

Research paper

Psychometric properties of the Fear of Birth Scale in women in the perinatal period: A multicountry study

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ABSTRACT

Assessing Fear of Birth Scale's (FOBS) psychometric properties in the perinatal period using multicountry data is a step toward effectively screen clinically significant fear of childbirth (FOC) in maternal healthcare settings. FOBS psychometric properties were analyzed in women in the perinatal period using data from Australia, Germany, Lithuania, Poland, and Portugal. FOBS' reliability, criterion (known group and convergent), concurrent, predictive, and clinical validity were analyzed. FOBS was completed by 3431 women in pregnancy ($n = 2984$) or postpartum ($n = 447$). Sociodemographic, obstetric, neonatal, and mental health-related data, depressive and anxiety symptoms, and tokophobia severity were self-reported. FOBS has good reliability. Known-group validity was established based on differences in sociodemographic, obstetric, neonatal, and mental health-related variables. Convergent validity was found with depressive and anxiety symptoms, and birth trauma. Concurrent validity was found with tokophobia severity. FOBS scores in pregnancy predicted elective cesarean section, and postpartum depressive and anxiety symptoms. FOBS discriminates between women with and without clinically significant FOC in pregnancy and postpartum, with optimal cut-offs across countries. This multicountry study suggested that FOBS is a psychometrically strong measure that can be an effective tool to screen clinically significant FOC in the perinatal period.

1. Introduction

Fear of childbirth (FOC) refers to a concern or intense fear of giving birth (Slade et al., 2019). This fear is related to complications, pain, or

lack of control during childbirth that can increase the perceived threat of vaginal childbirth (Wigert et al., 2020) and can range from low to clinically significant FOC (i.e., tokophobia). It can be categorized as primary and secondary FOC (Hofberg and Brockington, 2000;

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Shakarami et al., 2021). Primary FOC refers to the fear of experiencing childbirth for the first time (Shakarami et al., 2021), and secondary FOC refers to the fear of experiencing future childbirths after potentially traumatic childbirth experiences, such as prolonged labor, intense pain, loss of control, and fear of death during childbirth (Dencker et al., 2019; Olsen et al., 2022). Clinically significant FOC aligns with the criteria for specific phobia, characterized by interference with daily functioning, including occupational, social activities, and relationships (DSM-5-TR; American Psychiatric Association [APA], 2022). The overall prevalence of clinically significant FOC in women during pregnancy is approximately 14 % (O'Connell et al., 2017) and tends to be higher in the second (45 %) and the third trimesters (43 %) than in the first (12 %) trimester (Hendrix et al., 2022). In the postpartum period (between 1 and 3 months postpartum), the prevalence of clinically significant FOC ranges between 10 % and 29 % (Grundström et al., 2022; Khwepeya et al., 2018).

Several sociodemographic, obstetric, fetal/neonatal, and mental health-related factors are associated with FOC during the perinatal period, such as women's lower age (Ryding et al., 2015), higher education (Dal Moro et al., 2023), parity (Huang et al., 2021), previous pregnancy loss (Smorti et al., 2021), obstetric and fetal/neonatal complications (Vaajala et al., 2023a), previous traumatic experiences, previous or current traumatic childbirth experiences, and perinatal mental health problems, such as depression, anxiety, and childbirth-related post-traumatic stress disorder (Grundström et al., 2022; Størksen et al., 2012).

Clinically significant FOC during the perinatal period may compromise women's ability to experience a fulfilling pregnancy, due to the development of avoidant behaviors related to childbirth (e.g., not participating in support groups for pregnant women) (Rondung et al., 2016), which may lead to choosing an elective cesarean section (Ryding et al., 2015; Wigert et al., 2020), and can have a negative impact on positive childbirth experiences (Dencker et al., 2019; Seefeld et al., 2022), as well as on future family planning, namely the delaying of subsequent pregnancies (Vaajala et al., 2024). Other factors negatively impacted include mother-infant bonding (Challacombe et al., 2021; Seefeld et al., 2022) and couple relationship quality (Molgora et al., 2020).

