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ORIGINAL RESEARCH

Screening of psychiatric disorders in women with high-risk pregnancy: Accuracy of three psychological tools

Angela Hamidia[1] | Farzan Kheirkhah[1] | Mohammad Chehrazi[2] | Zahra Basirat[3] | Reza Ghadimi[4] | Shahnaz Barat[3] | Pim Cuijpers[5] | Elizabeth O'Connor[6] | Seyyedeh Mahboubeh Mirtabar[7] | Mahbobeh Faramarzi[8]

[1]Social Determinants of Health Research Center, Health Research Institute, Department of Psychiatry, Babol University of Medical Sciences, Babol, Iran

[2]Department of Biostatistics and Epidemiology, School of Public Health, Babol University of Medical Sciences, Babol, Iran

[3]Infertility and Health Reproductive Research Center, Health Research Institute, Department of Obstetrics and Gynecology, Babol University of Medical Sciences, Babol, Iran

[4]Social Determinants of Health Research Center, Health Research Institute, Social Medicine Department, Babol University of Medical Sciences, Babol, Iran

[5]Department of Clinical Neuro and Developmental Psychology, Amsterdam Public Health Research Institute, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

[6]Center for Health Research, Kaiser Permanente Northwest, Portland, Oregon, USA

[7]Student Research Committee, Babol University of Medical Sciences, Babol, Iran

[8]Social Determinants of Health Research Center, Health Research Institute, Department of General Courses, Babol University of Medical Sciences, Babol, Iran

Correspondence
Mahbobeh Faramarzi, Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran.
Email: mahbob330@yahoo.com

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Abstract

Purpose: This study investigated the optimal cutoff points of three psychological tools for screening psychiatric disorders in women with high-risk pregnancy.

Design and Methods: In this cross-sectional study (N = 155), sensitivity/specificity of the Edinburgh Postnatal Depression Scale (EPDS), the Brief Symptom Inventory 53-items (BSI-53), and the BSI-18 were computed with respect to having a psychiatric diagnosis based on the clinical interview.

Results: The usual cutoffs (≥13 for EPDS, T-score of 63 for BSI-53) demonstrated poor diagnostic accuracy. The optimal thresholds were computed for EPDS cutoff of 6.5, GSI = 0.47 for BSI-53, and GSI = 0.5 for BSI-18.

Practice Implications: The use of psychological tools among pregnant women with high-risk pregnancy may need to be modified in order to accurately identify psychiatric disorders.

KEYWORDS
anxiety, depression, high-risk, mental disorders, pregnancy, screening

1 | INTRODUCTION

Perinatal mental disorders are a major public health concern. The overall prevalence of perinatal psychiatric symptoms ranges from 14% to 30%.[1,2] Mental disorders are associated with problematic health behaviors as well as poor maternal and fetal outcomes.[3,4] Evidence emphasized that perinatal mental disorders increase the risk of complications of pregnancy such as spontaneous abortion, preterm delivery, and hypertension.[5,6] In addition, infants born to mothers with psychiatric symptoms have an increased risk of premature delivery, low birth weight, gestational hypertension, perinatal death, and congenital malformations.[7,8] Identification of psychological difficulties during pregnancy may help prevent some of the devastating consequences of mental health issues on both women and children. Indeed, a systematic review confirmed that screening programs in perinatal women reduced the likelihood of depression at 3 to 5 months' follow-up.[9]

Women with high-risk pregnancies, associated with obstetric complications, seem to be at particularly increased risk for developing mental disorders.[10] A recent review study reported the prevalence of prenatal depression as 12.5% to 44.2% in pregnant women with high-risk pregnancies.[11] Most research examined the prevalence of depression in women with high-risk pregnancy,[12] while other mental disorders have remained neglected.

