Implementing a Perinatal Depression Screening in Clinical Routine: Exploring the Patient's Perspective

Einführung eines Screenings auf perinatale Depression als Teil der Schwangerschaftsvorsorge aus Sicht der Patientinnen

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ABSTRACT

Introduction Perinatal depression (PND) is a frequently observed mental disorder, showing a prevalence of up to 20% and resulting in unfavorable maternal and neonatal outcomes. Targeted screening for PND offers the potential to identify and treat undiagnosed cases and help prevent its deleterious consequences. The aim of the present study was to evaluate participants' personal attitudes and acceptance of a routine screening program for PND in pregnancy care, identify any potential underlying factors, and appraise the general perspective on perinatal mental health problems.

Methods In total, 732 women in their second trimester of pregnancy took part in a PND screening program that was incorporated in routine prenatal care using the Edinburgh Postnatal Depression Scale (EPDS) and completed a web-based survey on screening acceptance.

Results Participants viewed PND screening as useful (78.7%, n = 555/705), especially in terms of devoting attention to perinatal mental health problems (90.1%, n = 630/699), easy to complete (85.4%, n = 606/710), and without feelings of discomfort (88.3%, n = 628/711). Furthermore, women with previous or current mental health issues rated the usefulness of screening significantly higher, as did women with obstetric risks (p < 0.01 – p = 0.04). The final regression model explained 48.4% of the variance for screening acceptance.

Conclusion Patient acceptance for PND screening was high in our study cohort, supporting the implementation of screening programs in routine pregnancy care with the potential to identify, sensitize, and treat undiagnosed patients to reduce stigmatization and offer access to tailored dedicated PND care programs.

ZUSAMMENFASSUNG

Einleitung Die perinatale Depression (PND) ist eine häufig beobachtete psychische Störung, die mit ungünstigen mütterlichen und neonatalen Folgen assoziiert ist. Ihre Prävalenz wird auf bis zu 20% geschätzt. Ein gezieltes Screening auf PND bietet die Möglichkeit, nicht diagnostizierte Fälle zu identifizieren und zu behandeln, und könnte helfen, die schädlichen Konsequenzen einer PND zu vermeiden. Ziel dieser Studie war es, die persönliche Haltung von Teilnehmerinnen und die Akzeptanz eines Screenings auf PND als Teil der Schwangerschaftsvorsorge zu evaluieren, mögliche zugrunde liegende Faktoren zu identifizieren sowie die allgemeine Haltung zu psychischen Störungen in der perinatalen Phase zu evaluieren.

Methoden Insgesamt nahmen 732 Frauen im 2. Trimenon an einem PND-Screening-Programm teil, das in die Standard-Schwangerschaftsvorsorge integriert wurde. Dafür wurde die Edinburgh-Postnatal-Depressions-Skala (EPDS) genutzt und die Studienteilnehmerinnen füllten einen Online-Fragebogen über die Akzeptanz des PND-Screenings aus.

Ergebnisse Die Teilnehmerinnen werteten das PND-Screening als nützlich (78,7%, n = 555/705), besonders im Hinblick auf das damit verbundene höhere Interesse an Problemen der psychischen Gesundheit in der perinatalen Zeit (90,1%, n = 630/699). Die Patientinnen berichteten, dass der Fragebogen leicht auszufüllen sei (85,4%, n = 606/710), und empfanden kein Unbehagen beim Ausfüllen (88,3%, n = 628/711). Frauen, die früher oder aktuell mit Problemen der psychischen Gesundheit zu kämpfen hatten, und Frauen mit geburtshilflichen Risiken stuften den Nutzen des Screenings signifikant höher ein (p < 0,01 – p = 0,04). Das letzte Regressionsmodell erklärte die Varianz von 48,4% in der Akzeptanz des Screenings.

Schlussfolgerung Die Akzeptanz des PND-Screenings bei den Patientinnen in unserer Studienkohorte war hoch, was für die Einführung PND-Screening-Programms als Teil der Standard-Schwangerschaftsvorsorge spricht. Ein PND-Screening könnte helfen, nicht diagnostizierte Patientinnen zu identifizieren, zu sensibilisieren und zu behandeln und die Stigmatisierung dieser Patientinnen zu verringern. Patientinnen könnten dadurch Zugang zu auf ihre Bedürfnisse zugeschnittene psychische Gesundheitsprogramme bekommen.

Introduction

Women commonly suffer from mental health problems during the perinatal period. In particular, depression and anxiety disorders represent frequent manifestations of these problems during pregnancy and after delivery. Indeed, research has revealed a prevalence of 19.2% for perinatal depressive episodes [1] and rates of up to 25% for anxiety symptoms during pregnancy and 15% after delivery [2]. Accordingly, a large-scale retrospective observational database study including more than 38 000 pregnant women in Germany identified a high prevalence of mental health diagnoses and symptoms, with 9.3% suffering from depression and 16.9% from anxiety disorders, 24.2% of the study population showed a somatoform/dissociative disorder, and 11.7% reported to be affected by acute stress [3].

