Accuracy of Brief Screening Tools for Identifying Postpartum Depression Among Adolescent Mothers

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KEY WORDS

teenage, pregnancy, screening, postpartum depression, validity

ABBREVIATIONS

AUC—area under the curve

DSM-IV—*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*

EPDS—Edinburgh Postnatal Depression Scale

KID-SCID—*Structured Clinical Interview for DSM-IV Childhood Diagnoses*

PHQ-2—Patient Health Questionnaire-2

ROC—receiver operating characteristic

Dr Venkatesh designed the analysis and drafted the initial manuscript; Dr Zlotnick provided support for analyzing psychometric data and reviewed and revised the manuscript; Dr Triche provided statistical support and designed the analysis; Ms Ware coordinated and supervised data collection and reviewed the manuscript; Dr Phipps conceptualized and designed the study, reviewed the analysis, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: Studies assessing the accuracy of brief screening tools for postpartum depression have been conducted among adult women; however, no similar validation studies have been conducted among adolescent mothers. Accurate and valid brief depression screening tools are needed for adolescent mothers.

WHAT THIS STUDY ADDS: We found that the 10-item Edinburgh Postnatal Depression Scale (EPDS) and 2 subscales, the EPDS-7 and EPDS-2, are highly accurate at identifying postpartum depression among adolescent mothers. In pediatric settings with limited time and resources, these brief scales have potential to be used as effective depression screening tools.

abstract

OBJECTIVE: To evaluate the accuracy of the Edinburgh Postnatal Depression Scale (EPDS) and 3 subscales for identifying postpartum depression among primiparous adolescent mothers.

METHODS: Mothers enrolled in a randomized controlled trial to prevent postpartum depression completed a psychiatric diagnostic interview and the 10-item EPDS at 6 weeks, 3 months, and 6 months postpartum. Three subscales of the EPDS were assessed as brief screening tools: 3-item anxiety subscale (EPDS-3), 7-item depressive symptoms subscale (EPDS-7), and 2-item subscale (EPDS-2) that resemble the Patient Health Questionnaire-2. Receiver operating characteristic curves and the areas under the curves for each tool were compared to assess accuracy. The sensitivities and specificities of each screening tool were calculated in comparison with diagnostic criteria for a major depressive disorder. Repeated-measures longitudinal analytical techniques were used.

RESULTS: A total of 106 women contributed 289 postpartum visits; 18% of the women met criteria for incident postpartum depression by psychiatric diagnostic interview. When used as continuous measures, the full EPDS, EPDS-7, and EPDS-2 performed equally well (area under the curve >0.9). Optimal cutoff scores for a positive depression screen for the EPDS and EPDS-7 were lower (≥ 9 and ≥ 7 , respectively) than currently recommended cutoff scores (≥ 10). At optimal cutoff scores, the EPDS and EPDS-7 both had sensitivities of 90% and specificities of >85%.

CONCLUSIONS: The EPDS, EPDS-7, and EPDS-2 are highly accurate at identifying postpartum depression among adolescent mothers. In primary care pediatric settings, the EPDS and its shorter subscales have potential for use as effective depression screening tools. *Pediatrics* 2014;133:e45–e53

Postpartum depression among adolescent mothers is a serious mental health problem. Approximately 330 000 births occur each year in the United States to adolescent women <20 years of age,^{1–3} with a frequency of self-reported depressive symptoms among pregnant adolescents ranging from 28% to 59%, depending on the study and the measures used.^{4,5}

The prevalence of postpartum depression among adolescent mothers is significantly higher than that of adult postpartum women.^{2,6}

The deleterious effects of postpartum depression on maternal and infant health and psychosocial well-being have been extensively documented.^{7,8} Data suggest that depression among adolescent mothers can prevent them from engaging in health-promoting behaviors for their infants and themselves.⁹ Children born to mothers with untreated depression are at higher risk of developmental delay, lower levels of social engagement, greater stress reactivity, and negative interactions compared with infants of nondepressed mothers.^{10–12} These negative consequences of postpartum depression have led many health agencies and providers to proactively screen women so that those who are identified to be at risk for postpartum depression can be linked to appropriate services.