Successful screening of perinatal mental disorders in women with high-risk pregnancies would require screening tools with demonstrated accuracy. There are unfortunately still some shortcomings in the scales of psychiatric tools during pregnancy. These include the multitude of various optimal cutoffs, particularly in different cultures and for non-English language versions of screening instruments.[13]

The Symptom Checklist 90-R (SCL-90-R)[14] and short versions of the SCL-90-R such as the Brief Symptom Inventory (BSI-53)[15] and BSI-18[16] are widely used instruments to assess psychiatric symptoms, such as depression, anxiety, and somatization.[17,18]

Finally, the Edinburgh Postnatal Depression Scale (EPDS-10 item) is a common screening tool with high accuracy for detecting perianal and postnatal depression.[19] Evidence supports that the EPDS is useful for screening mental disorders such as anxiety during pregnancy.[20] Although some studies have used the psychological screening tools for both low-risk and high-risk pregnant women,[11,12] no study has reported the accuracy of psychological tools for detecting mental disorders in pregnant women with high-risk pregnancy.

To our knowledge, there is no published study simultaneously assessing the accuracy of the three psychological tools for screening mental disorders among women affected by high-risk pregnancy. To overcome the previously described limitations, the aims of this study were to (a) validate EPDS, BSI-53, and BSI-18 for use in identifying mental disorders in pregnant women with high-risk pregnancy; (b) clarify the sensitivity and specificity and optimal cutoff points of the scales; and (c) establish whether the means of the three scales differ among outpatient and inpatient high-risk pregnant women.

2 | METHODS

2.1 | Study participants

Enrollment of participants for this study was performed from December 2019 to January 2020 at Obstetric Department of University Hospital, a tertiary referral perinatal center care of the University of Medical Sciences in the city (3000 deliveries per year). Women with high-risk pregnancy were enrolled in the study consecutively and according to their convenient accessibility. The sample size was calculated for an area under the Receiver Operating Characteristic (ROC) curve of at least 0.65, power of 0.9, and type I error of 0.05. Null hypothesis was set to 0.05. Sample size calculations indicated that 155 participants were needed to detect this level of diagnostic accuracy for the BSI-53 for screening mental disorders among women with high-risk pregnancy.

The study population consisted of women experiencing high-risk pregnancy recruited from either an inpatient high-risk pregnancy unit or an outpatient obstetric clinic. High-risk pregnancy was identified through a department's obstetrical checklist.[21] The checklist classified the risks into three main categories: (a) maternal factors: such as pregnancy in women over the age of 35, pregnancy in teenagers; (b) pregnancy factors: such as hypertension, diabetes, preterm birth, and placenta abruption; and (c) fetal factors: such as congenital defects, multiple gestation, and fetal growth restriction. Other inclusion criteria were age of at least 18 years, educational level above 5 years, and no report of severe developmental delay or intellectual disability. Women who were taking any antidepressant or other psychiatric medications were excluded. All women provided written informed consent when they met the eligibility criteria to enter the study.

2.2 | Assessments

2.2.1 | Structured Clinical Interview for the DSM-5

All participants were examined through the individual SCID-5 for diagnosis of all perinatal mental disorders. The SCID is established as the gold standard for evaluating mental disorders in diverse cultural settings and countries.[22] Participants meeting the criteria for ≥1 SCID diagnoses were considered to have a psychiatric diagnosis.

2.2.2 | The BSI-53

It was developed by Derogatis in 1975. It is composed of nine symptom subscales, including somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The responses ranged from 0 (never) to 4 (always) (5-point Likert). The Global Severity Index (GSI) is calculated as the average score across all BSI 53 items, measuring the extent or depth of the individual's psychiatric symptoms. The GSI and subscale scores are converted to T-scores based on a normative sample. There are two cutoffs for probable mental disorders based on BSI-53: (a) T-score for GSI of 63 or greater, or (b) T-score of 63 or greater on 2 or more subscales. We

used validated Persian version of BSI-53. Test-retest reliability of Persian BSI-53 for 9 scales was between 0.75 and 0.91.[22]