Social factors such as domestic violence or a low socioeconomic status as well as pre-existing physical or mental health problems have been identified as risk factors for perinatal depression (PND) and seem to be indicative of other perinatal mental disorders, too [4]. Antenatal depression in particular has been identified as a strong risk factor for a subsequent postpartum depressive disorder. Remarkably, the prevalence of antenatal depression tends to be even higher than the rates of postpartum depression (17% vs. 13%, respectively) [5]. Mental health problems can have profound adverse effects on mother, infant and father, including preterm delivery, fear of delivery, an increased rate of cesarean sections, low-birthweight infants, neonatal adaptation disorders, developmental delay of the infant and a depressed mood in fathers [3, 6 – 8].

Despite the high prevalence of perinatal mental health problems, the majority of affected women remains undiagnosed. The various symptoms can easily be missed in the context of the often emotionally challenging circumstances of a pregnancy and the postpartum period [8]. As a consequence, affected women do not receive adequate treatment [9]. However, even if diagnosed, a proportion of those women refuse to seek help and treatment because of structural and knowledge barriers [10], including the existing stigma associated with mental disorders [11, 12] and the fear of possible teratogenic effects of drug treatment [13, 14].

Maternity care offers a unique chance to implement a routine mental health assessment, given the frequent routine appointments with health professionals during pregnancy and after childbirth. Therefore, official bodies have recommended a deeper inquiry into women's mental health and have promoted screening for depression during pregnancy and the postpartum period [15, 16]. Previous studies suggest that best practice for early detection of perinatal mental health problems is through routine screenings [17]. Various screening approaches have been tested, most of them using the Edinburgh Postnatal Depression Scale (EPDS) [18] – a screening tool that has proven to be valid and reliable in the antenatal period, too [19, 20].

When implementing screening for PND, it is essential to refer affected women to mental health services with diagnostic and treatment resources [21]. Up to now, however, referral rates are low and only 15% of positively screened pregnant women receive mental health treatment [22]. Research has also shown that women are more likely to seek help when they are asked about their past or present mental health status by a health professional, and especially when they are directly referred to further support services [23].

Although various mental health screening approaches have already been tested, only a few studies have examined the acceptance of a PND screening among perinatal women [24 – 29]. The present study therefore aims to add to the literature by examining the following:

1. Based on previous findings, we expected the acceptance rate of implementing a screening program for PND during pregnancy by using the EPDS to be high.
2. We hypothesized that screening acceptance is higher among women with a positive mental health record than women without. To identify more factors that potentially impact screening acceptance, we also investigated medical, obstetric, sociodemographic and self-report characteristics.
3. Lastly, we evaluated women's perspectives on perinatal mental health problems in the perinatal period.

Methods

Study design and sample

The screening was implemented in gynecological and obstetric outpatient practices throughout Baden-Württemberg and at the University Hospitals in Heidelberg and Tübingen between February 2019 and December 2020 as part of the *Mind:Pregnancy* program, a screening and treatment approach being applied in the federal state of Baden-Württemberg, Germany, and supported by the Federal Joint Committee and several major health care providers (01NVF17034). German-speaking pregnant women with a singleton pregnancy between the 13th and 27th gestational week were eligible for taking part in the PND screening. The participants completed a paper-based German version of the EPDS during a routine prenatal visit. Women with a positive screening result (EPDS score ≥ 10) were contacted and offered an interdisciplinary psychological and obstetric assessment. Based on the psychological assessment, women were referred for further professional mental health treatment, if indicated, and/or study participation in *Mind:Pregnancy* was offered. The *Mind:Pregnancy* program included an electronic mindfulness-based intervention (eMBI), which is currently being examined in a prospective randomized controlled trial [30]. Ethics approval was granted by the ethics committee of Heidelberg University (S-744/2018). Data for this acceptance study were collected under the data privacy terms of the *Mind:Pregnancy* program, for which informed consent was obtained from all participants.

Our final study sample consisted of N = 732 perinatal women who completed a survey on screening acceptance. This sample was recruited from a larger sample of the *Mind:Pregnancy* program in December 2019 (total: N = 2659). All participants in *Mind:Pregnancy* were screened for PND in the second trimester of pregnancy by using the EPDS. Out of these, N = 2094 participants were contacted by email in the further course and received access to the acceptance survey via a personalized link to the platform *SoSci Survey*. A total of n = 565 (21.2%) participants could not be contacted for the acceptance survey due to missing contact data (email address missing or incorrect). The link to the acceptance questionnaire was accessible from December 2019 to January 2020; a reminder was sent after one month. Due to the cross-sectional study design, the final study sample included both pre- and postpartum women. For reasons of data protection and to keep the registration process for *Mind:Pregnancy* as simple as possible, no sociodemographic or medical data were collected during the

initial EPDS screening. Therefore, these data were not available for nonrespondents of the present acceptance survey.

Measurements
EPDS

The German version of the EPDS [31] was used as a screening instrument for PND. The EPDS is a 10-item, self-rating questionnaire, initially developed as a screening instrument for symptoms of depression in the postpartum period, but afterwards validated for use during pregnancy as well [20]. It has been translated and validated for use in a German-speaking population [31]. With a cutoff value of 10 (EPDS ≥ 10), the sensitivity of detecting a clinically significant depression is 0.96, the specificity is 1.00, and the positive predictive value is 1.00 [18, 31]. The scale reached a good internal consistency in our sample (Cronbach's α = 0.88).