Some self-reported measures were designed to assess FOC and provided evidence of good psychometric properties (Haines et al., 2011; Huizink et al., 2016; Martin et al., 2022; Wijma et al., 1998; Wootton et al., 2020). These measures range from very long - Wijma Delivery Expectancy Questionnaire (WDEQ-A; Wijma et al., 1998) the Tokophobia Severity Scale (TSS; Martin et al., 2022; Wootton et al., 2020), and the Pregnancy Anxiety Questionnaire - Revised-2 (PRAQ-R2; Huizink et al., 2016) - to very brief - Fear of Birth Scale (FOBS; Haines et al., 2011). One of the most commonly used long scales is the WDEQ-A, which comprises 33 items and focuses on the expectations regarding childbirth, with factors including fear of negative appraisal and lack of self-efficacy. The TSS comprises 13 items to assess both the cognitive and behavioral aspects of tokophobia, which aligns with the diagnostic criteria proposed by the ICD-11 and the DSM-5-TR. The PRAQ-R2 comprises 10 items to assess fear of giving birth, worries about bearing a handicapped child, and concern about one's own appearance. The FOBS is a two-item visual analogue scale in which women are asked to rate their feelings concerning childbirth (Haines et al., 2011). It was developed and psychometrically tested for reliability (Cronbach's alpha coefficient and inter-item correlation) and clinical validity in pregnant women in Sweden and Australia. Evidence of excellent reliability ($\alpha = 0.91$ and large-sized item correlations) and clinical validity (according to another self-reported item of FOC) was provided and a cut-off of 50 or higher was proposed to identify women with clinically significant FOC in pregnancy (Rouhe et al., 2009; Haines et al., 2015). Compared to WDEQ-A and TSS that are lengthier and can be more useful tools in identifying targets for treatment, FOBS can be more useful as a screening tool in maternal healthcare settings both during pregnancy and the

postpartum period, since it is brief and easy to administer (i.e., comprises only 2 items) (Haines et al., 2015). Still, reliable and effective use of this tool requires the assessment of its psychometric properties in the population that is being used.

Assessing the psychometric properties of the FOBS in both pregnancy and the postpartum period using multicountry data is a step toward effective screening of clinically significant FOC in the perinatal period. The main aim of this study was to analyze the psychometric properties of the FOBS in women in the perinatal period using data from five countries: Australia, Germany, Lithuania, Poland, and Portugal. Specific aims were to analyze FOBS' (1) reliability, through Cronbach's alpha and inter-item correlations; (2) criterion validity (known groups - comparing FOBS scores with sociodemographic and obstetric and neonatal characteristics, and mental health-related factors - and convergent - associations among FOBS scores, depressive and anxiety symptoms, and birth trauma perception); (3) concurrent validity, through associations between FOBS scores and tokophobia severity; (4) predictive validity, testing FOBS scores in pregnancy as a predictor of postpartum anxiety and depressive symptoms, birth trauma perception, and type of birth (Poland and Portugal); and (5) clinical validity, testing the screening performance of the FOBS to identify women with and without clinically significant FOC, according to a measure of tokophobia (Australia, Lithuania, and Portugal).

2. Methods

2.1. Participants

The sample comprised 3431 women, of whom 2984 (87.0 %) completed the FOBS during pregnancy and 447 (13.0 %) during the postpartum period. Women from Germany ($n = 1963$), Lithuania ($n = 514$), Poland ($n = 293$), and Portugal ($n = 214$) completed the FOBS during pregnancy. From these, the sample from Poland ($n = 293$) and a subsample from Portugal ($n = 119$) also completed data on type of birth, birth trauma perception, depressive and anxiety symptoms in the postpartum period. Women from Australia ($n = 263$) and Lithuania (another independent sample; $n = 184$) completed the FOBS during the postpartum.

Women who completed the FOBS in pregnancy were aged between 19 and 43 years and women who completed the FOBS in postpartum were aged between 18 and 47 years. Most women perceived their income as average or above average (96.4 % in pregnancy; 91.1 % in postpartum), were married or cohabiting (95.7 % in pregnancy; 94.1 % in postpartum), and had a higher education (64.7 % in pregnancy; 73.1 % in postpartum). More than half of participants were primiparous (76.0 % in pregnancy; 53.4 % in postpartum), had not experienced previous pregnancy loss (79.1 % in pregnancy; 63.4 % in postpartum), had no obstetric (67.7 % in pregnancy; 56.2 % in postpartum) or fetal/neonatal complications (93.9 % in pregnancy; 56.2 % in postpartum), no previous diagnosis of mental health problems (76.9 % in pregnancy; 74.3 % in postpartum), and no previous potentially traumatic lifetime events (45.1 % in pregnancy; 41.2 % in postpartum) (see Table 1).

2.2. Procedures

We included FOBS data from a sample of women derived from larger studies from five countries - Australia, Germany, Lithuania, Poland, and Portugal (Kress et al., 2019; Pinto et al., 2023a). All studies were conducted following the guidelines from the Helsinki Declaration and received approval from the Ethical Commissions of the involved institutions or the Biomedical Research Ethics Committee (Australia 2022/ETH01110; Germany: No: EK 278062015; Lithuania: P1-BE-2-73/2020 and 2024-BEC2-153; Poland: KE UG 07/2017; Portugal: CES CHUSJ: 279 / 2022; MAC:1317/2022; CHPVVC: 10/2022).

The sample was recruited in person in Australia at hospital antenatal clinics (January–December 2023), in Germany at obstetric clinics,

Table 1

Women's sociodemographic, obstetric, and fetal/neonatal characteristics, and mental health-related factors.