Screening for maternal depression is increasingly a standard, common component of pediatric well child care.^{13–16} Screening is crucial because it is often the first step in the pathway to treatment. Pediatricians, obstetricians, and gynecologists have been encouraged to screen mothers,^{13,17} but providers are often unsure of which instrument to use.¹⁸ Recent studies assessing the accuracy of screening tools for postpartum depression have been conducted among adult women^{19,20}; however, no similar validation studies have been

conducted among adolescent mothers. In addition, evaluating a tool's accuracy over multiple clinical encounters is important because depression can occur at any time in the postpartum year.^{16,21}

Brevity is an important aspect of a screening tool, particularly for use in a busy clinical practice.²² There is growing consensus on the need to conduct routine, universal screening for postpartum depression, and therefore there is a need for brief postpartum depression screening tools. The 10-question Edinburgh Postnatal Depression Scale (EPDS) is often underused in general health surveys and clinical practice because it could be too long.¹⁵ The utility of briefer case-finding instruments, including subscales of the EPDS, have been assessed among adult mothers^{14,23–26}; however, these screening tools have not been validated against a formal diagnosis of postpartum depression among adolescent mothers.²⁷

We evaluated the accuracy and validity of the EPDS and 3 brief subscales of the EPDS for identifying primiparous adolescent mothers who met criteria for a major depressive disorder according to the gold standard the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV). The primary objective of this study was to establish the sensitivity, specificity, and operating characteristics of the EPDS and its briefer subscales for identifying postpartum depression during the first 6 months postpartum.

METHODS

Study Setting

This validation study uses data from a randomized controlled trial to prevent postpartum depression among adolescent mothers. Both intervention and control groups are included. The primary analysis found that an intervention based on interpersonal theory reduced the risk of postpartum

depression among primiparous adolescent mothers.²⁸ Briefly, the attention and dose matched control condition involved using the *Baby Basics: Your Month by Month Guide to a Healthy Pregnancy* book as a guide for the didactic control program,²⁹ which provided information about maternal and infant health. The intervention and control programs included 5 sessions that were delivered individually during the prenatal period.

This study was approved by the institutional review board at Women & Infants Hospital of Rhode Island (Providence, RI). Consent was obtained from the adolescent mother's legal guardian, and assent was obtained from the minor participant.

Participants

Participants were recruited between February 2007 and August 2008 through an urban prenatal clinic. Eligible women were ≤17 years of age when they conceived their pregnancy and <25 weeks' gestational age at their first prenatal visit. Exclusion criteria included receiving mental health services from a health care provider and meeting criteria for a current affective disorder, substance use disorder, anxiety disorder (excluding simple phobia), or psychosis determined by the *Structured Clinical Interview for DSM-IV Childhood Diagnoses* (KID-SCID).³⁰ Adolescents who met these criteria were excluded because the intervention was a prevention program and was not designed to treat any of these disorders.

Study Measures

Sociodemographic characteristics were assessed at baseline before randomization. Both the KID-SCID and EPDS were delivered at 6 weeks, 3 months, and 6 months after birth at the same study visit. All assessments were delivered by research assistants trained in

psychometrics and clinical assessments who were blinded to study group assignment.

Diagnosis of Postpartum Depression

The KID-SCID was used to assess for a major depressive disorder. The KID-SCID is a semistructured interview developed for the assessment of DSM-IV axis I diagnoses (ie, depression, anxiety, bipolar disorder, substance use, and psychotic disorders).³⁰ Given that most investigators classify a depressive episode that occurs within the first 6 months after delivery as postpartum depression and a third of teenagers have been shown to have scores that indicate depression at 4 months postpartum,^{3,31} we used data up to 6 months postpartum.

