

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Identifying Postpartum Depression: Are 3 Questions as Good as 10?

Karolyn Kabir, Jeanelle Sheeder and Lisa S. Kelly

Pediatrics 2008;122:e696

DOI: 10.1542/peds.2007-1759

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/122/3/e696.full.html>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2008 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



Identifying Postpartum Depression: Are 3 Questions as Good as 10?

Karolyn Kabir, MD, Jeanelle Sheeder, MSPH, Lisa S. Kelly, PA-C

Department of Pediatrics, Colorado Adolescent Maternity Program, University of Colorado and Health Sciences Center, Denver, Colorado

The authors have indicated they have no financial relationships relevant to this article to disclose.

What's Known on This Subject

Postpartum depression is the most common medical problem that new mothers face. Anxiety is a more prominent feature of postpartum depression than depression that occurs at other times in life. Routine, universal screening significantly improves detection in primary health care settings.

What This Study Adds

The brevity, reliability, and operating characteristics of the EPDS-3 make it an attractive postpartum depression screening tool for primary health care settings in which the goal is to detect depression, not to assess its severity. Validation by diagnostic psychiatric interview is needed.

ABSTRACT

BACKGROUND. Postpartum depression is the most common medical problem that new mothers face. Anxiety is a more prominent feature of postpartum depression than of depression that occurs at other times in life. Routine, universal screening significantly improves detection in primary health care settings. Thus, an ultrabrief scale that could be incorporated into a general health survey or interview would be useful.

OBJECTIVE. We tested the hypothesis that, during the first 6 postpartum months, the 3-item anxiety subscale of the Edinburgh Postpartum Depression Scale is a better ultrabrief depression screener than 2 Edinburgh Postpartum Depression Scale questions that are almost identical to the widely used Patient Health Questionnaire.

METHODS. A cohort of 199 14- to 26-year-old participants in an adolescent-oriented maternity program completed the Edinburgh Postpartum Depression Scale at well-child visits during the first 6 postpartum months. Three subscales of the Edinburgh Postpartum Depression Scale were examined as ultrabrief alternatives: the anxiety subscale (3 items; Edinburgh Postpartum Depression Scale-3), the depressive symptoms subscale (7 items; Edinburgh Postpartum Depression Scale-7), and 2 questions that resemble the Patient Health Questionnaire (Edinburgh Postpartum Depression Scale-2). The reliability, stability, and construct validity of the Edinburgh Postpartum Depression Scale and 3 subscales were compared. Criterion validity was assessed by comparison with a score of ≥ 10 on the full, 10-item Edinburgh Postpartum Depression Scale.

RESULTS. A total of 41 mothers (20.6%) met study criteria for referral for evaluation of depression (Edinburgh Postpartum Depression Scale-10 score ≥ 10). The Edinburgh Postpartum Depression Scale-3 exhibited the best screening performance characteristics, with sensitivity at 95% and negative predictive value at 98%. It identified 16% more mothers as depressed than the Edinburgh Postpartum Depression Scale did. The performance of the Edinburgh Postpartum Depression Scale-2 was markedly inferior, with sensitivity at 48% to 80%. Moreover, the Edinburgh Postpartum Depression Scale-2 was unreliable for mothers who had not been depressed in the past.

CONCLUSION. The brevity, reliability, and operating characteristics of the Edinburgh Postpartum Depression Scale-3 make it an attractive postpartum depression screening tool for primary health care settings in which the goal is to detect depression, not to assess its severity. Validation by diagnostic psychiatric interview is needed. *Pediatrics* 2008; 122:e696–e702

www.pediatrics.org/cgi/doi/10.1542/peds.2007-1759

doi:10.1542/peds.2007-1759

Key Words

postpartum depression, health screening, depression scales

Abbreviations

PHQ-2—Patient Health Questionnaire
EPDS—Edinburgh Postpartum Depression Scale
CAMP—Colorado Adolescent Maternity Program
ERAP—Electronic Report on Adolescent Pregnancy
EPDS-10—10-item Edinburgh Postpartum Depression Scale
EPDS-3—3-item Edinburgh Postpartum Depression Scale
EPDS-7—7-item Edinburgh Postpartum Depression Scale
EPDS-2—2-item Edinburgh Postpartum Depression Scale

Accepted for publication Apr 17, 2008

Address correspondence to Karolyn Kabir, MD, University of Colorado and Health Sciences Center, Children's Hospital, Department of Pediatrics, 1056 E 19th St, Box B025, Denver, CO 80218. E-mail: kabir.karolyn@tchden.org

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2008 by the American Academy of Pediatrics