		FOBS in pregnancy ^a					FOBS in postpartum ^b		
		Germany	Lithuania	Poland	Portugal	Total	Australia	Lithuania	Total
		n = 1963 (%)	n = 514 (%)	n = 293 (%)	n = 214 (%)	n = 2984 (%)	n = 263 (%)	n = 184 (%)	n = 447 (%)
Sociodemographic characteristics									
Age	<i>M (SD)</i>	30.27 (4.04)	30.17 (4.57)	29.69 (4.10)	33.47 (4.85)	30.42 (4.29)	32.23 (5.16)	30.59 (4.50)	31.55 (4.96)
	<i>Missings</i>	12 (0.6)	0 (0)	1 (0.3)	3 (1.4)	16 (0.5)	7 (6.7)	0 (0)	7 (1.6)
Ethnicity	Ethnic majority	–	–	293 (100.0)	185 (89.8)	478 (95.8)	–	–	–
	Ethnic minority	–	–	0 (0.0)	6 (2.9)	6 (1.2)	–	–	–
	Not sure	–	–	0 (0.0)	15 (7.3)	15 (3.0)	–	–	–
	<i>Missings</i>	–	–	0 (0.0)	8 (3.7)	2485 (83.3)	–	–	–
Perception of Income	Above average	–	222 (43.2)	137 (46.9)	48 (23.2)	407 (40.2)	44 (17.1)	61 (33.2)	105(23.8)
	Average	–	282 (54.9)	149 (51.0)	138 (66.7)	569 (56.2)	177 (68.9)	120 (65.2)	297 (67.3)
	Below average	–	10 (1.9)	6 (2.1)	21 (10.1)	37 (3.7)	36 (14.0)	3 (1.6)	39 (8.8)
	<i>Missings</i>	–	0 (0.0)	1 (0.3)	7 (3.3)	1971 (66.1)	6 (2.3)	0 (0.0)	6 (1.3)
Marital status	Married/cohabiting	1865 (95.4)	493 (95.9)	289 (99.0)	198 (94.3)	2845 (95.7)	232 (89.9)	184 (100.0)	416 (94.1)
	Single/divorced/ widow	90 (4.7)	21 (4.1)	3 (1.0)	12 (5.8)	126 (4.2)	26 (10.0)	0 (0.0)	26 (5.9)
	<i>Missings</i>	8 (0.4)	0 (0.0)	1 (0.3)	4 (1.9)	13 (0.4)	5 (1.9)	0 (0.0)	5 (1.19)
Education	With higher education	1092 (55.7)	418 (81.3)	261(89.4)	155 (72.8)	1926 (64.7)	193 (74.8)	130 (70.7)	323 (73.1)
	Without higher education	867 (44.3)	96 (18.7)	31 (10.6)	58 (27.2)	1052 (35.3)	65 (25.2)	54 (29.4)	119 (27.0)
	<i>Missings</i>	4 (0.2)	0 (0.0)	1 (0.3)	1 (0.5)	6 (0.2)	5 (1.9)	0 (0.0)	5 (1.1)
Obstetric and fetal/neonatal characteristics									
Parity	Primiparous	1566 (80.1)	359 (69.8)	205 (70.2)	130 (61.0)	2260 (76.0)	127 (49.2)	109 (59.2)	236 (53.4)
	Multiparous	388 (19.9)	155 (30.2)	87 (29.8)	83 (39.0)	713 (24.0)	131 (50.8)	75 (40.8)	206 (46.6)
	<i>Missings</i>	9 (0.5)	0 (0.0)	1 (0.3)	1 (0.5)	11 (0.4)	5 (1.9)	0 (0.0)	5 (1.1)
Previous pregnancy loss	Yes	409 (20.9)	98 (19.1)	57 (19.6)	58 (27.4)	622 (20.9)	64 (48.9)	51 (27.9)	115 (36.6)
	No	1544 (79.1)	416 (80.9)	234 (80.4)	154 (72.6)	2348 (79.1)	67 (51.1)	132 (72.1)	199 (63.4)
Obstetric complications	<i>Missings</i>	10 (0.5)	0 (0.0)	2 (0.7)	2 (0.9)	14 (0.5)	132 (50.2)	1 (0.5)	133 (29.7)
	Yes, major complications	–	14 (2.7)	28 (9.6)	13 (6.1)	55 (5.4)	25 (9.5)	15 (8.2)	40 (8.9)
	Yes, minor complications	–	152 (29.6)	46 (15.8)	76 (35.7)	274 (26.9)	112 (42.6)	44 (23.9)	156 (34.9)
	No	–	348 (67.7)	217 (74.6)	124 (58.2)	689 (67.7)	126 (47.9)	125 (67.9)	251 (56.2)
	<i>Missings</i>	–	0 (0.0)	2 (0.7)	1 (0.5)	1966 (65.9)	0 (0.0)	0 (0.0)	0 (0.0)
Fetal/ neonatal medical complications	Yes, major complications	–	–	1 (0.3)	5 (2.3)	6 (1.2)	14 (5.3)	–	14 (5.3)
	Yes, minor complications	–	–	6 (2.1)	19 (8.9)	25 (5.0)	63 (24.0)	–	63 (24.0)
	No	–	–	285 (97.6)	189 (88.7)	474 (93.9)	185 (70.3)	–	185 (70.6)
Type of delivery	Vaginal	–	–	–	–	–	124 (47.1)	138 (75.0)	262 (58.6)
	Assisted vaginal	–	–	–	–	–	20 (7.6)	8 (4.3)	28 (6.3)
	Emergency Caesarian	–	–	–	–	–	46 (17.5)	28 (15.2)	74 (16.6)
	Elective Cesarean Section	–	–	–	–	–	73 (27.8)	10 (5.4)	83 (18.6)
	<i>Missings</i>	–	–	–	–	–	0 (0.0)	0 (0.0)	0 (0.0)
Mental health-related factors									
Potentially traumatic lifetime events	Yes	–	263 (51.2)	–	60 (29.7)	323 (45.1)	166 (63.1)	97 (52.7)	263 (58.8)
	No	–	251 (48.8)	–	142 (70.3)	393 (54.9)	97 (36.9)	87 (47.3)	184 (41.2)
	<i>Missings</i>	–	0 (0.0)	–	12 (5.6)	2268 (76.0)	0 (0.0)	0 (0.0)	0 (0.0)