2.2.3 | The BSI-18

It is the short form of BSI-53 and includes 18 of the BSI-53 items. It has three subscales, including somatization, depression, and anxiety, alongside the GSI (max = 72). Higher scores on the BSI-18 reflect greater psychiatric symptoms. Psychometric properties of the BSI-18 have been used in various countries and languages.[17] In this study, the patients filled BSI-53, and then we calculated the BSI-18 score by extracting the answers to the 18 questions of BSI-18. The Persian version of BSI-18 has good validity and reliability. Test-retest reliability of Persian BSI-18 was reported as 0.81.[23]

2.2.4 | The EPDS

It is a widely used tool to identify antenatal and postnatal depression in worldwide research. It consists of 10 items with response categories from 0 (never) to 3 (always) (4-point Likert). Total scores range from 0 to 30. Higher scores of EPDS reflect greater depressive symptoms. The most common cutoff for screening depressive symptoms is ≥13, however, optimal cutoffs have been reported along the full range of ≥10-13.[24] We used the validated Persian EPDS in this study. The coefficient alpha for the Persian EPDS reported 0.83.[25]

2.3 | Statistical analysis

Demographic characteristics as well as the prevalence of psychiatric disorders were compared between outpatient and inpatients pregnant women by chi-square test. In addition, two independent sample t-tests were used to compare the mean scores of psychiatrics tools and their relevant subscales between the two groups of high-risk pregnant women: inpatients and outpatients. Sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), positive-clinical utility index (P-CUI), and negative-clinical utility index (N-CUI) were computed from the data and the calculations were done for cutoff values of EPDS, GSI for BSI-53, T-score for BSI-53, and GSI for BSI-18. We used the GSI T-score cutoff of the BSI-53 was used in isolation rule (not in combination with the T-scores on 2 subscales >63). P-CUI index was defined as >0.81(excellent), >0.64 (good), >0.49 (adequate), and >0.36 (poor). All statistical analyses were done via STATA version 15 (STATA Corp, College Station, Texas) at level of type I error 0.05.

2.4 | Data collection

During the project period, a member of the research team interviewed pregnant women who received prenatal visits at the obstetric clinic or were hospitalized in the high-risk pregnancy unit, to assess the inclusion criteria. Eligible women who consented to be in the study were asked to complete the EPDS and BSI-53, and were then referred to psychiatric resident for clinical interviews in a private room in clinic/unit. The

TABLE 1 Demographics of the population study in two groups with and without psychiatric disorders based on SCID-5[a,b]

	With psychiatric disorders (n = 92)	Without psychiatric disorders (n = 63)		
Variable	N (%)	N (%)	*P* value	Total N (%)
Age (y)				
<21	7 (7.5)	10 (16.1)	.017	17 (11.1)
21-30	29 (31.3)	28 (45.2)		57 (37.0)
>30	57 (61.3)	24 (38.7)		80 (51.9)
Education				
Primary school	4 (4.3)	1 (1.6)	.312	5.0 (3.2)
High school	67 (72.8)	41 (66.1)		108 (70.1)
University	21 (22.8)	20 (32.3)		41 (26.7)
Job				
Unemployed	83 (89.2)	57 (91.9)	.397	140 (90.3)
Employed	10 (10.8)	5 (8.1)		15 (9.7)
Gestational age (wk)				
<14	4 (6.6)	10 (11.1)	.050	14 (9.6)
14-26	16 (26.2)	3 (3.3)		19 (13.1)
>26	41 (67.2)	77 (85.6)		112 (77.2)
Living place				
Rural	56 (60.9)	29 (46.8)	.059	85 (55.1)
Urban	36 (39.1)	33 (53.2)		69 (44.9)

Note: With psychiatric disorders: ≥1 SCID diagnoses, without psychiatric disorders: any disorders based on SCID diagnoses.
[a]There are some missing values for some demographic information.
[b]n = 155.