POSTPARTUM DEPRESSION IS the most common medical problem that new mothers face.¹⁻⁶ Some cases of postpartum depression are manifestations of chronic depression unrelated to pregnancy. Others are a continuation of depressive episodes that began during pregnancy. Still others only begin after delivery.¹⁻⁶ Postpartum depression is also a serious public health problem.¹⁻³ It is associated with numerous maternal and child medical and psychosocial problems.¹⁻⁸ Yet, like other forms of depression, most cases are never diagnosed.¹⁻⁶ Routine screening significantly improves detection but is not standard practice because of constraints such as time and concerns about the social

acceptability of screening or being identified as an unhappy mother.^{1-6,9-14} The lack of evidence that detection translates into diagnosis, diagnosis into treatment, and treatment into better maternal and child functioning is another commonly cited deterrent to routine screening for postpartum depression in primary care settings.^{1-6,9-14}

Yet, in theory (if not in practice), depression is a treatable condition.¹⁵ There is also evidence that appropriate treatment of depressed mothers benefits both the mother and her children.¹⁶⁻¹⁹ Thus, the consensus is that routine screening for postpartum and ongoing maternal depression should become a standard of care.²⁰ Most experts also agree that optimal screening should include repeated assessments during the first postpartum year and follow-up of mothers with positive screens.^{1-6,20-22} Accordingly, pediatric care settings have been identified as particularly attractive screening sites.^{5,14,20,22} Although most pediatric providers and mothers agree with these experts, they rarely discuss the topic, and formal maternal mood assessments are not part of most pediatric visits.^{1-6,9-14,20-22}

Brevity is an essential quality of new screening tools designed for use in busy clinics where providers are already expected to ask about numerous potential morbidities and environmental hazards.^{23,24} Fortunately, the purpose of asking about maternal psychological status during pediatric visits is to detect depression, not to assess its severity.²⁰ Thus, incorporating a few key questions about maternal mood into a multipurpose child health and safety questionnaire^{21,24} is a logical solution.

Postpartum depression is diagnosed by essentially the same criteria as other types of depression.²⁵ Hence, the 2-item depression screener that the US Preventative Task Force recommends for use in primary care settings (Patient Health Questionnaire [PHQ-2])^{26,27} is a reasonable choice for pediatric providers. When the time frame is limited to the retrospective 2 weeks using a Likert scale, a cutoff score of ≥ 3 is 83% sensitive and 92% specific for major depression.²⁷ Extending the time frame of inquiry to the retrospective month and recording yes or no responses significantly compromises specificity, without benefit to sensitivity.^{27,28} Both formats have been used^{6,21,29} to screen for maternal depression in pediatric care settings with favorable results.^{6,20,21} However, from the theoretical standpoint, the PHQ-2 is not the optimal tool for identifying postpartum depression.

Postpartum depression is also distinguished from nonperinatal depression by a prominent anxiety component.^{4,7,30-35} The prevalence of postpartum depression peaks 10 to 14 weeks after delivery, when the diagnosis is made by a psychiatrist or a pregnancy-specific scale like the Edinburgh Postpartum Depression Scale (EPDS).^{4,5,34} This is not true when the diagnosis is made with other depression scales.^{6,35} This may be because, unlike the EPDS, most depression inventories do not adequately assess the anxiety that is a unique and important component of postpartum depression.^{4,34,35} Brief as the EPDS is, it is too long to be incorporated into a general health survey and, hence, is underused.^{1-6,9-14} The growing consensus that it would be desirable to conduct routine, universal screening for postpartum de-

pression in primary care settings^{5,14,20,22} has prompted previous efforts to develop ultrabrief postpartum depression screening tools.^{6,21,29} Accordingly, this analysis was undertaken to test the hypothesis that, during the first 6 postpartum months, the 3-item anxiety subscale of the EPDS is a better ultrabrief depression screener than the 2 EPDS questions that are almost identical to the PHQ-2.

METHODS

Subjects

The study sample of 199 newly delivered 14- to 26-year-old (mean \pm SD: 19.1 \pm 2.4 years) mothers was enrolled consecutively. They represent 99% of the mothers who brought a 0- to 6-month-old infant to ≥ 1 pediatric health maintenance visit in the Colorado Adolescent Maternity Program (CAMP; a description of the program is available at www.uchsc.edu/camp/Whydiff.htm and in ref 36) during the study period.

The cohort was racially and ethnically diverse (35.7% black, 44.2% Hispanic, 16.1% white, and 4.0% Pacific Islander/Native American). Most subjects obtained prenatal care in CAMP (71.4%) and identified CAMP as their and their children's primary care provider (89.4%). Although participants were selected from 1 clinic, they were demographically representative of American women who become pregnant during adolescence.³⁷ Most were <20 years of age at the time of conception (77.9%), poor (87.1% Medicaid recipients), unmarried (96.4%), primigravidas (61.3%) who lived with a parent (51.3%) and had participated in socially proscribed behaviors (ie, illicit substance abuse, fighting, and other illegal activities resulting in their arrest) in the past (52.1%). On average they had completed 10.4 \pm 1.5 years of school; 29.4% were high school graduates or had passed the General Education Development test, and 42.9% had dropped out of or were failing in school. The study was approved by the institutional review board at the University of Colorado Health Sciences Center. Participants signed a consent form when they joined the program. The University of Colorado Health Sciences Center Institutional Review Board authorized waivers enabling minors to sign the consent form even if they were not accompanied by an adult and allowing the investigators to conduct this analysis without obtaining additional consent.