(continued on next page)

Table 1 (continued)

		FOBS in pregnancy ^a					FOBS in postpartum ^b		
		Germany	Lithuania	Poland	Portugal	Total	Australia	Lithuania	Total
		n = 1963 (%)	n = 514 (%)	n = 293 (%)	n = 214 (%)	n = 2984 (%)	n = 263 (%)	n = 184 (%)	n = 447 (%)
Previous diagnosis of mental health problems	Yes	–	–	–	44 (20.8)	44 (20.8)	99 (37.6)	11 (6.0)	110 (24.6)
	No	–	–	–	163 (76.9)	163 (76.9)	162 (61.6)	170 (92.4)	332 (74.3)
	I don't know	–	–	–	5 (2.4)	5 (2.4)	2 (0.8)	3 (1.6)	5 (1.1)
	Missings	–	–	–	2 (0.9)	2772 (92.9)	0 (0.0)	0 (0.0)	0 (0.0)
Clinically significant symptoms of depression ^c	Yes	134 (6.9)	–	28 (9.6)	18 (8.6)	180 (7.4)	35 (13.4)	37 (20.1)	72 (16.2)
	No	1798 (93.1)	–	263 (90.4)	192 (91.4)	2253 (92.6)	226 (86.6)	147 (79.9)	373 (83.8)
	Missings	31 (1.6)	–	2 (0.7)	4 (1.9)	551 (18.5)	2 (0.8)	0 (0.0)	2 (0.4)
	Yes	–	–	–	21 (20.0)	21 (20.0)	–	–	–
Clinically significant symptoms of anxiety ^d	No	–	–	–	84 (80.0)	84 (80.0)	–	–	–
	Missings	–	–	–	109 (50.9)	2879 (96.5)	–	–	–
	Yes	–	–	–	21 (20.0)	21 (20.0)	–	–	–
	Missings	–	–	–	109 (50.9)	2879 (96.5)	–	–	–
Previous traumatic childbirth	Yes	–	–	–	20 (24.1)	20 (24.1)	83 (63.8)	23 (30.7)	106 (51.7)
	No	–	–	–	63 (75.9)	63 (75.9)	47 (36.2)	52 (69.3)	99 (48.3)
	Missings	–	–	–	131 (61.2)	2901 (97.2)	133 (50.6)	109 (59.2)	242 (54.2)
	Missings	–	–	–	131 (61.2)	2901 (97.2)	133 (50.6)	109 (59.2)	242 (54.2)
Gestational/postpartum weeks when completed	M (SD)	29.50 (6.48)	30.95 (5.71)	33.51 (3.91)	33.77 (3.70)	30.37 (6.19)	–	–	–
	Missings	1 (0.05)	0 (0)	2(0.68)	69 (32.24)	72 (2.41)	–	–	–
Gestational weeks at birth	M (SD)	–	–	39.84 (1.69)	38.19 (2.17)	39.35 (1.99)	38.52 (1.87)	39.36 (2.13)	38.87 (2.02)
	Missings	–	–	8 (2.73)	90(42.06)	2575 (86.27)	0 (0)	0(0)	0(0)

FOBS = Fear of Birth Scale; “–”: data not available.