SCID-5[26] was conducted by one of three trained psychiatric residents, who received ongoing supervision by a psychiatrist of the research team for all participants. At the end of the interview, inpatient women diagnosed as having a psychiatric disorder were given an appointment with a psychiatrist and a referral to a psychiatric clinic to receive appropriate treatment. To prevent interviewer bias and ensure diagnostic reliability, the residents had no previous knowledge about the pregnant women and were blind to scores of EPDS and BSI-53. Information was collected from the staff and a resident by a midwife who was independent of the research team and was blind to scores of both questionnaires and the diagnoses made by the residents.

We enrolled 177 pregnant women with a high-risk pregnancy. Twenty-two patients filled out the questionnaires, but were discharged from the hospital or left the clinic before the clinical interview was completed, leaving final samples of 155 women.

3 | FINDINGS

Table 1 presents the characteristics of the participants in two groups of women with psychiatric disorders or without psychiatric disorders based on SCID-V. Of these 155 pregnant women with high-risk pregnancy, 54 (34.8%) were hospitalized in a high-risk pregnancy unit. Most participants (73.4%) had a high-school educational level. They were on average 30.3 years old (SD = 6.4 years). The major complications of pregnancy affecting the women were diabetes, hypertension, and premature rupture of membrane. There were no statistically significant differences between the women with high-risk pregnancies who were with psychiatric disorders and without psychiatric disorders in demographic characteristics, including education, occupation, gestational age, and place of residence, except age ($P > .05$). Women with psychiatric disorders had older age than those without psychiatric disorders ($P = .017$).

Table 2 compares the mean and SD of scores of psychiatric symptoms based on screening tools in two groups of women within two groups of women with psychiatric disorders or without psychiatric disorders based on SCID-V. The results of Student *t* test revealed that women diagnosed with psychiatric disorders had higher scores regarding depressive symptoms based on Edinburg Postnatal Depression Scale (EPDS) than those without psychiatric disorders. In addition, women who had psychiatric disorders had higher mean scores of three subscales of BSI-18, including somatization, depression, and anxiety as well as GSI-18 than those without psychiatric disorders. Similarly, women diagnosed with psychiatric disorders had statistically significantly higher mean scores on nine subscales of BSI-53, including somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism as well as GSI-53 than those without psychiatric disorders.

Table 3 shows the frequency of psychiatric disorders based on the SCID-5. Of patients identified through the outpatient obstetric clinic, 55.4% (56/101) met the criteria for a psychiatric disorder based on SCID-5, compared with 66.6% (36/54 persons) of the participants hospitalized in the high-risk unit. Chi-square tests revealed no

TABLE 2 Mean and SD of the measurements for patients with psychiatric disorders and without psychiatric disorders based on SCID-5 (n = 155)

Variable	With psychiatric disorders Mean (SD)	Without psychiatric disorders Mean (SD)	*P* value	Total Mean (SD)
EPDS	9.42 ± 5.06	5.34 ± 3.78	<.001	7.84 ± 5.01
BSI-18				
Somatization	0.89 ± 0.68	0.50 ± 0.40	<.001	0.74 ± 0.62
Depression	0.5683 ± 0.75	0.23 ± 0.37	<.001	0.59 ± 0.69
Anxiety	0.99 ± 0.68	0.34 ± 0.40	<.001	0.73 ± 0.67
GSI-18	0.51 ± 0.03	0.20 ± 0.18	<.001	0.71 ± 0.61
BSI-53				
Somatization	0.86 ± 0.02	0.51 ± 0.39	.002	0.73 ± 0.57
Obsession-compulsion	0.89 ± 0.74	0.40 ± 0.37	<.001	0.70 ± 0.66
Depression	0.83 ± 0.71	0.23 ± 0.37	<.001	0.59 ± 0.69
Anxiety	0.99 ± 0.68	0.34 ± 0.40	.012	0.73 ± 0.66
Phobic	0.51 ± 0.52	0.28 ± 0.37	<.001	0.42 ± 0.48
Paranoid ideation	1.20 ± 0.92	0.63 ± 0.47	<.001	0.97 ± 0.81
Psychoticism	0.72 ± 0.67	0.18 ± 0.21	<.001	0.50 ± 0.60
Interpersonal sensitivity	0.97 ± 0.87	0.43 ± 0.43	<.001	0.75 ± 0.77
Hostility	0.69 ± 0.55	0.31 ± 0.29	<.001	0.54 ± 0.50
GSI-53	0.84 ± 0.59	0.36 ± 0.27	<.001	0.65 ± 0.54