Data Collection and Variable Definitions

The primary source of data was the CAMP database, called the Electronic Report on Adolescent Pregnancy (ERAP).³⁸ ERAP includes questionnaires used to collect information about program participants' medical, psychological, sexual, and reproductive histories; clinical and research evaluations; and supplemental data from medical charts. Detailed descriptions of ERAP, the data collection procedures, and variable definitions are available at www.uchsc.edu/camp/defsandsumms.htm.

Depression

Depressive symptoms were quantified with a self-administered version of the EPDS.³⁴ The EPDS is a brief (10-item), well-validated, reliable (Cronbach's α : .87-

.88) scale that was developed for use during the perinatal period.^{34,35,39} The questions focus on the psychological rather than the somatic aspects of depression. Subjects respond to items such as, "I have been so unhappy that I have been crying," on a 4-point Likert scale (responses range from: "yes, most of the time" score = 3 to "no, never" score = 0). Thus, total scores range between 0 and 30. The questions explore 2 distinct domains of negative affect: depressive symptoms (7 items) and anxiety (3 items).³ The EPDS has not been validated in adolescents, but it has been used with them.^{34,39,40} Construct validity of the EPDS in this population is supported by evidence that adolescent mothers' scores vary in relation to anticipated antecedents, such as social support and self-efficacy.⁴⁰

In the original validation studies,^{34,39} a score of ≥ 10 identified >90% of women diagnosed with depression by the research diagnostic criteria. A cutoff score of ≥ 12 improved the specificity of the scale for detecting severe depression but at the price of losing sensitivity for detecting mild-to-moderate depression.^{34,39} To minimize the chance of missing mothers whose day-to-day functioning was compromised by depressive symptoms, the referral threshold was set at a score of ≥ 10 on the 10-item EPDS (EPDS-10).

Three subscales of the EPDS-10 were examined as ultrabrief alternatives: the anxiety subscale (3 items [EPDS-3]), the depressive symptoms subscale (7 items [EPDS-7]), and 2 questions that resemble the PHQ-2 (EPDS-2; Appendix). To compensate for the items that were removed, subscale scores were multiplied by a constant: 10 divided by the number of scale items. Thus, the diagnostic cutoff was ≥ 10 on all 4 of the scales. To replicate the original PHQ-2 screener more closely, an alternative threshold, a score of ≥ 3 , was also examined for the EPDS-2.

Mothers who accompanied 0- to 6-month-olds to health maintenance visits were asked to complete the EPDS while they waited to see the pediatric health care provider; 97 (49%) did so more than once. On average, the 2 assessments were conducted 2.1 ± 1.1 months apart (range: 0.2–5.1 months). Health care providers collected and scored the EPDS forms. Mothers who crossed the referral threshold were referred immediately to the program's on-site social worker for additional evaluation if they were <22 years old. Older mothers who crossed the referral threshold were referred to a mental health provider. Suicidality was treated as a medical emergency.

Covariates

Characteristics that could influence the understanding and interpretation of dysphoria and questions about it and the type of mood disorder that was manifested (ie, chronic depression or acute perinatal depression) were considered as possible confounders of the relationship between the full-scale and subscale diagnoses of depression. Intelligence, cognitive capacity, and literacy were not measured. However, responses could be influenced by age (early compared with middle or late adolescent or adult; <15 compared with ≥ 15 -year-olds), educational achievement

(middle school compared with high school or college; highest grade completed; eighth grade or less compared with more than eighth grade), educational achievement (grade retention compared with no grade retention), race/ethnicity (white, black, Hispanic, or Pacific Islander/Native American), and the chronicity of the depressive symptoms. Chronic depression was defined as a history of depression before pregnancy (self-report, not otherwise verified, yes or no) and depression during pregnancy (Center for Epidemiologic Studies Depression Scale score ≥ 24 ⁴¹). Acute, prenatal depression was diagnosed if the first symptoms emerged during pregnancy (Center for Epidemiologic Studies Depression Scale score ≥ 24). For more information about these variable definitions, see www.uchsc.edu/camp/defsandsumms.htm.