^a Data of women who completed FOBS in pregnancy.

^b Data of women who completed FOBS in postpartum.

^c Edinburgh Postnatal Depression Scale ≥ 13 .

^d State Anxiety Inventory ≥ 45 .

midwife practices, and birth centers (June 2017–December 2020), and in Portugal at obstetric units of three large public hospitals (January 2023–February 2024). In Lithuania, recruitment was online (December 2023–February 2024) through social media platforms (e.g., Facebook and Instagram groups for pregnant women). In Poland, recruitment was both online and in person (October 2017–February 2019) through obstetricians' routine visits, antenatal classes, and via announcements published on the Facebook profile of the Polish foundation 'Birth with Dignity Foundation'. For all countries, inclusion criteria were living in the country where childbirth is planned to occur and the ability to read and understand the questionnaires. Additionally, the age of 18 years or older was a criterion in Lithuania, Poland, and Portugal, and 16 years or older was a criterion in Australia. Gestational age (GA) was a criterion in Australia (30–36 weeks GA), Lithuania (≥ 20 weeks GA), Poland (≥ 28 weeks GA), and in Portugal (≥ 37 weeks GA). Planned pregnancy was a criterion in Poland (see supplementary Table 1).

Participants completed self-reported questionnaires to collect sociodemographic, obstetric, neonatal, and mental health-related data either in pregnancy (Germany, Lithuania), at 2 months postpartum (Australia, Lithuania), or both (longitudinal studies in Poland and Portugal). Concurrently with FOBS, (1) participants from Australia, Lithuania, and Portugal also completed a self-report measure to assess tokophobia (Tokophobia Severity Scale; Martin et al., 2022; Wootton et al., 2020); (2) participants from Germany, Lithuania, Poland, and Portugal also completed self-report measures to assess current depressive symptoms (Edinburgh Postpartum Depression Scale; Cox et al., 1987); and (3) participants from Poland (Short Anxiety Scale; Clarke et al., 2008) and Portugal also completed self-reported measures to assess anxiety symptoms (State Anxiety Inventory; Spielberger et al., 1983). Along with FOBS in pregnancy, participants from Poland and Portugal provided longitudinal data on the type of birth, depressive

(EPDS) and anxiety symptoms (STAI-S; Portugal), and birth trauma perception (one item from the sociodemographic questionnaire; Portugal) at 2 months postpartum (see supplementary Table 2).

2.3. Measures

2.3.1. Fear of Birth Scale (FOBS)

Participants are asked to rate their feelings concerning childbirth by responding to the question “How do you feel right now about the approaching birth?”, by marking an “X” on two 10 cm lines, quoting the answer between “no fear/strong fear”, and “calm/worried” (Haines et al., 2011). In Australia, women who completed the FOBS in postpartum were instructed to complete the FOBS thinking about the recent childbirth experience and selecting the response that best described how they might feel about a future pregnancy/childbirth. In Lithuania, women who completed the FOBS in postpartum were instructed to complete the FOBS thinking about how they felt before giving birth. The FOBS total score is derived by calculating the average of the two items, ranging from 0 to 100, and higher scores indicate more FOC. In Germany, women who completed the FOBS paper-and-pencil questionnaire had a scale where they could only choose values between 0 and 10. Participants who completed the online questionnaire could choose values between 0 and 100. Values from the paper-and-pencil questionnaire were then multiplied by 10 and rounded up or down to end up in increments of 10: 0, 10, 20, ..., 90, 100 (e.g. a value of 3 was changed to 30). The FOBS items were translated following best practices and methodological recommendations (Streiner et al., 2014). Pilot testing was then conducted with potential end-users.

2.3.2. Sociodemographic, obstetric, neonatal, and mental health-related data

A questionnaire was used to collect sociodemographic data (age, ethnicity, marital status, education, income), obstetric and fetal/neonatal data (GA at childbirth, parity, previous pregnancy loss, obstetric complications, fetal/neonatal complications, and type of birth) and mental health-related data (previous potential traumatic events ever in life, previous diagnosis of mental health problems, and previous traumatic childbirth) that were used to analyze FOBS known-groups validity.