Abbreviations: BSI-18, Brief Symptom Inventory 18-items; BSI-53, Brief Symptom Inventory 53-items; EPDS, Edinburgh Postnatal Depression Scale; GSI, Global Severity Index.

TABLE 3 Frequency of psychiatric disorders based on SCID-5 among inpatients and outpatients women with high-risk pregnancy

Disorders	Overall N = 92 n (%)	Outpatients N = 56 n (%)	Inpatients N = 36 n (%)
Bipolar disorder	7 (7.6)	3 (5.3)	4 (11.1)
Major depressive disorder	2 (2.2)	2 (3.7)	0 (0.0)
Dysthymic disorder	9 (9.8)	6 (10.7)	3 (8.3)
Generalized anxiety disorder	4 (4.3)	1 (1.8)	3 (8.3)
Specific phobia	13 (14.1)	6 (10.7)	7 (19.5)
Obsessive-compulsive disorder	30 (32.6)	16(28.5)	14 (38.9)
Adjustment			
Depression	24 (26.1)	1 (1.8)	0 (0.0)
Anxiety		7 (12.5)	3 (8.3)
Mixed depression and anxiety		11 (19.6)	2 (5.6)
Adult attention deficit and hyperactivity disorder	1 (1.1)	1 (1.7)	0 (0.0)
Substance use disorder	2 (2.2)	2 (3.7)	0 (0.0)

Abbreviation: SCID-5: Structured Clinical Interview for the DSM-5.

TABLE 4 Sensitivity and specificity of EPDS and BSI-53 with usual cutoff points for screening psychiatric disorders among women with high-risk pregnancy

	Diagnosis of disorders with SCID-5						
Psychiatric tools	No	Yes	Sensitivity 95% (CI)	Specificity 95% (CI)	PLR 95% (CI)	NLR 95% (CI)	AUC 95% (CI)
EPDS≤ 13			29.07 (19.78-39.86)	98.21 (90.45-99.95)	16.28 (2.27-116.76)	0.72 (0.63-0.83)	0.637 (0.585-0.687)
No	55	1					
Yes	61	25					
BSI-53 with T-score ≤63			2.86 (0.35-9.94)	100 (92.6-100)	NA	0.97 (0.93-1.01)	0.514 (0.421-0.533)
No	48	0					
Yes	68	2					

Abbreviations: AUC, the area under the ROC curve; BSI-53, Brief Symptom Inventory 53-items; CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; NA, not available; NLR, negative likelihood ratio; PLR, positive likelihood ratio; SCID-5, Structured Clinical Interview for the DSM-5.

differences in the frequency of psychiatric disorders based on SCID-5 in inpatient women hospitalized in high-risk pregnancy unit and in outpatients in the obstetric clinic ($\chi^2 = 1.837$, df = 1, $P = .118$).

Overall, 92 pregnant women with high-risk pregnancy (61.9%) were diagnosed as having the symptoms meeting the criteria for a psychiatric disorder. The frequencies for specific disorders are as follows: obsessive-compulsive disorders (30/92, 32.6%) and adjustment disorders (24/92, 26.1%) were the more frequent diagnoses, followed by phobia (13/92, 14.1%), depressive disorders (11/92, 11.9%), bipolar disorders (7/92, 7.6%), GAD (4/92, 4.3%), and substance use disorders (2/92, 2.8%).