Survey on acceptance for PND screening

Our survey on the acceptance for PND screening among perinatal women was a web-based questionnaire using modified items from established questionnaires on acceptance [24 – 26, 29, 32 – 35] and self-generated questions. We developed the questionnaire ourselves because so far, no instrument has been established for assessing the acceptance of a PND screening. Our final questionnaire comprised a total of 47 items. In order to analyze the participants' acceptance and perspective on perinatal mental health problems, we focused on the following key questions. If not indicated otherwise, answers were given on a 5-point Likert scale.
1. Usefulness: *"How useful is it from your point of view to apply the EPDS to every pregnant woman during pregnancy care?"* [24, 29]
2. Difficulty level: *"How easy was it for you to complete the EPDS?"* [24, 29, 33, 34]
3. Level of comfort: *"Did you feel uncomfortable being asked questions about your mental health?"* [24 – 26, 29, 34]
4. Importance of addressing the subject of mental health: *"How important is it from your point of view to address the subject of mental health with each pregnant woman during pregnancy care?"* [26]
5. Previous knowledge of perinatal mental health problems: *"Before screening, have you ever heard of perinatal mental health problems before?"* (yes/no-answer)
6. Stigmatization of perinatal mental health problems: *"Do you think that perinatal mental health problems are still a taboo topic in society?"* (yes/no-answer)
7. Raising awareness of perinatal mental health problems: *"Do you think that a screening for perinatal mental health problems could raise awareness of that issue?"* (yes/no-answer) [35]

Furthermore, the questionnaire contained demographic data, data about medical and obstetric history, and items to obtain participants' feedback on the screening and treatment program *Mind:Pregnancy* itself.

To assess the participants' level of acceptance for PND screening, we focused on the items *"usefulness"*, *"difficulty"*, and *"comfort"*, which are stated in the literature as some of *"the main terms used to describe acceptability"* [29]. In the present study, *"usefulness"* represents the key measurement for acceptance.

Statistical analyses

All analyses were conducted using the Statistical Package for Social Sciences (IBM SPSS v. 25.0.0.0) and G*Power (v. 3.1.9.7) [36, 37]. A nonparametric design was chosen due to the nonparametric scale of measurement of most study variables and unequal group sizes and/or skewed distributions ($p < 0.05$ in Kolmogorov-Smirnov and Shapiro-Wilk tests). Due to dependencies of questionnaire items and scale-specific amounts of missing values, the number of valid cases varied between analyses.

We analyzed the data in three steps by using the following statistical methods:

(1) Descriptive data: We applied descriptive methods to examine the sociodemographic, medical, obstetric, and psychological profile of the sample (▶ Table 1). Furthermore, we analyzed the self-report data on screening acceptance (question 1 to 3, see above) and perspective on perinatal mental health problems (questions 4 to 7, see above)

(2) Intergroup comparisons and correlations: Depending on the scale of measurement of the respective variables, we performed intergroup comparisons (Mann-Whitney U test, Kruskal-Wallis test; see ▶ Table 2 for the corresponding variables) or correlation analyses (Sperman's ρ; see ▶ Table 3 for the corresponding variables) to identify specific psychological, medical, obstetric, sociodemographic and self-report characteristics of women that are particularly associated with screening acceptance *(usefulness)*.

(3) Prediction of screening acceptance: In the last step, we performed a hierarchical multiple linear regression analysis to identify the most important predictors of a high screening acceptance among the significant results of the intergroup comparisons and correlations (dependent variable: *"usefulness"*; see ▶ Table 4 for the predictors).

We chose a backward procedure, as forward procedures bear the risk of neglecting small, but significant effects. Thus, predictors are excluded if the change in the F-value of the respective model step is not statistically significant ($p \geq 0.10$). Due to the nonparametric analytic design, the regression analysis serves as an approximation.

The two-sided critical α-error was set to $\alpha = 0.05$. Due to the exploratory nature of the analyses, the α-errors were not Bonferroni-adjusted. To estimate effect sizes, we computed w^2 $(= \frac{\chi^2}{N})$ for Kruskal-Wallis tests and Cohen's d in approximation for Mann-Whitney U tests. For the correlation analyses, the ρ coefficient and for the regression analysis the β coefficient served as estimator for effect sizes. Furthermore, $w^2 = 0.01$, $d = 0.20$, and ρ or $\beta = 0.10$ were interpreted as small; $w^2 = 0.09$, $d = 0.50$, and ρ or $\beta = 0.30$ as medium-sized; and $w^2 = 0.25$, $d = 0.80$, and ρ or $\beta = 0.50$ as large effects [38].

Results

Descriptive analyses

Sample characteristics

The average age of participants was M = 32.4 years (SD = 4.4 years) with a mean gestational age of M = 19.3 weeks (SD = 5.3 weeks) at the time of screening. At the time of completing the acceptance questionnaire, n = 363 women (50.2%) were still pregnant and n = 360 (49.8%) had already delivered their child. The mean overall EPDS score was M = 6.3 (SD = 5.4). In all, n = 182 (24.9%) of the respondents scored above the cutoff (EPDS ≥ 10), with a mean elevated EPDS score of M = 14.0 (SD = 3.5), compared to a mean of M = 3.7 (SD = 2.8) for the n = 550 (75.1%) women scoring below the cutoff.