2.3.3. Depressive symptoms

Depressive symptoms were used to analyze FOBS' convergent and predictive validity and were assessed using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). It is a 10-item self-report measure scored on a four-point Likert-type scale (from 0 = never to 3 = always) that assesses the severity of depression symptoms in the previous seven days. EPDS scores range between 0 and 30 and higher scores indicate higher symptom severity. EPDS ≥ 13 was used to indicate clinically significant symptoms of depression, as recommended for a cut-off with higher specificity in the perinatal period (Levis et al., 2020). It has good internal consistency for pregnancy and postpartum, in women from the countries included in our analysis (Germany, Cronbach's $\alpha = 0.81$ in postpartum; Lithuania, Cronbach's $\alpha = 0.91$ in postpartum; Poland, Cronbach's $\alpha = 0.91$ in postpartum; Portugal, Cronbach's $\alpha = 0.82$ in pregnancy and 0.88 in postpartum) (Bergant et al., 1998; Boyce et al., 1993; Kossakowska, 2013; Lapkienė et al., 2004; Costa et al., 2023; Tendais et al., 2014). In our sample, EPDS Cronbach's α coefficients were Australia = 0.89, Germany = 0.84, Lithuania = 0.87, Poland = 0.76 in pregnancy and 0.85 in postpartum, and Portugal = 0.86 in pregnancy and 0.88 in postpartum.

2.3.4. Anxiety symptoms

Anxiety symptoms were used to analyze FOBS' convergent and predictive validity and were assessed using the State Anxiety Inventory (STAI-S; Spielberger et al., 1983) and the Short Anxiety Scale (SAS; Clarke et al., 2008) in Portugal and Poland, respectively. STAI-S is a 20-item self-report measure scored on a four-point Likert-type scale (from 1 = almost never to 4 = almost always) that assesses the intensity of current anxiety symptoms. STAI-S scores range between 20 and 80, and higher scores indicate higher symptom severity. STAI-S ≥ 45 was used to indicate clinically significant symptoms of anxiety, based on previous studies with perinatal women in Portugal (e.g., Pinto et al., 2023b). SAS is a 5-item self-report questionnaire scored on a four-point Likert-type scale (from 1 = never to 4 = most of the time) that assesses anxiety symptoms. SAS scores range between 5 and 20 and higher scores indicate higher symptom severity.

Both measures have good internal consistency, in the countries included in our analysis (Portugal, Cronbach's α s for STAI-S = 0.94 in pregnancy and 0.92 in postpartum; Tendais et al., 2014; Poland, Cronbach's α s for SAS = 0.70 in non-pregnant group; Charzyńska et al., 2021). In our sample, STAI-S Cronbach's α coefficients were 0.93 in pregnancy and 0.94 in postpartum, and SAS Cronbach's α coefficient was 0.71.

2.3.5. Tokophobia severity

Tokophobia severity was used to analyze FOBS' concurrent and clinical validity and was assessed using the Tokophobia Severity Scale (TSS; Martin et al., 2022; Wootton et al., 2020). It is a 13-item self-reported measure scored on a four-point Likert-type scale from 0 = never to 3 = always. Items assess both the cognitive (e.g., worry; "I worry about medical complications during pregnancy and/or childbirth") and behavioral aspects (e.g., avoidance; "I avoid talking about pregnancy, children and childbirth because of my fears") of tokophobia. TSS scores range between 0 and 39 and higher scores indicate higher tokophobia severity. TSS ≥ 11 for Australia and Lithuania and TSS ≥ 12

for Portugal were used to indicate clinically significant FOC, based on psychometric analysis of the TSS (data under review by the team). TSS original version has good internal consistency (Cronbach's $\alpha = 0.93$; Martin et al., 2022; Wootton et al., 2020). To our knowledge, there is no published data available on the internal consistency of TSS in pregnancy or postpartum. In our sample, TSS Cronbach's α coefficients were Australia = 0.89; Lithuania = 0.89 in pregnancy and 0.90 in postpartum; and Portugal = 0.90.

2.4. Statistical analysis

Differences between countries in FOBS total score were tested using two-way ANOVAs and post-hoc Tukey HSD tests. Analyses of (1) reliability, (2) criterion (known groups and convergent) validity, (3) concurrent validity, (4) predictive validity, and (5) clinical validity were conducted to examine FOBS psychometric properties. Significance was considered at $p < .05$. Effect sizes (partial eta squared and Cohen's d) were calculated (Cohen, 1988). IBM SPSS Statistics, version 29 was used to conduct the statistical analyses.

2.4.1. FOBS reliability was examined using Cronbach's alpha coefficient and inter-item correlation (Pearson's correlations). Cronbach's alpha values ≥ 0.70 , ≥ 0.80 , and ≥ 0.90 were considered acceptable, good, and excellent, respectively (George and Mallery, 2019).

2.4.2. FOBS criterion validity (known groups and convergent) was examined using data from all countries by testing:

2.4.2.1. Differences in FOBS scores in pregnancy and postpartum according to sociodemographic, obstetric, and fetal/neonatal characteristics, and mental health-related factors (known groups validity, variables presented in Table 1) using two-way analyses of variance (ANOVAs) for categorical variables and Pearson correlations for associations with continuous variables. When data were available for only one country, independent sample t -tests or one-way ANOVA were conducted. Assumptions of normality and homogeneity of variances were tested. Non-parametric tests (non-parametric two-way ANOVAs, Mann-Whitney, and Kruskal-Wallis) were performed when the assumptions were not met (Pek et al., 2018). Results from parametric tests were reported when parametric and non-parametric tests provided the same results.