Data Analysis

Summary statistics were used to describe the study population. Cronbach's α was computed to assess the internal consistency of the scales in the population as a whole and in covariate subgroups. The κ statistic was used to assess the stability of the study definitions of excessive depressive symptomatology among those who completed the EPDS twice ($n[r] = 97$). Because depressed mothers were referred for evaluation and treatment, a low κ might be desirable. However, we reasoned that the time between assessments was so short that it would be unlikely that true depression would resolve. A false-positive diagnosis because of poor screener specificity may be less persistent. Sensitivity, specificity, and predictive values were computed for the 3 subscales. The reference criterion was a score of ≥ 10 on the EPDS-10. Next, the construct validity of the scales was assessed. To this end, the relationship between the 5 definitions of excessive depressive symptomatology and past episodes of depression was examined with Pearson correlations and forward, stepwise logistic regression analyses. Because anxiety represents a smaller component of the depression women experience outside of the perinatal period,^{4,7,30–34} we reasoned that the EPDS-2 and EPDS-7 definitions of depression might be more closely related to chronic depression. Conversely, it might be anticipated that the EPDS-3 definition would be more closely related to acute prenatal depression. Variables were allowed to enter the regression models 1 at a time, on the basis of the strength of their association with the outcome measure. Collinearity diagnostics were conducted. To approximate relative risk, odds ratios adjusted for other predictors that entered the model and their 95% confidence intervals were calculated. Final models were tested with the χ^2 likelihood ratio (SPSS 14.0 [SPSS Inc, Chicago, IL]).

RESULTS

On average, the initial depression screening was conducted (mean \pm SD) 2.1 ± 2.1 months after delivery (range: 0.1–6.0 months postpartum) and the second screening ($n = 97$; mean \pm SD) 3.2 ± 1.7 months after delivery (range: 0.6–6.7 months postpartum). Scores on the EPDS ranged between 0 and 26 months (mean \pm SD:

TABLE 1 Reliability and Stability of the EPDS and EPDS Subscales

| Variable | Reliability ^a | Stability ^b |
|---------------------------------|--------------------------|------------------------|
| EPDS-10 | .9 | 0.5 |
| EPDS-3 | .8 | 0.6 |
| EPDS-7 | .9 | 0.6 |
| EPDS-2 inflated score ≥ 10 | 0.6 | 0.4 |
| EPDS-2 raw score ≥ 3 | | 0.4 |

^a Data show Cronbach's α for EPDS-10, EPDS-3, and EPDS-7 and Pearson's *R* for EPDS-2. Reliability was maintained across all of the covariate groups except for the EPDS-2 (see text).

^b κ statistic was defined as follows: <0.20 indicates slight; 0.20 to 0.40, fair; 0.410 to 0.60, moderate; and >0.60, substantial agreement.

4.9 \pm 5.4 months; median: 3.0 months). A total of 41 mothers (20.6%) met study criteria for referral for evaluation of depression (EPDS-10 score ≥ 10); the mean \pm SD score for these mothers was 13.8 \pm 4.0 compared with 2.6 \pm 2.7 for the 158 mothers who did not cross the referral threshold.

The internal consistency of the 4 scales and the stability of the 5 definitions of excessive depressive symptomatology are presented in Table 1. The EPDS-2 was the least reliable, and the EPDS-2 definitions of excessive depressive symptomatology (ie, inflated score of ≥ 10 and raw score of ≥ 3) were the least stable. The EPDS-2 was the only scale that lacked internal consistency across covariate groups. The scale exhibited excellent internal consistency with mothers with chronic depression but was unreliable with mothers who did not have chronic depression (Cronbach's α : .78 and .29, respectively).

Table 2 displays the sensitivity, specificity, and predictive values of the 4 definitions of excessive depressive symptomatology compared with the reference criterion, EPDS-10 score of ≥ 10 . The EPDS-3 (anxiety subscale) had the best screening performance characteristics: sensitivity of 95% and negative predictive value of 98%. It identified 16% more of the mothers as depressed than the EPDS-10. The EPDS-2 was markedly inferior; sensitivity ranged from 48% to 80%, depending on the cutoff used.

Intercorrelations between the various measures of depression are presented in Table 3. With 1 minor exception, all 5 of the definitions of depressive symptomatology were significantly related to chronic (history of depression both before and during pregnancy) and acute prenatal depression.

When considered together in the stepwise regression analyses, chronic depression and prenatal depression remained significant independent predictors of depressive

TABLE 2 Operating Characteristics of the EPDS Subscales

| Measures of Test Accuracy | EPDS-3, % | EPDS-7, % | EPDS-2 Inflated Score ≥ 10 , % | EPDS-2 Raw Score ≥ 3 , % |
|---------------------------|-----------|-----------|-------------------------------------|-------------------------------|
| Sensitivity | 95 | 59 | 80 | 48 |
| Negative predictive value | 98 | 90 | 94 | 88 |
| Specificity | 80 | 100 | 95 | 97 |
| Positive predictive value | 56 | 100 | 77 | 79 |

Reference is the full 10-item EPDS score ≥ 10 ; all of the comparisons between sensitivities and specificities are at a *P* value of <.0001 (McNemar's test).

symptomatology. However, chronic depression was the only significant independent predictor of the EPDS-7 (depressive symptoms subscale) and EPDS-2 (PHQ-2 proxy) definitions of depressive symptomatology (Table 4). By contrast, prenatal depression was the only significant independent predictor of depressive symptomatology when the EPDS-3 (anxiety subscale) was used. In all of the cases, only a modest amount of the variance was explained by the previous episodes of depression, and most mothers who experienced depressive symptomatology after delivery had never been depressed before (Table 4).