Further characteristics of the sample, including socioeconomic status, medical, obstetric, and psychological history, are presented in ▶ Table 1.

▶ **Table 1** Sociodemographic, medical, obstetric, and mental health sample characteristics.

Variable	f	%$_{valid}$		f	%$_{valid}$
Location	$n_{valid} = 727$		**Monthly net household income**	$n_{valid} = 714$	
< 5000 inhabitants	268	36.9	< 1500 €	96	13.4
5000 – under 20 000 inhabitants	219	30.1	1500–2999 €	228	31.9
20 000 – under 100 000 inhabitants	159	20.6	3000–4999 €	239	33.5
100 000 – under 500 000 inhabitants	78	10.7	5000–8000 €	137	19.2
≥ 500 000 inhabitants	12	1.7	> 8000 €	14	2.0
Education level	$n_{valid} = 727$		**Pre-existing medical conditions**	$n_{valid} = 718$	
No school-leaving qualifications	1	0.1	0	522	72.7
Lower secondary qualification	16	2.2	≥ 1	196	27.3
Higher secondary qualification	110	15.1	▪ Metabolic disease[1]	75	38.3
University entrance qualification	65	8.9	▪ Diabetes[1]	23	11.7
Certified professional training	197	27.1	▪ Hypertension[1]	22	11.2
Advanced technical college	12	1.7	▪ Lung disease[1]	22	11.2
University degree	287	39.5	▪ Blood disease[1]	19	9.7
Doctoral degree	39	5.4	▪ Other pre-existing medical conditions[1]	105	53.6

Continued next page

▶ **Table 1** Sociodemographic, medical, obstetric, and mental health sample characteristics. *(Continued)*

Variable	f	%valid		f	%valid
Gravidity	n_valid = 723		**Parity**	n_valid = 722	
0	350	48.4	0	301	41.7
≥ 1	373	51.6	≥ 1	421	58.3
Obstetric risks during previous pregnancies	n_valid = 541		**Obstetric risks during recent pregnancy**	n_valid = 723	
0	299	55.3	0	524	72.5
≥ 1	242	44.7	≥ 1	199	27.5
▪ Pregnancy-related complications[2]	66	27.27	▪ Vaginal bleeding[3]	76	38.2
▪ Pathological CTG[2]	52	21.49	▪ Hyperemesis gravidarum[3]	62	31.2
▪ Birth arrest[2]	47	19.42	▪ Pregnancy-related complications[3]	33	16.6
▪ Placental remnants requiring curettage[2]	39	16.12	▪ Premature labor[3]	23	11.6
▪ Birth injuries[2]	38	15.70	▪ Suspected fetal malformations[3]	10	5.0
▪ Other maternal complications[2]	163	67.36	▪ Other maternal complications[3]	44	22.1
Previously diagnosed perinatal mental health disorder	n_valid = 539		**Current or history of diagnosed mental disorder**	n_valid = 718	
No[4]	478	88.7	No[5]	595	82.9
Depression[4]	46	6.3	Depression, dysthymia[5]	79	11.0
Anxiety[4]	27	3.7	Anxiety[5]	26	3.6
Other perinatal mental health disorder[4]	6	1.1	Other mental health disorder in the present or past[5]	54	7.5
Marital status	n_valid = 728		**Previous psychotherapeutic, psychosomatic, or psychiatric treatment**	n_valid = 718	
Married and living together with partner	570	78.3	No	552	76.9
In a relationship and living together with partner	136	18.7	Yes	166	23.1
In a relationship and living apart from partner	11	1.5	**Current psychotherapeutic or psychiatric treatment**	n_valid = 718	
Single	10	1.4	No	668	93.0
Widowed	1	0.1	Yes	50	7.0

Notes. f = frequency; %valid = percentage of valid case numbers; n_valid = valid case numbers

[1] %valid of category refers to n = 196 of positive responses to item "Pre-existing medical conditions"; multiple choices were possible. The category "other" includes further response categories: Musculoskeletal or rheumatic disease, Gastrointestinal disease, Liver or bladder disease, Malignant tumor disease, Nervous system disease, Kidney disease, Gynecological disease, Other disease.

[2] %valid of category refers to n = 242 of positive responses to item "Obstetric risks during previous pregnancies"; multiple choices were possible. The category "other" includes further response categories: Disproportion, Preterm birth after 36th gestational week, Preterm birth after 34th gestational week, Preterm birth before 34th gestational week, Slow labor, Strong bleeding requiring blood transfusions, Infant malformations, Infections, Fetal growth restriction, Other complications of the pregnancy, Other fetal complications, Other maternal complications.

[3] %valid of category refers to n = 199 of positive responses to item "Obstetric risks during current pregnancy"; multiple choices were possible. The category "other" includes further response categories: Pathological CTG, Maternal infection, Strong psychological distress, Other infant-related or pregnancy-related complications, Other maternal complications.

[4] %valid of category refers to n = 539 of responses to item "Previously diagnosed perinatal mental health disorder"; multiple choices were possible.