EPDS

The EPDS, a 10-item questionnaire, focuses on psychic symptoms of depression and is designed to reduce the focus on somatic symptoms (ie, poor sleep, weight gain or loss) that are common among women with depression.³² The EPDS has established psychometric properties and is one of the most widely used self-reported instruments to assess depressive symptoms in postpartum women, including minorities and teenagers. Each question response is coded from 0 to 3, and the maximum total score is 30. The cutoff point used to identify women as high risk for postpartum depression varies, with most studies using a cutoff score of ≥ 10 or ≥ 12 .^{33,34} A cutoff score ≥ 10 detects a major depressive disorder with sensitivity of $>90\%$ and specificity $>80\%$, and a cutoff score ≥ 13 detects a major depressive disorder with sensitivity of $>85\%$ and specificity of $>80\%$.^{32,33,35}

Brief Subscales of the EPDS

The EPDS explores 2 distinct domains of negative affect: depressive symptoms

and anxiety.³⁶ Three subscales were examined as brief alternatives to the 10-item EPDS: the 3-item anxiety subscale (EPDS-3), the 7-item depressive symptoms subscale (EPDS-7), and 2 questions that resemble the Patient Health Questionnaire-2 (PHQ-2) (EPDS-2) (Supplemental Table 5). The US Preventive Services Task Force recommends using the PHQ-2 as a depression screener among adults in primary care settings.³⁷ The PHQ-2 is derived from the longer PHQ-9, which is a validated diagnostic measure of depression severity among adults.³⁸ The PHQ-2 consists of 2 questions focusing on depressed mood and anhedonia.^{25,26} To compare across scales, we compensated for the items that were removed by multiplying subscale scores by a constant 10 divided by the number of subscale items.²⁷ Therefore, the screening cutoff score was 10 for the EPDS and the 3 subscales.

Statistical Analyses

We calculated the incidence and prevalence of screening positive for postpartum depression based on the KID-SCID and EPDS and its subscales (EPDS-7, EPDS-3, and EPDS-2) at 6 weeks, 3 months, and 6 months postpartum. In our sensitivity and specificity estimates, we considered a KID-SCID diagnosis to be the criterion standard (ie, gold standard) for the diagnosis of a major depressive disorder. Because each participant completed the screening instruments at 3 postpartum visits, we used a repeated-measures longitudinal modeling approach using generalized estimating equations with an exchangeable correlation structure because of the intraparticipant correlation over repeated visits.^{39,40} Predicted probabilities were derived from the generalized estimating equation model and were then used to construct receiver operating characteristic (ROC) curves and to compute the areas under the curve (AUCs).⁴¹

ROC curves plot the sensitivity of a measure on the y-axis and (1 minus the specificity) on the x-axis.⁴² The AUC, which ranges from 0 to 1, is a measure of the accuracy of a test. Screening instruments that identify cases significantly better than chance have AUCs >0.5 ; an AUC <0.70 is considered to have low accuracy, an AUC between 0.70 and 0.90 shows moderate accuracy, and an AUC >0.90 indicates excellent test accuracy.⁴³ We present continuous and dichotomized results at both the standard and optimal cutoff scores. Continuous measures identify an optimal cutoff score for screening positive for depression; dichotomous measures identify participants at high risk for depression. Differences between the AUCs obtained from the dichotomized and continuous curves assess whether potential differences in scale performance were related to dichotomizing the scales at a suboptimal threshold value. Comparisons of AUCs created by different measures on the same outcome data were conducted, with χ^2 statistics accounting for within-participant correlation.⁴⁴ Because sensitivity and specificity estimates change in opposite directions when the cutoff score varies, the optimal cutoff score balances both sensitivity and specificity while maintaining the ROC curve as close to the left corner (ie, the point [0, 1]). We defined optimal cutoff scores by using a cut-point rule (ie, the closest-to-[0, 1] criterion) that selects the shortest radius originating at the (0, 1) point and terminating on the ROC curve in the x-y plane.⁴⁵ All analyses used Stata version 10.0 (Stata Corp, College Station, TX) and SAS version 9.2 (SAS Institute, Inc, Cary, NC) software.

RESULTS

Overall, 106 primiparous adolescent mothers contributed a total of 289 postpartum study visits. The median

age was 16 years; 53% of the participants were Latina, 17% were black, and 16% were white (Table 1). Most women (77%) were enrolled in school, and 19% reported having completed 12th grade. Sixteen percent of women reported a history of depression before the study. Nineteen women (18%) met diagnostic criteria for incident postpartum depression according to the KID-SCID, and the prevalence of postpartum depression was 12% at both 3 months and 6 months postpartum (Table 2).