DISCUSSION

Our analysis provides strong evidence for the validity and use of the EPDS-3 as an ultrabrief screening tool for identifying mothers at increased risk for postpartum depression in primary pediatric care settings. The psychometric properties of the 3-item anxiety subscale of the EPDS were comparable to those of the full 10-item scale (Cronbach's $\alpha = .78$ and $.89$, respectively). Furthermore, the 2 diagnoses of depressive symptomatology were equally stable across the brief observation period ($\kappa = 0.6$ and 0.5 , respectively). Criterion validity for the EPDS-3 was established by operating characteristics that compared favorably with the EPDS-10 (Table 2).

The EPDS-3 identified 70 mothers (35%) of the study population as sufficiently depressed to warrant additional evaluation. This is 31 (16%) more cases than the EPDS-10 identified. However, formal psychiatric evaluations were not routinely conducted. Thus, it would be premature to interpret the discrepancy as "overdiagnosis" or evidence of poor specificity of the EPDS-3. Indeed, it might be argued that our assessment of construct validity favors the anxiety-based referral threshold of the EPDS-3. The unique association between prenatal depression and the risk of crossing the EPDS-3 referral threshold (Table 4) is consistent with reports concerning the prominence of anxiety in perinatal depression compared with other types of depression.^{4,7,30-34} The corresponding association between chronic depression and the risk of crossing the EPDS-7 and EPDS-2 referral thresholds supports this inference. However, a formal psychiatric evaluation would be needed to ensure that the EPDS-3 did not identify other mental health problems in these young mothers. Validation by diagnostic interview is particularly important, because the EPDS has not been validated in adolescents.

In comparison with the EPDS-3, the performance of the EPDS-2 was remarkably poor. The variations in the internal consistency of the EPDS-2 in relation to depression history make it a particularly poor choice. In another study, the operating characteristics of a scale composed of questions similar to the PHQ-2 were especially poor when administered as part of an interview during the first postpartum year.²⁹ This finding raises the concern that, during discussions of maternal mood, new mothers and/or care providers may unwittingly discount anxiety as a manifestation of the dysphoria that they label "postpartum depression."⁴ This reinforces the im-

TABLE 3 Intercorrelation Between Various Definitions and Types of Depression

| Variable | Full EPDS ≥ 10 | EPDS-3 ≥ 10 | EPDS-7 ≥ 10 | EPDS-2 Inflated Score ≥ 10 | EPDS-2 Raw Score ≥ 3 | Chronic Depression ^a | Prenatal Depression ^a |
|----------------------------------|---------------------|-------------------|-------------------|---------------------------------|---------------------------|---------------------------------|----------------------------------|
| Full EPDS ≥ 10 | 1.000 | .639 ^b | .727 ^b | .729 ^b | .536 ^b | .296 ^b | .282 ^b |
| EPDS-3 ≥ 10 | .639 ^b | 1.000 | .438 ^b | .508 ^b | .373 ^b | .177 ^c | .216 ^c |
| EPDS-7 ≥ 10 | .727 ^b | .438 ^b | 1.000 | .630 ^b | .668 ^b | .415 ^b | .276 ^b |
| EPDS-2 inflated score ≥ 10 | .729 ^b | .508 ^b | .630 ^b | 1.000 | .705 ^b | .288 ^b | .141 |
| EPDS-2 raw score ≥ 3 | .536 ^b | .373 ^b | .668 ^b | .705 ^b | 1.000 | .306 ^b | .187 ^c |
| Chronic depression ^a | .296 ^b | .177 ^c | .415 ^b | .288 ^b | .306 ^b | 1.000 | .346 ^b |
| Prenatal depression ^a | .282 ^b | .216 ^c | .276 ^b | .141 | .187 ^c | .346 ^b | 1.000 |

^a Data are limited to mothers who obtained prenatal care in CAMP ($N = 142$).

^b P value is $<.01$.

^c P value is $<.05$.

portance of using a depression screening tool that asks explicitly about anxiety in this setting.

A discussion of the risks and benefits of screening mothers for postpartum depression is beyond the scope of this study, and readers are referred elsewhere for an expert review of the controversy.^{20,42} Nonetheless, with 1 of 5 CAMP mothers crossing the screening threshold for referral and the circumstantial evidence that providers and mothers may preferentially discount anxiety as a symptom of depression,²⁹ the results of this study demonstrate that routine screening with an ultrabrief depression scale has the potential to improve detection of maternal depression.