[5] %valid of category refers to n = 718 of responses to item "Diagnosed mental health disorder in the present or past"; multiple choices were possible. The category "other" includes further response categories: Eating disorder, Compulsive disorder, Other disease.

Participants' ratings on PND screening during pregnancy

In total, 78.7% of the sample (n = 555 of 705 women) rated the EPDS screening as *"useful"* or *"very useful"*. In all, 85.4% (n = 606 of 710 women) found it *"easy"* or *"very easy"* to complete the EPDS and 88.3% (n = 628 of 711 women) felt *"no discomfort"* or *"no discomfort at all"* when answering the questions of the EPDS. Only 1.3% (n = 9 of 711 women) felt *"a lot of discomfort"* and 1.8% (n = 13 of 711 women) felt *"a little discomfort"* while 8.6% (n = 62 of 711 women) felt neither discomfort nor no discomfort. The im-

portance of addressing the subject of mental health with each pregnant woman during pregnancy care was confirmed as *"important"* or *"very important"* by 86.5% of the sample (n = 610 of 705 women).

Before participating in the screening program, 43.6% (n = 306 of 702 women) had never heard of perinatal mental health problems. Furthermore, 71.7% (n = 501 of 699 women) believed that perinatal mental health problems are still a taboo subject in society. However, a vast majority of the sample (90.1%, n = 630 of

Grouping variable	Subgroups	n	Mean rank	U	$p_{two-tailed}$	d	1-β for d = 0.20	1-β for d = 0.50
EPDS cutoff	EPDS ≤ 9	534	346.35	42107	0.1	0.15	0.6	0.99
	EPDS ≥ 10	171	373.76					
Pre-existing medical conditions	No	512	349.53	47631	0.42	0.07	0.64	0.99
	Yes	193	362.21					
Diagnosed mental health disorder in the present or past	No	582	342.93	29933	**< 0.01***	0.35	0.5	0.99
	Yes	123	400.65					
Previously diagnosed perinatal mental health disorder	No	470	260.62	11805	**0.03***	0.35	0.3	0.94
	Yes	60	303.75					
Current psychotherapy or psychiatric treatment	No	655	348.92	13701	**0.04***	0.38	0.26	0.91
	Yes	50	406.49					
Previous psychotherapy or psychiatric treatment	No	542	338.53	36331	**< 0.01***	0.36	0.59	0.99
	Yes	163	401.11					
Fertility treatment	No	649	353.42	17898	0.84	0.01	0.29	0.94
	Yes	56	348.1					
Obstetric risks during recent pregnancy	No	508	339.77	43317	**< 0.01***	0.28	0.64	0.99
	Yes	197	387.12					
Obstetric risks during previous pregnancies	No	290	250.78	30531	**0.01***	0.24	0.61	0.99
	Yes	239	282.26					
Gravidity	Primigravida	340	348.89	60652	0.57	0.03	0.74	0.99
	Multigravida	365	356.83					
Parity	Nullipara	291	353.28	59865	0.93	0.03	0.72	0.99
	Multipara	413	351.95					
Previous miscarriages, stillbirths, or early abortions	No	351	266.91	31271	0.84	0.01	0.57	0.99
	Yes	180	264.23					
Previous knowledge about PMHP	No	306	333.62	55118	**0.03***	0.2	0.73	0.99
	Yes	396	365.31					
Stigmatization of PMHP	No	198	305.14	40717	**< 0.01***	0.32	0.64	0.99
	Yes	501	367.73					

Notes. n = Group sizes; U = Mann-Whitney U; $p_{two-tailed}$ = two-tailed empirical significance level; d = Cohen's d; 1-β = statistical power to detect small effects (d = 0.20); PMHP = perinatal mental health problems; significant $p_{two-tailed}$ values ($p_{two-tailed}$ < 0.05) are in bold and marked with an asterisk.

699 women) confirmed that screening for perinatal mental health problems would raise awareness of that issue.

Factors associated with screening acceptance

Intergroup comparisons and correlation analyses were conducted to determine whether certain factors were particularly related to screening acceptance *(usefulness)*.

Intergroup comparisons

Women with a history of or a current mental health diagnosis rated the usefulness of an EPDS screening higher than women without any diagnoses (p < 0.01, ▶ **Table 2**). Likewise, women who were previously diagnosed with any perinatal mental health disorder or who were currently receiving or had received psychotherapy or psychosomatic or psychiatric treatment in the past found an EPDS screening more useful than their respective coun-

terparts (p ≤ 0.04, ▶ **Table 2**). Moreover, women who bore obstetric risks during their pregnancies evaluated the usefulness of an EPDS screening as higher than women without these risks (p ≤ 0.01, ▶ **Table 2**). Furthermore, women who already had knowledge about perinatal mental health problems or women who considered these problems as stigmatizing found an EPDS screening more useful than their respective counterparts (p ≤ 0.03, ▶ **Table 2**). The effect sizes of these differences (Cohen's d) were small (d ranged from 0.20 to 0.38). The overall comparison between the subgroups divided by family status was statistically significant and indicated a small effect ($χ^2$ = 8.036, df = 3, N = 704, p < 0.05, w^2 = 0.01). This effect mainly refers to the group comparison between married (n = 551, mean rank = 333.65) and unmarried women (n = 131, mean rank = 374.53), both living together with their partner (U = 31764.00, p = 0.02, d = 0.22), showing that unmarried women rated the usefulness of the EPDS

▶ **Table 3** Spearman's ρ correlations with screening acceptance *(usefulness)*.