2.4.2.2. Associations among FOBS scores, depressive and anxiety symptoms, and birth trauma perception (convergent validity), using Pearson correlations.

2.4.3. FOBS concurrent validity was examined with data from Australia, Lithuania, and Portugal, through associations between FOBS scores and the scores of a measure of tokophobia (TSS) using Pearson correlations.

2.4.4. FOBS predictive validity was examined using data from Poland and Portugal by testing FOBS scores in pregnancy as a predictor of postpartum depressive (Poland and Portugal) and anxiety (Portugal) symptoms, birth trauma perception (Portugal), and type of birth (vaginal, instrumental vaginal, emergency cesarean section, and elective cesarean section; Poland and Portugal), using multiple linear or multinomial (type of birth) regressions. For linear regressions, the assumptions of linearity, normal distribution, and homogeneity of errors were validated through residual plots. The Durbin-Watson statistic validated the independence of errors assumption ($d \approx 2 (\pm 0.4)$). For both linear and multinomial regressions, multicollinearity was checked with the Variance Inflation Factor (VIF) values, which were all below 5, indicating no issues (Field, 2013).

2.4.5. FOBS clinical validity was examined with data from Australia, Lithuania, and Portugal using Receiver Operating Curve (ROC) analysis with TSS. The screening performance of the FOBS to identify women with (above TSS cut-off) and without (below TSS cut-off) clinically significant FOC was assessed using the area under the curve (AUC; 95 % CI). AUC ≥ 0.70 , ≥ 0.80 , and ≥ 0.90 were indicative of acceptable, good, and exceptional predictive ability, respectively (Hosmer and Lemeshow, 2000). Sensitivity, specificity, positive and negative predictive values,

and accuracy were calculated for FOBS cutoff scores. Sensitivity and specificity between 50 % and 80 % or higher than 80 % indicate reasonable and good predictive ability, respectively (Hosmer and Lemeshow, 2000). The optimal cutoff score was also determined by identifying the value that is closer to the intersection between the ROC curve and the diagonal line from the upper left corner to the lower right corner of the graph (Bland, 2000).

3. Results

Differences between countries were found in FOBS scores in pregnancy, $F(1,2980) = 46.66, p < .001, \eta_p^2 = 0.045$. FOBS total scores were significantly higher in women from Lithuania, compared to those from Germany ($p < .001$) and Portugal ($p < .001$); and significantly higher in women from Poland compared to Germany ($p < .001$) and Portugal ($p < .001$). No significant differences were found in FOBS scores between women from Germany and Portugal ($p = 1.000$) or between women from Lithuania and Poland ($p = .293$). No differences between countries were found in FOBS scores in the postpartum, $t(445) = -1.68, p = .093, d = 0.16$ (see Tables 3 and 4). Supplementary Tables 3 and 4 present descriptive statistics of sociodemographic, obstetric, fetal/neonatal, and mental health-related data, EPDS, STAI-S (Portugal), SAS (Poland), and TSS scores in the study countries.

3.1. FOBS reliability

Table 2 presents FOBS items and total score descriptive statistics, Cronbach's alphas, and correlations between items, for each country.

Table 2
Reliability (Chronbach's alpha and item correlation) and descriptive statistics of the Fear of Birth Scale in pregnancy and postpartum.

	<i>n</i>	α	<i>r</i>	Range	<i>M</i> (<i>SD</i>)
Pregnancy					
Germany	1963	0.90	0.82		
Item 1				0–100	36.59 (23.74)
Item 2				0–100	39.28 (24.21)
FOBS total score				0–100	37.94 (22.90)
Lithuania	514	0.93	0.86		
Item 1				0–100	51.08 (27.25)
Item 2				0–100	51.31 (28.51)
FOBS total score				0–100	51.08 (27.25)
Poland	293	0.94	0.89		
Item 1				0–100	47.46 (30.35)
Item 2				0–100	48.30 (28.76)
FOBS total score				0–100	47.88 (28.73)
Portugal	214	0.88	0.80		
Item 1				0–100	42.26 (34.22)
Item 2				0–100	33.77 (28.24)
FOBS total score				0–100	38.02 (29.66)
Total	2984	0.91	0.84		
Item 1				0–100	41.18 (25.40)
Item 2				0–100	40.60 (26.84)
FOBS total score				0–100	41.18 (25.40)
Postpartum					
Australia	263	0.90	0.83		
Item 1				0–100	40.14 (33.49)
Item 2				0–100	42.16 (32.21)
FOBS total score				0–100	41.15 (31.38)
Lithuania	184	0.88	0.78		
Item 1				0–100	45.37 (30.98)
Item 2				0–100	46.84 (31.57)
FOBS total score				0–100	46.10 (29.52)
Total	447	0.89	0.81		
Item 1				0–100	42.29 (32.55)
Item 2				0–100	44.09 (32.00)
FOBS total score				0–100	43.19 (30.69)

Notes. FOBS = Fear of Birth Scale; α = Cronbach's alpha; *r* = Pearson's correlation; Item 1: How do you feel right now about the approaching birth? - no fear to strong fear; Item 2: How do you feel right now about the approaching birth? - calm to worried.