Table 4 reports the sensitivity (probability of a score detecting the test outcome in a psychiatric disorder) and specificity (probability of a negative test outcome in a nonpsychiatric disorder individual) for pregnant women with high-risk pregnancy based on usual cutoff points (13 for EPDS, and T-score of 63 for BSI-53) that previous research has proposed for pregnant women. The sensitivity of EPDS for cutoff points 13 was low (29.7%, 95% CI, 19.8% to 39.9%). In addition, the sensitivity of BSI-53 for the threshold of T-score of 63 was very low (2.9%, 95% CI, 0.4% to 9.9%).

Table 5 indicates the sensitivity and specificity of EPDS, BSI-53, and BSI-18 with cut-off points for screening psychiatric disorders among women with high-risk pregnancy. The AUC indicated that an EPDS cutoff of 6.5 had the best sensitivity and specificity for detection of any psychiatric disorder in pregnant women with high-risk pregnancy, with adequate P-CUI (0.56). In addition, the threshold of T-score of 39.35 and GSI = 0.47 for BSI-53, and GSI = 0.5 for BSI-18 were the best sensitivity and specificity for detection of any psychiatric disorder in pregnant women with high-risk pregnancy.

The receiver operating characteristic curve also showed that the GSI threshold of 0.5 for BSI-18 and specificity of 75% had the best cutoff point for detection of psychiatric disorders in pregnant women with a high-risk pregnancy, with adequate P-CUI (0.61). Further, the best sensitivity and specificity for detection of psychiatric disorders in

TABLE 5 Sensitivity and specificity of EPDS, BSI-53, and BSI-18 with cutoff points for screening psychiatric disorders among women with high-risk pregnancy

Psychiatric tools	Sensitivity 95% (CI)	Specificity 95% (CI)	PLR 95% (CI)	NLR 95% (CI)	AUC 95% (CI)	P-CUI	N-CUI
EPDS 6.5	0.77 (0.66-0.85)	0.55 (0.42-0.69)	1.72 (1.26-2.35)	0.42 (0.27-0.66)	0.66 (0.58-0.74)	0.56	0.33
GSI of BSI-18 (0.50)	0.75 (0.63-0.86)	0.75 (0.59-0.87)	3.02 (1.73-5.26)	0.33 (0.20-0.53)	0.75 (0.66-0.84)	0.62	0.50
GSI of BSI-53 (0.47)	0.69 (0.56-0.79)	0.71 (0.56-0.83)	2.35 (1.47-3.76)	0.44 (0.30-0.66)	0.70 (0.61-0.78)	0.53	0.43
T-score for BSI-53 (39.35)	0.69 (0.56-0.79)	0.71 (0.56-0.83)	2.35 (1.47-3.76)	0.44 (0.30-0.66)	0.70 (0.61-0.78)	0.53	0.43

Abbreviations: AUC, the area under the ROC curve; CI = confidence interval; BSI-18, Brief Symptom Inventory 18-items; BSI-53, Brief Symptom Inventory 53-items; EPDS, Edinburgh Postnatal Depression Scale; GSI, Global Severity Index; NLR, negative likelihood ratio; PLR, positive likelihood ratio; SCID-5, Structured Clinical Interview for the DSM-5.

pregnant women with high-risk pregnancy for BSI-53 was the GSI threshold of 0.47, specificity of 71%. Because using a T-score of 63 demonstrated poor accuracy for detection of psychiatric disorders in women with high-risk pregnancy, we calculated the best sensitivity and specificity for T-score of BSI-53 (Figures S1-S3).

4 | DISCUSSION

The study investigated the prevalence of psychiatric conditions and the diagnostic accuracy of the BSI-53, BSI-18, and EPDS to screen for mental disorders in women with high-risk pregnancy.