Variable	N	ρ	$p_{two\text{-}tailed}$	1-β
Level of comfort	704	0.15	**< 0.01***	0.76[a]
Importance of addressing the subject of mental health	705	0.69	**< 0.01***	0.76[a]
Maternal age	703	0.02	0.64	0.76[a]
Location	704	0.07	0.08	0.76[a]
Education level	704	0.01	0.77	0.76[a]
Monthly net household income	692	0.06	0.10	0.75[a]

Notes. N = Valid case numbers; ρ = Spearman's ρ correlation coefficient; $p_{two\text{-}tailed}$ = two-tailed empirical significance level; 1-β = statistical power to detect small effects (ρ = 0.10); a. 1-β for medium-sized effects (ρ = 0.30) > 0.99; significant $p_{two\text{-}tailed}$ values ($p_{two\text{-}tailed}$ < 0.05) are in bold and marked with an asterisk.

screening higher. None of the other intergroup comparisons reached statistical significance (p ≥ 0.10).

There were no significant group differences regarding the EPDS cutoff (EPDS ≤ 9 vs. EPDS ≥ 10), pre-existing medical conditions, fertility treatment, gravidity, or parity or regarding previous miscarriages or stillbirths (▶ **Table 2**). The statistical power of these tests increased to a minimum 1-β of 0.91 for medium-sized effects (d = 0.50), which can be evaluated as sufficient.

Correlation analyses

The correlation analyses revealed that the variables level of comfort while completing the EPDS and importance of addressing the subject of mental health during pregnancy care were significantly associated with the rating of usefulness (p < 0.01, ▶ **Table 3**). There were no statistically significant associations with maternal age, location, educational level, or monthly net household income (p ≥ 0.08, ▶ **Table 3**).

Regression analysis

To identify predictors of screening acceptance among the aforementioned significant effects, we performed a hierarchical multiple linear regression analysis. The final model (step 11, R^2_{change} > −0.01; F_{change}[1,521] = 1.79, p_{change} = 0.181) contained the variables previous psychotherapy or psychiatric treatment, level of comfort while completing the EPDS, and importance of addressing the subject of mental health during pregnancy care as significant predictors (p ≤ 0.02, ▶ **Table 4**) for screening acceptance. Only the effect size of the last predictor can be evaluated as large (β = 0.67), however. The overall model is significant and explains 48.4% of variance for screening acceptance (R^2_{adj} = 0.48, F[3,522] = 165.25, p < 0.01). Multicollinearity seems not to have biased the estimates as the variance inflation factors (VIF) are low (largest VIF in the start model = 2.34; VIFs in the final model ≈ 1.00).

Discussion

The aim of the present study was
1. to evaluate the acceptance of a routine screening program for perinatal depression in pregnancy care,
2. to identify factors that potentially impact screening acceptance, and
3. to evaluate participants' perspectives on mental health problems during the perinatal period.

The overall acceptance of screening was high: 78.7% (n = 555/705) of the participants in our study rated an EPDS screening as useful and easy to complete (85.4%, n = 606/710) with no feeling of discomfort (88.3%, n = 628/711). Surprisingly, only 56.4% (n = 396/702) of the participants were familiar with perinatal mental health problems and most of the women regarded perinatal mental health problems as stigmatizing (71.7%, n = 501/699). However, a vast majority of 90.1% (n = 630/699) believed that implementing a screening program into routine pregnancy care would raise awareness of perinatal mental health problems.

Regarding factors particularly associated with the acceptance for PND screening among perinatal women, screening acceptance *(usefulness)* was found to be significantly higher among women

▶ **Table 4** Coefficients of the final regression model of study variables onto screening acceptance *(usefulness)*.

	B	S. E.	β	t	$p_{two\text{-}tailed}$	95% CI Lower Bound	95% CI Upper Bound	VIF
Constant	0.38	0.21	0.00	1.79	0.07	− 0.04	0.81	/
Previous psychotherapy or psychiatric treatment	0.16	0.07	0.07	2.30	**0.02***	0.02	0.29	1.05
Level of comfort	0.10	0.04	0.09	2.81	**0.01***	0.03	0.17	1.05
Importance of addressing the subject of mental health	0.75	0.04	0.67	21.00	**0.00***	0.68	0.82	1.04

Notes. B = nonstandardized regression coefficient; S. E. = Standard error of nonstandardized regression coefficient; β = standardized regression coefficient; t = empirical t-value; $p_{two\text{-}tailed}$ = two-tailed empirical significance level; 95% CI = 95% confidence interval; VIF = Variance inflation factor; significant $p_{two\text{-}tailed}$ values ($p_{two\text{-}tailed}$ < 0.05) are in bold and marked with an asterisk.

who suffered from perinatal and/or mental health disorders and/or received mental health treatment than among those without. Furthermore, ratings were also significantly higher in women who had obstetric risks during their current or a past pregnancy compared to their counterparts. In addition, women with knowledge of perinatal mental health problems and those regarding perinatal mental health problems as stigmatizing rated the usefulness of screening significantly higher. Moreover, the more comfortable a woman felt while completing the EPDS or the higher she rated the importance of addressing mental health during pregnancy care, the higher she rated screening acceptance.