Ultimately it would be desirable to repeat this analysis in a larger cohort of mothers spanning a wider age range. It will also be important to extend screening beyond the first 6 postpartum months. Anxiety remains a prominent feature of maternal depression beyond the immediate postpartum period,⁴³ and chronicity is an important de-

terminant of maternal and child outcome.^{44,45} The criterion validity for the EPDS-3 must also be established by comparison with a psychiatric interview. The lack of such validation is clearly an important shortcoming of this analysis, because we cannot ensure that the EPDS-3 did not identify other mental health problems (ie, anxiety disorder) in these adolescent mothers. However, even without this information, the results of this study add important new information to the discussion about how to screen mothers for depression. Our findings strongly suggest that health care providers who do not have time to administer the full EPDS should consider incorporating the EPDS-3 into their health maintenance visits with new mothers. For example, the EPDS-3 might be incorporated into an electronic medical chart so that providers are automatically cued to ask the questions at well-child visits. Online scoring with links to referral options where scores indicate the need for additional evaluation would make screening for postpartum and maternal depression difficult to resist.

TABLE 4 Relationship Between Previous Episodes of Depression and Various Definitions of Postpartum Depression

| Definition of Depression | β | Adjusted R^2 | R^2 change | F | F Change | P |
|-----------------------------------|---------|-------------------|--------------|------|----------|----------|
| Full EPDS raw score $\geq 10^a$ | | | | | | |
| Step 1 | | | | | | |
| Chronic depression ^b | .6 | 8.1 ^c | — | 13.1 | — | $<.0001$ |
| Step 2 | | | | | | |
| Chronic depression | .5 | 11.1 ^c | 3.0 | 9.6 | -3.5 | $<.0001$ |
| Prenatal depression ^d | .2 | | | | | |
| EPDS-7 inflated score $\geq 10^a$ | | | | | | |
| Chronic depression | .4 | 16.6 ^c | — | 28.4 | — | $<.0001$ |
| EPDS-2 inflated score $\geq 10^a$ | | | | | | |
| Chronic depression | .3 | 7.6 ^c | — | 12.4 | — | .001 |
| EPDS-2 raw score $\geq 3^a$ | | | | | | |
| Chronic depression | .3 | 8.7 ^c | — | 14.1 | — | $<.0001$ |
| EPDS-3 inflated score $\geq 10^a$ | | | | | | |
| Prenatal depression | .2 | 9.4 ^c | — | 6.7 | — | .01 |

— indicates no data.

^a The model includes chronic depression and prenatal depression.

^b Chronic depression indicates a history of depression before pregnancy (self-report, not otherwise verified, yes or no) and depression during pregnancy (Center for Epidemiologic Studies Depression Scale score ≥ 24).

^c Most depressed mothers had never been depressed before; 85% of patients identified as depressed by the EPDS-10, 92% by EPDS-3, 75% by EPDS-7, 86% by EPDS-2 inflated score ≥ 10 , and 80% by EPDS-2 raw score ≥ 3 had no previous history of depression.

^d Prenatal depression indicates depression with onset during pregnancy (Center for Epidemiologic Studies Depression Scale score ≥ 24).

ACKNOWLEDGMENTS

We would like to acknowledge the contributions of Dr. Catherine "Cassie" Stevens-Simon to this work and for her dedication to the Colorado Adolescent Maternity Program. Dr. Stevens-Simon passed away last November after a long battle with cancer. She is greatly missed and we hope to continue her legacy of caring for adolescent mothers and their families.

We thank Lisa Kelly and other members of the CAMP staff for help in collecting the data.

REFERENCES

- Evins GG, Theofrastous JP, Galvin SL. Postpartum depression: a comparison of screening and routine clinical evaluation. *Am J Obstet Gynecol.* 2000;182(5):1080-1082
- Stowe, ZN, Hostetter AL, Newport J. The onset of postpartum depression: Implications for clinical screening in obstetrical and primary care. *Am J Obstet Gynecol.* 2005;192(2):522-526
- Wisner KL, Parry BL, Piontek CM. Postpartum depression. *N Engl J Med.* 2002;347(3):194-199
- Ross LE, Gilbert Evans SE, Sellers EM, Romach MK. Measurement issues in postpartum depression part 1: anxiety as a feature of postpartum depression. *Arch Womens Ment Health.* 2003;6(1):51-57
- Chaudron LH. Postpartum depression: what pediatricians need to know. *Pediatr Rev.* 2003;24(5):154-161