This study found that the frequency of mental disorders diagnosed based on current symptoms meeting criteria for a psychiatric disorder according to SCID-5 was high (61.9%) in women with high-risk pregnancy in a tertiary referral perinatal healthcare center. The percentage of mental disorders found in this study was higher than in other studies.[9] Dagklis et al[27] investigated the prevalence of depressive symptoms among pregnant women hospitalized in a high-risk pregnancy unit due to threatened preterm labor.[27] The differences observed in prevalence may be due to a number of reasons. Unlike most studies, we reported the prevalence of the mental disorders based on SCID-5, not psychiatric tools. In addition, we defined the mental disorders for pregnant women with high-risk pregnancy who met the criteria for ≥1 SCID diagnoses.

The most frequent diagnosis of the current disorders among women with high-risk pregnancy was obsessive-compulsive disorders, followed by adjustment disorders, phobia, depressive disorders, bipolar disorders, Generalized Anxiety Disorder (GAD), and substance use disorders. Although anxiety and related disorders such as adjustment, GAD, and panic disorder are the most common of all psychiatric conditions.[28] Few studies have reported mental disorders among pregnant women, especially women with high-risk pregnancy. A study reported a 12.5% prevalence of anxiety disorders.[29] A study reported that anxiety disorders in pregnancy were found to be 6.58 times greater for women with high-risk pregnancy than their low-risk counterparts.[30] The rate of Obsession Compulsion Disorder (OCD) was reported at 2.07% for pregnant women and 2.43% for women in the postpartum period.[31]

Our founding revealed that women with psychiatric disorders had older age than those without psychiatric disorders. In addition, the mean scores of all of the psychiatric symptoms based on screening tools were higher in women with psychiatric disorders than those without psychiatric disorders. In line with our results, some previous studies supported that older age was associated with psychiatric disorders.[32,33] However, some research reported that younger age was a risk factor for psychiatric disorders in pregnant women.[34,35]

Interestingly, this study revealed that 29.7% of women with mental disorders identified with cut-off point more than 13 for EPDS. The EPDS is a suitable tool for screening mental disorders and depressive disorders women with high-risk pregnancy whenever the cutoff of ≥6.5 is determined for it. In line with our study, Alvarado-Esquivel et al[36] investigated the capacity of EPDS for discriminating mental disorders other than depression in 300 pregnant women in northern Mexico. That study reported the best EPDS score for screening of mental disorders as 8.9 (sensitivity of 52.4%, specificity of 67.0%, positive predictive value of 11.5%, a negative predictive value of 95.4%, AUC 0.643). The difference between Alvarado-Esquivel' report and our study was that the population in our study consisted of high-risk pregnant women.

We found that the optimal T-score threshold of 63 for BSI-53 is not appropriate for screening perinatal mental disorders in women with high-risk pregnancy. In addition, only 2.9% of pregnant women with mental disorders identified with BSI-53 for the threshold of T-score of 63. This study proposed the optimal T-score threshold of 39.35 and GSI = 0.47 for BSI-53 among women with high-risk pregnancy. As this has been the first study to have investigated the diagnostic accuracy of psychiatric tools for screening perinatal mental disorders in women with high-risk pregnancy, we could not find any research to use BSI-53, BSI-18, and EPDS, in women visited in outpatient/inpatient high-risk pregnancy units. Thus, we compared the preset study against other non-pregnant populations. Petkus et al[37] evaluated the factor structure and psychometric properties of BSI-18 in a sample of 142 older adults. The results showed that the cutoff score of T = 63 proposed by the original author[38] did not have suitable sensitivity and specificity for detection of mental disorders. The study proposed a cutoff score of T = 50 for detecting three subscales of BSI-18.[37] Another study investigated the validity of BSI-18 cutoff scores in survivors of cancer. It reported that no alternative BSI-18 cutoff scores met the study criteria for clinical screening in the public.[39]

This study had a number of strengths and limitations. This was the first study assessing the accuracy of three psychiatric tools for screening antenatal mental disorders in women with high-risk pregnancy. Other strengths included the use of a gold standard design whereby the responses of the three scales were compared against an independently administered psychiatric diagnostic interview by a trained resident psychiatrist (SCID-5). In addition, we included both pregnant women with complications of pregnancy, hospitalized in a high-risk pregnancy unit, and those visited in an outpatient obstetric clinic. One limitation is that we did not have enough data to compare the participants who completed the clinical interview to the 12 women who did not. Another limitation is that only one psychiatry registrar administrated and scored the SCID. Having two assessors and calculating inter-rater reliability would have increased the objectivity of our findings.