With our final regression model explaining 48.4% of the variance for screening acceptance, our regression analysis suggested that previous psychotherapy or psychiatric treatment, the level of comfort while completing the EPDS, and the importance of addressing mental health during pregnancy care are potential predictors for the acceptance of a PND screening.

Our participants rated the EPDS screening as useful, easy, and comfortable to complete, suggesting that overall acceptance is high among these women. Our findings are in line with previous studies. In the study of Gemmill et al. [25], women rated the completion of the EPDS as at least comfortable (81.2%) and 96.7% of 467 women confirmed it to be "a good idea" to screen all new mothers for postnatal depression. In the study of Buist et al. [24], 93% of the 860 participants found it easy to complete the EPDS and 85% experienced no discomfort. The same applies for the study of Kalra et al., in which most of the participants found it comfortable and not distressing to be asked questions about mental health [26]. All studies concluded that acceptance was high for their survey. A direct comparison, however, is difficult due to the different approaches used for measuring acceptance.

One qualitative analysis including 39 postnatal women concluded that the screening was unacceptable due to an inappropriate setting of the screening venue, the fear of stigmatization, and the questionnaire form of the EPDS [39]. However, their study sample was very small and study results could not be replicated so far.

The high overall acceptance in our study is supported by the strong desire of the participants to integrate the survey about mental health into routine pregnancy care (86.5%, n = 610/705), which also turned out to be the strongest predictor for screening acceptance in our regression analyses. The results are in line with a study from Australia in which 78% of the participants agreed that all women should be "checked for depression" during pregnancy [40]. Adding up these findings with the high acceptance rate of an EPDS screening, it seems plausible that establishing a routine screening procedure would constitute a first important step in integrating mental health evaluation into maternity care.

Women with current or past mental health issues and/or obstetric risks considered general screening for PND useful. The same applied to women who were familiar with perinatal mental health problems and the potential stigma associated with them. Furthermore, women who regarded addressing the subject of mental health during pregnancy care as an important issue found a PND screening useful.

In summary, our data imply that women with mental health issues and/or obstetric risks find the EPDS screening most accept-

able. These women are generally at higher risk for developing PND: pre-existing physical or mental health problems are identified risk factors for PND [4] and the prevalence of antenatal depression has been reported to be higher especially in high-risk pregnancies than in those without any risks [41, 42]. If women with these risk factors give high ratings for the acceptance of a PND screening, this might also increase their willingness to participate in the screening, thereby increasing early detection of PND in risk groups, and to follow subsequent diagnostic and therapeutic steps as well. Ultimately, those being screened should approve of the screening in the first place to ensure participation and sustainability. Moreover, our study also demonstrated that screening was seen as a chance to raise awareness of perinatal mental health problems and that women who were aware of perinatal mental health problems found the EPDS screening most acceptable. This closes the circle of screening implementation, raising awareness, and increasing acceptance.

Various studies strongly emphasize well-structured screening programs with subsequent referral to more detailed mental health diagnostics and linkage to therapy options to increase acceptance [24, 34, 43, 44]. Since our EPDS screening was integrated into a program with subsequent diagnostic referral, this might have helped to reach the high acceptance rates. One predictor of screening acceptance that we identified was the level of comfort while completing the EPDS: The less discomfort a woman felt when answering questions about her mental health, the higher she rated the usefulness of the screening. Our findings are in contrast to the study of Gemmill et al. [25], which showed that despite experiencing discomfort while completing the questionnaire, women rated a general PND screening as useful. Previous studies identified several characteristics that increase acceptance rates among women for participating in a PND screening, including creating a sensitive setting, clinician engagement and confidence, and an extended timeframe to complete the screening questions. The following factors were also recommended for a successful implementation of a PND screening: training of the clinical staff, ongoing clinical support, and supervision [26, 28]. Additionally, the timing of the screening seems to play an important role. Venkatesh et al. [44] found that women were more likely to undergo a follow-up mental health evaluation when being screened antenatally rather than postnatally. In our study, all participants were screened antenatally between the 13th and 27th gestational week.

Our results revealed that perinatal mental health problems are still regarded as socially stigmatizing by the majority of our study participants. This social stigma may prevent women from overcoming their personal stigma on mental health issues, fostering the vicious circle of denying symptoms and not seeking help while trying to be a good mother at the same time [12, 45]. Fonseca et al. [10] identified different barriers that prevent women from seeking professional help. The most frequently reported barriers were lack of knowledge, such as difficulties in identifying corresponding symptoms, finding appropriate treatment places, and structural barriers related to financial and time constraints. These findings and our results of only 56.4% of participants who had ever heard about perinatal mental health problems before underscore the need to implement a mental health evaluation in mater-

nity care to reduce the stigma on PND. With 90% of our participants confirming that a screening for PND could raise awareness, implementing a screening would help minimize knowledge barriers. Our data even surpass a previously reported rate of 50% of study participants who believed that the screening process raised their awareness of PND [35]. However, key features of an effective screening include a low-threshold routine and universal offer to break down the aforementioned barriers [24].