ROC Curves for the Screening Tools

Table 3 presents the accuracy of the EPDS and the briefer EPDS-7, EPDS-3, and EPDS-2. We used standard and optimal cutoff scores overall at any postpartum time point and separately at 6 weeks, 3 months, and 6 months postpartum. As a continuous measure, the full EPDS performed very well at identifying postpartum depression, with an overall AUC of 0.94 (95% confidence interval [CI], 0.91–0.99) (Fig 1). Similarly, both the briefer EPDS-7 and ultrabrief EPDS-2 performed well, with overall AUCs of 0.96 (95% CI, 0.92–0.99)

TABLE 1 Sociodemographic Characteristics of the Study Population (*N* = 106)

Sociodemographic Characteristics	%
Study arm	
Behavioral intervention	51
Control condition	50
Age in years, median (range)	16 (13–18)
Race or ethnicity	
Hispanic	52.8
Black, non-Hispanic	16.9
White, non-Hispanic	16.0
Other	14.2
Currently in school	
Yes	77.4
No, completed 12th grade	18.9
No	3.8
Lives with biological mother	71.7
Lives with husband or boyfriend	16.0
Perceptions of current pregnancy	
Current pregnancy was intended	9.4
I am very or somewhat glad to be having a baby	94.3
Psychological characteristics	
Previous diagnosis of depression	10.4

TABLE 2 Prevalence and Incidence of Postpartum Depression by Assessment Tool at 6-wk, 3-mo, and 6-mo Postpartum Visits

Assessment Tool	Frequency at Postpartum Follow-up Visits		
	6 wk (<i>N</i> = 96), <i>N</i> (%)	3 mo (<i>N</i> = 96), <i>N</i> (%)	6 mo (<i>N</i> = 97), <i>N</i> (%)
KID-SCID			
Prevalence	—	11 (11.5)	12 (12.4)
Incidence	8 (8.3)	5 (5.2)	6 (6.2)
EPDS			
EPDS standard cutoff ≥ 10			
Prevalence	—	17 (17.7)	12 (12.4)
Incidence	16 (16.7)	8 (8.3)	6 (6.2)
EPDS optimal cutoff ≥ 9			
Prevalence	—	20 (20.8)	17 (17.5)
Incidence	18 (18.8)	9 (9.4)	8 (8.2)
EPDS-7			
EPDS-7 standard cutoff ≥ 10			
Prevalence	—	13 (13.5)	10 (10.3)
Incidence	11 (11.5)	8 (8.3)	5 (5.2)
EPDS-7 optimal cutoff ≥ 7			
Prevalence	—	22 (22.9)	17 (17.5)
Incidence	22 (22.9)	9 (9.4)	9 (9.3)
EPDS-3 ^a			
EPDS-3 standard cutoff ≥ 10			
Prevalence	—	34 (35.4)	32 (33.0)
Incidence	34 (35.4)	13 (13.5)	11 (11.3)
EPDS-2 ^a			
EPDS-2 standard cutoff ≥ 10			
Prevalence	—	26 (27.1)	19 (19.6)
Incidence	25 (26.0)	10 (10.4)	8 (8.2)

^a Optimal cutoff scores for both the EPDS-3 and EPDS-2 were the same as the standard cutoff scores.

and 0.90 (95% CI, 0.93–0.97), respectively (Fig 2 A and B). The EPDS-3 performed satisfactorily, with an AUC of 0.80 (95% CI, 0.73–0.88) (Fig 2C).

At standard cutoff scores (≥ 10), the full EPDS, the EPDS-7, and EPDS-2 performed satisfactorily with AUCs > 0.85 ; however, the EPDS-3 did not perform as well as these other measures, with an AUC of 0.72. When we looked at using an optimal cutoff score for the full EPDS (≥ 9), the AUC improved (0.90; 95% CI, 0.84–0.96). Similarly, the EPDS-7 at an optimal cutoff score (≥ 7) also performed better, with an AUC of 0.89 (95% CI, 0.83–0.94). The optimal cutoff scores for the EPDS-2 and EPDS-3 were the same as the standard cutoff scores.