Our finding suggests that screening for all psychiatric disorders, especially OCD, adjustment, anxiety, should be implemented alongside depression. In maternity units, nursing/obstetricians need to identify whether or not a woman has any psychiatric disorders, not solely a specific disorder such as depression. Nurses who work in maternity care units should be informed that three psychiatric tools, including the EPDS, BSI-53, and BSI-18 are useful tools for case identification of psychiatric disorders in women with high-risk pregnancy. An EPDS score of 6.5, BSI-53 GSI score of 0.47, and BSI-18 GSI of 0.027 suggest a pregnant woman may have a psychiatric disorder, and needs to consult with a psychologist or psychiatric for further clinical assessment.

5 | CONCLUSION

The high prevalence of psychiatric disorders in outpatients and inpatients women with high-risk pregnancy confirmed that antenatal screening of psychiatric disorders with suitable tools is vital. These findings suggest that obstetricians should pay attention in using of cutoff scores of psychological tools in women with high-risk pregnancy. The study proposed that EPDS can be considered for screening psychiatric disorders other than depression among pregnant women with high-risk pregnancy whenever a cutoff score of 6.5 is used. The study also proposed the threshold of T-score of 39.35 and GSI = 0.47 for BSI-53, and GSI = 0.5 for BSI-18. Further research is required to replicate the findings and investigate whether the cutoffs are confirmed in other societies. Further research is also necessary to determine whether routine screening of psychiatric disorders among women with high-risk pregnancy with these tools is necessary. In addition, future studies should determine whether routine screening of psychiatric disorders would prevent the negative psychological problems of untreated psychiatric disorders. Understanding if routing screening of psychiatric disorders in women with high-risk pregnancy is cost-effective and how such programs can be implemented in inpatient and outpatient management of women is, therefore, an important area of focus for clinicians and researchers.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The authors declare that there is no conflict of interests.

AUTHOR CONTRIBUTIONS

Conceptualization: Angela Hamidia, Mahbobeh Faramarzi, Zahra Basirat. Pim Cuijpers, Elizabeth O'Connor
Data Curation: Seyyedeh Mahboubeh Mirtabar
Formal Analysis: Mohammad Chehrazi
Investigation: Angela Hamidia, Reza Ghadimi
Methodology: Mohammad Chehrazi, Mahbobeh Faramarzi, Angela Hamidia
Project Administration: Farzan Kheirkhah, Angela Hamidia
Supervision: Shahnaz Barat
Writing—Original Draft Preparation: Mahbobeh Faramarz
Writing—Review and Editing: Pim Cuijpers, Elizabeth O'Connor
All authors have read and approved the final version of the manuscript. Mohammad Chehrazi had full access to all the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

Mahbobeh Faramarzi affirms that this manuscript is an honest, accurate, and transparent account of the study being reported that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

DATA AVAILABILITY STATEMENT

The datasets generated and analyzed for the current study are not publicly available due to ethical concerns, but are available from the corresponding author upon reasonable request and after clearance from the ethics committee.

ORCID

Angela Hamidia https://orcid.org/0000-0003-3113-2383
Farzan Kheirkhah https://orcid.org/0000-0003-1420-5480

Mohammad Chehrazi https://orcid.org/0000-0003-1770-4170
Reza Ghadimi https://orcid.org/0000-0002-4296-2836
Shahnaz Barat https://orcid.org/0000-0002-7536-7267
Pim Cuijpers https://orcid.org/0000-0001-5497-2743
Seyyedeh Mahboubeh Mirtabar https://orcid.org/0000-0003-2679-5449
Mahbobeh Faramarzi https://orcid.org/0000-0002-3568-7039

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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