In Germany, mental health examinations in pregnancy care cannot be billed, therefore they are missing in medical care. Creating a billing position for an EPDS screening would be the first step to implement mental health evaluation into routine pregnancy care. Yet, a screening only makes sense if subsequent confirmatory diagnostic steps and therapy options are guaranteed [21]. But for mentally ill people, the waiting lists in Germany are still long with average waiting times of 5.7 weeks until the first consultation and 19.9 weeks until the start of the actual therapy [46], and that is only under the premise of having found a therapist. Plus, conventional therapies often only treat the maternal depression itself, neglecting pregnancy- and motherhood-related circumstances. Treating maternal depression, however, even successfully, does not necessarily improve an impaired mother–child relationship, having negative effects on parenting and the child's development [47]. Therefore, therapy options with an additional focus on the challenges of pregnancy and parenthood are needed. To alleviate the workload of therapists, digital health solutions should also be considered [30].

The EPDS score itself did not show a significant correlation to the rating of usefulness, which is contrary to previous findings [24]. Our results, however, suggest that, regardless of the current clinical (i.e., symptomatic) mental health status of a woman, the usefulness of an EPDS screening is rated high.

In our study sample, 24.9% (n = 182/732) of the participants reached an EPDS score ≥ 10. We set this cutoff point to increase sensitivity and to include symptoms of a minor depression compared to a cutoff of ≥ 13 for symptoms of major depression (as recommended by the authors of the EPDS, among others) [18, 48]. Similarly, a recent study suggested setting the cutoff for routine perinatal screening to an EPDS score ≥ 10 because subclinical symptoms of mental health problems in the antenatal period can also have adverse effects on maternal and infant outcomes [49].

Our study suggests a high prevalence of PND among pregnant women. In another study in Germany using the same EPDS cutoff, 17% (n = 772) exceeded the cutoff 6 to 8 weeks after delivery [50]. In our sample, the proportion of women exceeding the cutoff was higher, but these numbers are not directly comparable because of different study designs, such as antenatal vs. postnatal screening. Moreover, in our study, only women scoring above the EPDS cutoff were referred to subsequent mental health evaluation and treatment within the program *Mind:Pregnancy*. It is possible that these women were more willing to complete the voluntary acceptance questionnaire because they benefited more from the program and they may have recalled the EPDS questions more precisely, this possible bias leading to our high acceptance rate and to an overrepresentation of positively screened women and thus, a higher PND prevalence in our sample.

One strength of the present study is the large sample size (N = 732). Only few studies on the acceptance of a screening for PND had larger sample sizes [24, 25], while most studies included significantly fewer participants [26, 35, 39].

Furthermore, the outpatient setting in which the screening was performed represented rural and urban areas with women of diverse socioeconomic backgrounds. Nonetheless, the percentage of academics in our sample is over-proportionally high, which might have affected our results. *Mind:Pregnancy* is the first large-scale screening program for PND in Germany, providing important information for a German population of perinatal women. Almost all studies on screening programs and their acceptability so far were conducted in English-speaking populations.

Despite the strengths of our study, some limitations have to be considered. As participants filled out the acceptance questionnaire voluntarily, we cannot exclude a participation bias. Furthermore, outpatient gynecologists may have tended to recommend those women to the screening program who, in their estimation, would profit most from study participation, possibly causing selection bias. Due to the cross-sectional study design of the acceptance survey, antepartum and postpartum women were included although screening was performed antenatally, causing a varying interval between screening and acceptance survey. Hence, a recall bias cannot be excluded.

The broad definition of the term "acceptance" is reflected in the differing assessment tools used (e.g., qualitative interviews, quantitative instruments, and interpreting response rates) in the sparse literature on acceptance for perinatal mental health screenings since there is no validated, uniform tool to measure screening acceptance [29]. This makes it difficult to compare our self-generated acceptance questionnaire with other tools.

In this study, we were not able to provide information for nonrespondents of the acceptance survey, hence, no analyses of the full sample (N = 2659) could be conducted, limiting the representativity of our study results. Although nonrespondents were registered in *Mind:Pregnancy*, only their EPDS score, expected date of delivery, and contact details were collected. Due to our data protection policy and in order to keep screening as simple as possible, sociodemographic, or medical data were not collected generally but only in participants who either provided them voluntarily by participating in the acceptance survey or who were screened positively and agreed to study participation in *Mind:Pregnancy*. Therefore, we did not have any such data for the full sample.

Conclusion

Our study highlights the need to implement routine screening for PND during pregnancy. The overall acceptance of a PND screening among peripartum women was high. Particularly, women with mental health issues, obstetric risks, and those who are aware of perinatal mental health problems and associated potential stigmatization found screening most useful. Further efforts should be invested in implementing a routine screening program for PND in pregnancy care for early identification of women at risk, which may also help destigmatize perinatal mental health problems. To benefit most from a mental health screening, affected

women should be referred for subsequent diagnostic testing and therapy options.

Authors' Contributions

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Ethical Approval

This study was performed in line with the principles of the Declaration of Helsinki and approved by the Scientific Ethics Committee of the University of Heidelberg (S-744/2018).

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Conflict of Interest

The authors declare that they have no conflict of interest.

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