6. Olson AL, Dietrich AJ, Prazar G, Hurley J. Brief maternal depression screening at well-child visits. *Pediatrics*. 2006;118(1):207–216
7. O'Connor TG, Heron J, Glover V; Alspac Study Team. Antenatal anxiety predicts child behavioral/emotional problems independently of postnatal depression. *J Am Acad Child Adolesc Psychiatr*. 2002;41(12):1470–1477
8. Cohn JF, Campbell SB, Matias R, Hopkins J. Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. *Dev Psychol*. 1990;26(1):15–23
9. Olson AL, Kemper KJ, Kelleher KJ, Hammond CS, Zuckerman BS, Dietrich AJ. Primary care pediatricians' roles and perceived responsibilities in the identification and management of maternal depression. *Pediatrics*. 2002;110(6):1169–1176
10. Chaudron LH, Szilagyi PG, Kitzman HJ, Wadkins HI, Conwell Y. Detection of postpartum depressive symptoms by screening at well-child visits. *Pediatrics*. 2004;113(3 pt 1):551–558
11. Horwitz SM, Kelleher KJ, Stein RE, et al. Barriers to the identification and management of psychosocial issues in children and maternal depression. *Pediatrics*. 2007;119(1). Available at: www.pediatrics.org/cgi/content/full/119/1/e208
12. Heneghan AM, Chaudron LH, Storfer-Isser A, et al. Factors associated with identification and management of maternal depression by pediatricians. *Pediatrics*. 2007;119(3):444–454
13. Tam LW, Newton RP, Dern M, Parry BL. Screening women for postpartum depression at well baby visits: resistance encountered and recommendations. *Arch Women Ment Health*. 2002;5(2):79–82
14. Currie ML, Rademacher R. The pediatrician's role in recognizing and intervening in postpartum depression. *Pediatr Clin North Am*. 2004;51(3):785–801
15. Ebmeier KP, Donaghey C, Steele JD. Recent developments and current controversies in depression [comment]. *Lancet*. 2006;367(9505):86
16. Weissman MM, Pilowsky DJ, Wickramaratne PJ, et al. Remissions in maternal depression and child psychopathology: a STAR*D-child report. *JAMA*. 2006;295(12):1389–1398
17. Nulman I, Rovet J, Stewart DE, et al. Child development following exposure to tricyclic antidepressants or fluoxetine throughout fetal life: a prospective, controlled study. *Am J Psychiatry*. 2002;159(11):1889–1895
18. Brent DA, Kolko DJ, Birmaher B, et al. Predictors of treatment efficacy in a clinical trial of three psychosocial treatments for adolescent depression. *J Am Acad Child Adolesc Psychiatr*. 1998;37(9):906–914
19. Modell JC, Modell JG, Wallander J, Hodgins B, Duke L, Wisely D. Maternal ratings of child behavior improve with treatment of maternal depression. *Fam Med*. 2001;33(9):691–695
20. Chaudron LH, Szilagyi PG, Campbell AT, Mounts KO, McInerney TK. Legal and ethical considerations: risks and benefits of postpartum depression screening at well-child visits. *Pediatrics*. 2007;119(1):123–128
21. Dubowitz H, Feigelman S, Lane W, et al. Screening for depression in an urban pediatric primary care clinic. *Pediatrics*. 2007;119(3):435–443
22. Heneghan AM, Mercer M, DeLeone NL. Will mothers discuss parenting stress and depressive symptoms with their child's pediatrician? *Pediatrics*. 2004;113(3 pt 1):460–467
23. Prazar G. How many pediatricians does it take to change a practice? Or how to incorporate change into practice. *Arch Pediatr Adolesc Med*. 2005;159(5):500–502
24. Williams JW Jr. Competing demands: does care for depression fit in primary care? *J Gen Intern Med*. 1998;13(2):137–139
25. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Washington, DC: American Psychiatric Association; 2000
26. Pignone MP, Gaynes BN, Rushton JL, et al. Screening for depression in adults: a summary of the evidence for the US Preventive Services Task Force. *Ann Intern Med*. 2002;136(10):765–776
27. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care*. 2003;41(11):1284–1292
28. Whooley MA, Avins AL, Miranda J, Browner WS. Case-finding instruments for depression: two questions are as good as many. *J Gen Intern Med*. 1997;12(7):439–445
29. Olson AL, Dietrich AJ, Prazar G, et al. Two approaches to maternal depression screening during well child visits. *J Dev Behav Pediatr*. 2005;26(3):169–176
30. Weinberg MK, Tronick EZ. Emotional characteristics of infants associated with maternal depression and anxiety. *Pediatrics*. 1998;102(5 suppl E):1298–1304
31. Howell EA, Mora P, Leventhal H. Correlates of early postpartum depressive symptoms. *Matern Child Health J*. 2006;10(2):149–157
32. Surkan PJ, Peterson KE, Hughes MD, Gottlieb BR. The role of social networks and support in postpartum women's depression: a multiethnic urban sample. *Matern Child Health J*. 2006;10(4):375–383
33. Ritter C, Hobfoll SE, Lavin J, Cameron RP, Hulsizer MR. Stress, psychosocial resources, and depressive symptomatology during pregnancy in low-income, inner-city women. *Health Psychol*. 2000;19(6):576–585
34. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatr*. 1987;150(6):782–786
35. Harris B, Huckle P, Thomas R, Johns S, Fung H. The use of rating scales to identify post-natal depression. *Br J Psychiatr*. 1989;154(6):813–817
36. Stevens-Simon C, Kelly L, Kulick R. A village would be nice but it takes a long acting contraceptive to prevent repeat adolescent pregnancies. *Am J Prevent Med*. 2001;21(1):60–65
37. Elfenbein DS, Felice ME. Adolescent pregnancy. *Pediatr Clin North Am*. 2003;50(4):781–800
38. Sheeder J, Scott S, Stevens-Simon C. The Electronic Report on Adolescent Pregnancy (ERAP). *J Pediatr Adolesc Gynecol*. 2004;17(5):341–346
39. Murray L, Carothers AD. The validation of the Edinburgh Post-natal Depression Scale on a community sample. *Br J Psychiatry*. 1990;157:288–290
40. Birkeland R, Thompson JK, Phares V. Adolescent motherhood and postpartum depression. *J Clin Child Adolesc Psychol*. 2005;34(2):292–300
41. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. *J Appl Psychol Meas*. 1977;1(1):385–401
42. American College of Obstetricians and Gynecologists. Committee on Health Care for Underserved Women. ACOG Committee opinion No. 343: psychosocial risk factors—perinatal screening and intervention. *Obstet Gynecol*. 2006;108(2):469–77
43. Swartz HA, Shear MK, Wren FJ, et al. Depression and anxiety among mothers who bring their children to a pediatric mental health clinic. *Psychiatr Serv*. 2005;56(9):1077–1083
44. Holub CK, Kershaw TS, Ethier KA, Lewis JB, Milan S, Ickovics JR. Prenatal and parenting stress on adolescent maternal adjustment: identifying a high-risk subgroup. *Matern Child Health J*. 2007;11(2):153–159
45. Brennan PA, Hammen C, Andersen MJ, Bor W, Najman JM, Williams GM. Chronicity, severity, and timing of maternal depressive symptoms: relationships with child outcomes at age 5. *Dev Psychol*. 2000;36(6):759–766

