%)	8 (17.4%)
Previous cesarean section	7 (25.9%)	9 (19.6%)
Fetal distress	6 (22.2%)	11 (23.9%)
Breech presentation	4 (14.8%)	3 (6.5%)
Suspected macrosomia	5 (18.5%)	3 (6.5%)
Maternal anxiety	1 (3.7%)	1 (2.2%)
Transverse lie	0 (0.0%)	1 (2.2%)
Failure to progress/arrest of labor	3 (11.1%)	10 (21.7%)

Note. Percentages are calculated within cesarean deliveries in each group. CS, cesarean section.

DISCUSSION

In this retrospective observational study, attendance at the institutional antenatal education program was associated with lower early postpartum Edinburgh Postnatal Depression Scale (EPDS) scores and a lower proportion of women classified as high EPDS risk. The median EPDS score was 7 in the antenatal education group and 14 in the control group, and high EPDS risk was observed in 14.1% and 82.4% of women, respectively. This association remained statistically significant after adjustment for maternal age, gravida, parity, gestational age at delivery, neonatal birth weight, and mode of delivery. Antenatal education attendance was also associated with a higher vaginal delivery rate.

The lower EPDS scores observed among women who attended antenatal education are biologically and clinically plausible. Antenatal education may reduce uncertainty about labor, increase perceived preparedness, improve childbirth self-efficacy, and provide basic coping strategies for the transition to motherhood. These mechanisms are consistent with randomized and quasi-experimental studies showing that structured antenatal education can reduce fear of birth, depressive symptoms, anxiety, and stress, while improving childbirth self-efficacy [9]. Similarly, Badrin et al. reported that guided antenatal education support reduced postnatal depression scores and improved social support and life satisfaction among first-time mothers [10]. In a cluster-randomized trial, prenatal group-based psychoeducation delivered in primary healthcare settings was also associated with a reduction in postpartum depression at follow-up [11].

The present findings are also partly consistent with recent synthesis-level evidence. Meta-analytic data suggest that antenatal education may reduce fear of childbirth and pain intensity during labor, improve childbirth self-efficacy, and support vaginal birth [6-8]. Hooper et al. reported that antenatal education improved some labor and birth outcomes, although the included studies varied substantially in intervention content and outcome definitions [6]. Zaman et al. similarly concluded that antenatal education improved maternal psychological outcomes and promoted vaginal delivery, while emphasizing high heterogeneity and potential bias [7]. In this context, the higher vaginal delivery rate in the antenatal education group in the present study supports the role of antenatal education in birth preparedness and informed decision-making.

Nevertheless, the magnitude of the EPDS difference in this study was larger than that reported in much of the previous literature and should be interpreted carefully. Several studies have not found a significant postpartum mental health benefit of antenatal education. Can Gürkan and Ekşi reported no significant difference in EPDS

scores between antenatal education and control groups at either the sixth postpartum week or sixth postpartum month [12]. In a recent Turkish retrospective analysis, Koç Tiske et al. found that antenatal education was associated with a higher vaginal delivery rate but did not significantly reduce EPDS scores or high postpartum depression risk [13]. In a large Italian perinatal sample, Camoni et al. showed that crude associations suggested lower anxiety and depressive symptoms among women attending antenatal classes, but these associations weakened after adjustment and did not persist into the postpartum period [14]. These findings suggest that the apparent effect of antenatal education on postpartum depressive symptoms may be influenced by self-selection, baseline psychosocial differences, timing of assessment, and program content.

The very high rate of high EPDS risk in the control group is one of the most important issues in interpreting the present results. An EPDS ≥ 13 rate of 82.4% is substantially higher than expected for clinically diagnosed postpartum depression in general postpartum populations. This value should therefore not be interpreted as the true prevalence of postpartum depression in the control group. The timing of EPDS assessment is particularly relevant. In the present study, EPDS was administered within the first 24 hours postpartum, when pain, fatigue, sleep disruption, acute stress, surgical recovery, or anxiety related to the newborn may influence responses. Although early postpartum EPDS assessment may help identify women who require closer follow-up, it is more appropriate to describe the outcome as early postpartum depressive symptom burden or high EPDS risk rather than confirmed postpartum depression [15,16,18].