When we assessed screening tool performance separately at 6 weeks, 3 months, and 6 months postpartum at the standard cutoff score (≥ 10), the EPDS-7 generally performed significantly better than the EPDS, and the

EPDS-3 performed significantly worse than the EPDS ($P < .05$). At an optimal cutoff score, both the EPDS-7 (≥ 7) and EPDS (≥ 9) performed similarly at all 3 postpartum time points.

Sensitivity and Specificity of the Screening Tools

We assessed the sensitivity and specificity to estimate the optimal cutoff scores for the EPDS and its briefer subscales overall and at each postpartum time point (Table 4). We then compared these optimal cutoff scores with published cutoff scores. The overall optimal cutoff scores for the EPDS (≥ 9) and EPDS-7 (≥ 7) were lower than published guidelines. For both measures, the optimal cutoff scores at 6 weeks, 3 months, and 6 months were generally closer to the overall optimal cutoff scores than the standard cutoff scores. The EPDS at a standard cutoff score had an overall sensitivity of 80% and a

TABLE 3 Accuracy of Depression Screening Tools as Continuous and Dichotomized Measures Overall and at 6 wk, 3 mo, and 6 mo Postpartum (*N* = 289 visits)

Screening tool	Postpartum Follow-up Visits						
	Overall						
	<i>N</i> = 289 Visits	<i>N</i> = 96 Visits		<i>N</i> = 96 Visits		<i>N</i> = 97 Visits	
		6 wk	<i>P</i> ^a	3 mo	<i>P</i> ^a	6 mo	<i>P</i> ^a
	ROC (95% CI)	ROC (95% CI)		ROC (95% CI)		ROC (95% CI)	
Continuous measures							
EPDS	0.94 (0.91–0.99)	0.92 (0.83–1.00)	—	0.98 (0.96–1.00)	—	0.94 (0.87–1.00)	—
EPDS-7	0.96 (0.92–0.99)	0.97 (0.93–1.00)	.09	0.98 (0.94–1.00)	.62	0.94 (0.87–1.00)	.63
EPDS-3	0.81 (0.73–0.88)	0.73 (0.53–0.93)	<.01	0.82 (0.71–0.92)	<.01	0.86 (0.75–0.96)	.03
EPDS-2	0.90 (0.83–0.97)	0.88 (0.70–1.00)	.47	0.93 (0.87–0.99)	.04	0.89 (0.77–1.00)	.04
Dichotomous measures							
Standard cutoff scores							
Standard EPDS ≥10	0.86 (0.79–0.94)	0.81 (0.65–0.98)	—	0.91 (0.82–1.00)	—	0.86 (0.73–0.99)	—
Standard EPDS-7 ≥10	0.87 (0.79–0.94)	0.85 (0.68–1.00)	.02	0.94 (0.85–1.00)	.09	0.82 (0.68–0.96)	.39
Standard EPDS-3 ≥10	0.72 (0.64–0.80)	0.65 (0.46–0.83)	.01	0.71 (0.56–0.86)	.03	0.79 (0.67–0.91)	.36
Standard EPDS-2 ≥10	0.85 (0.79–0.92)	0.83 (0.71–0.96)	.79	0.86 (0.76–0.96)	.01	0.86 (0.75–0.98)	.88
Optimal cutoff scores							
Optimal EPDS ≥9	0.90 (0.84–0.96)	0.81 (0.64–0.97)	—	0.95 (0.91–0.98)	—	0.92 (0.84–1.00)	—
Optimal EPDS-7 ≥7	0.89 (0.83–0.94)	0.92 (0.88–0.96)	.17	0.88 (0.79–0.98)	.18	0.88 (0.76–0.99)	.27

^a For each χ^2 test for statistical comparison, the reference was the full EPDS.

specificity of 92% at detecting postpartum depression. At an optimal cutoff score, the sensitivity was higher at 90%, with a specificity of 90%. The EPDS-7 at

a standard cutoff score (≥ 10) had an overall sensitivity of 77% and a specificity of 96%, and at an optimal cutoff score (≥ 7), the sensitivity was 90%

and the specificity was 87%. The EPDS-2 had a sensitivity of 87% and a specificity of 83% at detecting postpartum depression. The EPDS-3 was inferior at detecting postpartum depression, with a sensitivity of 74% and a specificity of 70%.