APPENDIX EDINBURGH POSTPARTUM DEPRESSION SCALE

As you have recently had a baby, we would like to know how you are feeling.
Please UNDERLINE the answer that comes closest to how you have felt
IN THE PAST 7 DAYS, not just how you feel today.

| | |
|--|--|
| <p><u>I have been able to laugh and see the funny side of things.</u></p> <p>As much as I always could Not quite so much now Definitely not so much now Not at all</p> | <p><u>I have looked forward with enjoyment to things. *</u></p> <p>As much as I ever did Rather less than I used to Definitely less than I used to Hardly at all</p> |
| <p><u>I have blamed myself unnecessarily when things went wrong.</u></p> <p>Yes, most of the time Yes, some of the time Not very often No, never</p> | <p><u>I have been anxious or worried for no good reason.</u></p> <p>No, not at all Hardly ever Yes, sometimes Yes, very often</p> |
| <p><u>I have felt scared or panicky for not very good reason.</u></p> <p>Yes, quite a lot Yes, sometimes No, not much No, not at all</p> | <p><u>Things have been getting on top of me.</u></p> <p>Yes, most of the time I haven't been able to cope at all Yes, sometimes I haven't been coping as well as usual No, most of the time I have coped quite well No, I have been coping as well as ever</p> |
| <p><u>I have been so unhappy that I have had difficulty sleeping.</u></p> <p>Yes, most of the time Yes, sometimes Not very often No, not at all</p> | <p><u>I have felt sad or miserable. *</u></p> <p>Yes, most of the time Yes, quite often Not very often No, not at all</p> |
| <p><u>I have been so unhappy that I have been crying.</u></p> <p>Yes, most of the time Yes, quite often Only occasionally No, never</p> | <p><u>The thought of harming myself has occurred to me.</u></p> <p>Yes, quite often Sometimes Hardly ever Never</p> |

Yellow = EPDS-3 White= EPDS-7 Green = EPDS-2

* Original PHQ-2 depression screener (26):

Over the last 2 weeks, how often have you been bothered by any of the following problems?:

I've had little interest or pleasure in doing things.

Not at all = 0 Several days = 1 More than half the days = 2 Nearly everyday = 3

I've been feeling down, depressed, or hopeless.

Not at all = 0 Several days = 1 More than half the days = 2 Nearly everyday = 3

Depression cut-off is a score ≥ 3

Identifying Postpartum Depression: Are 3 Questions as Good as 10?

Karolyn Kabir, Jeanelle Sheeder and Lisa S. Kelly

Pediatrics 2008;122:e696

DOI: 10.1542/peds.2007-1759

| | |
|---|---|
| Updated Information & Services | including high resolution figures, can be found at: http://pediatrics.aappublications.org/content/122/3/e696.full.html |
| References | This article cites 43 articles, 17 of which can be accessed free at: http://pediatrics.aappublications.org/content/122/3/e696.full.html#ref-list-1 |
| Citations | This article has been cited by 1 HighWire-hosted articles: http://pediatrics.aappublications.org/content/122/3/e696.full.html#related-urls |
| Subspecialty Collections | This article, along with others on similar topics, appears in the following collection(s): Office Practice http://pediatrics.aappublications.org/cgi/collection/office_practice |
| Permissions & Licensing | Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://pediatrics.aappublications.org/site/misc/Permissions.xhtml |
| Reprints | Information about ordering reprints can be found online: http://pediatrics.aappublications.org/site/misc/reprints.xhtml |

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2008 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