Another possible explanation for the strong association is selection bias. Participation in antenatal education was voluntary, and women who attended the program may have differed from non-attendees in health literacy, motivation, planned pregnancy status, family support, socioeconomic status, and engagement with healthcare services. In the present cohort, women in the antenatal education group were younger and had lower gravida, parity, and abortion history than controls. Although the control group was selected using a consecutive sampling strategy to reduce investigator-driven selection, this approach does not replace randomization. The multivariable models adjusted for several demographic and obstetric variables, but residual confounding remains possible because the dataset did not include educational level, income, employment status, planned pregnancy, previous psychiatric history, previous postpartum depression, marital relationship quality, perceived social support, breastfeeding status, sleep quality, or birth satisfaction.

The association between antenatal education and mode of delivery is clinically meaningful. Women who attended antenatal education had a higher vaginal delivery rate than controls. This finding is

consistent with the broader literature suggesting that childbirth education may reduce fear, increase confidence, and support women in making informed decisions about delivery mode [6,7]. It is also supported by a recent Turkish retrospective study by Atalay Mert et al., which evaluated term deliveries in women who attended pregnancy school education and exercises and reported lower cesarean section, episiotomy, and oxytocin augmentation rates among attendees compared with controls [20]. In the present cohort, episiotomy frequency among women with vaginal delivery and available episiotomy data did not differ significantly between groups. Moreover, mode of delivery was not independently associated with EPDS score or high EPDS risk in the adjusted models. This suggests that the lower EPDS scores observed in the antenatal education group were not explained solely by the higher vaginal delivery rate.

Within the antenatal education group, no statistically significant correlations were observed between EPDS score and gestational week at program initiation, number of attended sessions, or number of exercise sessions. This finding does not support a clear dose-response pattern for these continuous program-related variables in the present dataset. However, the result should be interpreted cautiously because the analysis was exploratory, the sample size within the antenatal education group was limited, and antenatal education attendance was defined broadly as participation in at least one theoretical session. Partner participation and exercise participation were recorded descriptively; therefore, the present data do not allow firm conclusions regarding their independent effects on early postpartum EPDS outcomes.

In the linear regression model, gestational age at delivery showed a small inverse association with continuous EPDS score. However, this finding should be interpreted cautiously because gestational age distributions were clinically similar between groups and only three women in the analytic cohort delivered before 37 weeks. Therefore, this secondary association should be considered hypothesis-generating rather than a central finding of the study.

The study also has important limitations. First, its retrospective and non-randomized design prevents causal inference. Second, antenatal education attendance was voluntary, making self-selection bias likely. Third, EPDS was measured within the first 24 hours postpartum, which limits comparability with studies assessing postpartum depression at 4-8 weeks or later. Fourth, no antenatal baseline EPDS score was available, so it was not possible to determine whether the groups differed in depressive symptoms before delivery. Fifth, important psychosocial variables were not available for adjustment. Sixth, the study was conducted at a single center and included women without major maternal or

fetal pathology, which may limit generalizability. Finally, the broad definition of antenatal education attendance may have introduced heterogeneity within the intervention group.

These findings support the potential value of antenatal education as part of perinatal mental health promotion, but they should not be interpreted as evidence that antenatal education alone prevents postpartum depression. Antenatal education may be most useful when integrated with structured psychosocial screening, mental health literacy, referral pathways, partner involvement, and postpartum follow-up. Current perinatal mental health guidance emphasizes that screening should be linked to systems that ensure further assessment, treatment, and follow-up when needed [3]. Future prospective studies should include baseline antenatal EPDS assessment, standardized education content, detailed attendance data, psychosocial covariates, and repeated postpartum EPDS measurements to clarify whether antenatal education has a sustained effect on clinically relevant postpartum depressive symptoms.

CONCLUSION

In conclusion, antenatal education attendance was independently associated with lower early postpartum EPDS scores and lower high EPDS risk in this retrospective cohort. Attendance was also associated with a higher vaginal delivery rate. Because EPDS was administered within the first 24 hours postpartum and the study was non-randomized, the findings should be interpreted as an association with early postpartum depressive symptom burden rather than proof of a causal preventive effect on postpartum depression. Nevertheless, the results support strengthening antenatal education programs within broader perinatal psychosocial care models.

Ethical approval: This study was approved by the Local Ethics Committee (approval no: AEŞH-BADEK2-2026-372; approval date: May 5, 2026).

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Data Availability: The datasets generated and/or analyzed during the current study are not publicly available because of institutional privacy restrictions but may be available from the corresponding author upon reasonable request.

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