DISCUSSION

This study is unique in assessing the validity of the EPDS and its briefer subscales as screening tools for postpartum depression among adolescent mothers using a formal psychiatric interview as the gold standard for diagnosis. We found that the EPDS and the brief EPDS-7 and ultrabrief EPDS-2 were accurate screening tools for identifying postpartum depression among our population of primiparous adolescent mothers. The optimal cutoff scores for screening positive for postpartum depression among adolescent mothers may need to be lowered from current standard cutoff scores, but results must be replicated in larger nontrial populations of adolescent women. Although the screening tools' performances did show variability at different time points from 6 weeks to 6 months

FIGURE 1
ROC curve for a major depressive disorder as measured by the EPDS.

FIGURE 2

A, ROC curve for a major depressive disorder as measured by the EPDS-7. B, ROC curve for a major depressive disorder as measured by the EPDS-2. C, ROC curve for a major depressive disorder as measured by the EPDS-3.

postpartum, both the EPDS and EPDS-7 generally performed significantly better than the EPDS-3 at each postpartum time point. These findings are concordant with recent validation studies of depression screening tools, which included the EPDS, conducted among adult women being screened for postpartum depression.^{19,20}

We found that the shorter EPDS-7 and EPDS-2 can be considered as effective depression screening tools among adolescent mothers. This finding is different from a recent study conducted among adolescent mothers that identified the EPDS-3, rather than the EPDS-7 and EPDS-2, as an attractive screening tool because of its reliability and operating characteristics; however, validation by diagnostic interview was not conducted, and, as the authors suggested, it was possible that the EPDS-3 was unable to differentiate depression from other mental health problems (eg, anxiety disorders).²⁷ Similar to the current analysis, studies conducted among adult mothers that included validation by psychiatric interview identified the PHQ-2 as a sensitive postpartum depression screening tool.^{23,26} Data assessing brief postpartum depression screening tools conducted among adult women suggest that initial screens with as few as 2 items can be valid and effective in primary care pediatric settings and surveillance systems.^{14,22,24} A study assessing maternal screening using the 10-item EPDS at infant well visits found that screening occurred at only 46% of visits, and 31% of screening forms either were not scored by providers or were scored inaccurately.¹⁵ Routine screening by using brief depression scales could improve detection of maternal depression in primary care settings by providers with limited time and mental health training.⁴⁶

Providers generally use cutoff scores to guide their evaluations and referrals for postpartum depression. The current study suggests that standard cutoff scores for the EPDS may not adequately identify teenage mothers at high risk for being diagnosed with postpartum depression. In fact, scores 1 to 4 points lower on the EPDS below standard cutoff scores may indicate a need for additional clinical evaluation.

Recent studies conducted among adult women at risk for postpartum depression have similarly suggested that standard cutoff scores for depression screening tools are suboptimal and must be adjusted downward.^{19,20} The reasons for lower optimal cutoff scores for the EPDS are not clear. It is possible that this population of primiparous adolescent mothers has higher rates of psychosocial concerns that might influence cutoff scores. The revised cutpoints defined in the current study must be validated on larger samples of adolescent mothers before using clinically.

Because an adolescent mother and her child may be in follow-up care with the same pediatric physician, the pediatrician is uniquely situated to address teenage postpartum depression. It is estimated that pediatric providers may recognize less than half of depressed women relying solely on clinical indicators.⁴⁷ Given that the full EPDS and the subscales performed well as screening tools in this population of primarily urban, minority adolescent mothers, providers can consider the relative advantages and disadvantages of each screening tool. The EPDS has the advantages of being short and easy to complete, and it has been used in many different socioeconomic and linguistic groups. In care programs with limited time and resources, the briefer EPDS-7 and EPDS-2 may be particularly attractive as screening tools.

There are several study limitations to note. The current study used data from a randomized controlled trial to prevent postpartum depression and enrolled participants who met stringent inclusion criteria, which may have influenced the study finding to lower standard cutoff scores. Because of study inclusion criteria and legal guardian consent, participants may have had lower social risk factors, such as homelessness, lack of parental support, and ongoing depression, than the overall

TABLE 4 Sensitivity, Specificity, and Optimal Cutoff Values of the Depression Screening Tools Overall and at 6 wk, 3 mo, and 6 mo Postpartum (*N* = 289 visits)

Screening Tool	Overall			Postpartum Follow-up Visits								
	<i>N</i> = 289 Visits			<i>N</i> = 96 Visits			<i>N</i> = 96 Visits			<i>N</i> = 97 Visits		
				6 wk			3 mo			6 mo		
	Cutoff Score	Se	Sp	Cutoff Score	Se	Sp	Cutoff Score	Se	Sp	Cutoff Score	Se	Sp
EPDS												
Standard cutoff	≥10	80.7	92.3	≥10	75.0	88.6	≥10	90.9	91.8	≥10	75.0	96.5
Optimal cutoff	≥9	90.3	89.5	≥9	75.0	86.4	≥9	100.0	89.4	≥9	91.7	92.9
Optimal time point cutoff	—	—	—	≥8	87.5	79.6	≥12	98.8	94.8	≥9	91.7	92.9
EPDS-7												
Standard cutoff	≥10	77.4	96.1	≥10	75.0	94.3	≥10	90.9	96.5	≥10	66.7	97.7
Optimal cutoff	≥7	90.3	87.2	≥7	100.0	84.1	≥7	90.9	85.9	≥7	83.3	91.8
Optimal time point cutoff	—	—	—	≥8	87.5	88.6	≥11	90.9	97.7	≥8	83.3	95.3
EPDS-3												
Standard cutoff ^a	≥10	74.2	70.2	≥10	62.5	67.1	≥10	72.7	69.4	≥10	83.3	74.1
Optimal time point cutoff	—	—	—	≥13	62.5	81.8	≥10	72.7	69.4	≥10	83.3	74.1
EPDS-2												
Standard cutoff ^a	≥10	87.1	83.3	≥10	87.5	79.6	≥10	90.9	81.2	≥10	83.3	89.4
Optimal time point cutoff	—	—	—	≥10	87.5	79.6	≥10	90.9	81.2	≥10	83.3	89.4

Se, sensitivity; Sp, specificity.

^a Optimal cutoff scores for the EPDS-3 and EPDS-2 were the same as the standard cutoff scores.

teenage parent population. Adolescent women enrolled in the intervention may have been more likely to provide ideal answers, which may have introduced confounding. We were also unable to assess the true population-based incidence of postpartum depression. The incidence of depression may be lower than in other population-based samples because women were enrolled in a care program providing services to prevent postpartum depression. Although this study involved a small sample size of 106 women, these women provided a robust number of 289 study visits, which were used in longitudinal data analyses. Because this study consisted primarily of urban, minority women, the results may not be generalizable to all adolescent women. These findings must be replicated in other clinical settings, with a socioeconomically diverse population of adolescent mothers.

A major strength of the current study was validation by diagnostic psychiatric interview. A robust number of follow-up visits allowed the use of longitudinal analytical techniques to assess the screening tools' accuracy at repeated visits. Few women were lost to follow-up in the current analysis, which included a cohort of women who underwent repeated assessments at 3 postpartum time points. Previous studies assessing the accuracy of depression screening tools have used a cross-sectional study design. Although this sample consisted primarily of urban, minority adolescent women, this is also a strength. Given the disproportionate burden of teenage pregnancy among this subpopulation of women with limited socioeconomic resources, the current findings are particularly timely and relevant.

Postpartum depression is prevalent among adolescent mothers. This study suggests not only that the EPDS is a valid tool for postpartum depression screening among adolescent mothers but that its briefer subscales may also be effective screening tools in clinical practice. With a wider recognition of the high frequency of postpartum depression among teenage mothers and increasing evidence of the deleterious effects of postpartum depression on maternal and child health, routine screening as part of postpartum care is essential whether in the obstetric provider's office or the pediatrician's office. The findings of this study inform the process of most accurately, effectively, and efficiently identifying adolescent mothers at high risk for postpartum depression by using currently available screening instruments.

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