Cronbach's alpha values were equal to or higher than 0.88. The two items of FOBS were strongly correlated ($rs \geq 0.78$) for all countries (see Table 2).

3.2. FOBS criterion (known groups and convergent) and concurrent validity

3.2.1. Known groups validity

3.2.1.1. FOBS in pregnancy. Age was positively associated with FOBS total scores in pregnancy only in Germany ($n = 1951, r = 0.06, p = .015$). Women who perceived their income as below average or average reported higher FOBS scores in pregnancy than women who perceived their income as above average. The interaction between country and education was statistically significant, $H(3) = 17.73, p < .001$ (see Table 3). Women from Germany without higher education ($median_{no\ HE} = 35.00$) reported higher FOBS total scores than those with higher education ($median_{HE} = 32.00$) ($U = 437,564.50, z = -2.89, p = .004$). Women from Portugal without higher education ($median_{no\ HE} = 19.75$) reported lower FOBS total scores than those with higher education ($n_{HE} = 155; median_{HE} = 42.50$) ($U = 5349.50, z = 2.13, p = .033$). No differences were found in women from Lithuania ($median_{no\ HE} = 55.00, median_{HE} = 50.00, U = 18,648.00, z = -1.08, p = .280$) or Poland ($median_{no\ HE} = 24.50, median_{HE} = 52.00, U = 4913.50, z = 1.95, p = .051$).

Pregnant women reporting minor ($p < .001$) or severe ($p < .001$) obstetric complications reported higher FOBS total scores than those reporting no obstetric complications. The interaction between country and parity was statistically significant. Primiparous women from Poland reported higher FOBS total scores than multiparous women ($p = .003$). No differences were found in women from Germany ($p = .436$), Lithuania ($p = .189$), or Portugal ($p = .102$) (see Table 3).

Women who reported previous traumatic childbirth, $t(81) = -2.85, p < .01, d = 0.73$, previous diagnosis of mental health problems, $t(205) = -2.49, p < .05, d = 0.42$, or current clinically significant anxiety symptoms ($STAI-S \geq 45$), $t(103) = -6.99, p < .001, d = 1.71$, reported higher FOBS total scores in pregnancy than women who reported no previous traumatic childbirth, no previous diagnosis of mental health problems, or current non-clinically significant anxiety symptoms ($STAI-S < 45$) (see Table 3).

The interaction between the country and potentially traumatic lifetime events, or current clinically significant depressive symptoms, was statistically significant. Women from Portugal who experienced at least one potentially traumatic lifetime event ($p = .005$) reported higher FOBS scores in pregnancy than those who did not experience potentially traumatic lifetime events. No differences were found in women from Lithuania ($p = .715$). Women from Germany ($p < .001$), Poland ($p < .001$), and Portugal ($p < .001$) who reported current clinically significant depressive symptoms ($EPDS \geq 13$) reported higher FOBS total scores in pregnancy than those who reported current non-clinically significant depressive symptoms ($EPDS < 13$). However, the differences in FOBS scale scores according to the country are higher in women from Portugal ($M_{difference} = 38.29$) than in women from Germany ($M_{difference} = 18.38$) and Poland ($M_{difference} = 28.06$) (see Table 3).

3.2.1.2. FOBS in postpartum. Women who reported severe obstetric complications reported higher FOBS total scores in postpartum than those who reported minor ($p < .001$) or no obstetric complications ($p < .001$). Women who experienced an emergency cesarean section reported higher FOBS total scores in postpartum ($p < .05$) than those who had a vaginal birth. In Australia, women who reported severe fetal/neonatal complications reported higher FOBS scores in postpartum than those who reported minor ($p = .026$) or no fetal/neonatal complications ($p = .007$) (see Table 4).

Women who experienced at least one potentially traumatic lifetime

Table 3
Known-groups validity of the Fear of Birth Scale in pregnancy: differences in Fear of Birth Scale scores according to sociodemographic, obstetric, and fetal characteristics, and mental health-related factors, by country.

		FOBS scores in pregnancy										Effects ^a		
		Germany		Lithuania		Poland		Portugal		Total		Sociodemographic, obstetric, and fetal/neonatal characteristics	Country	Sociodemographic, obstetric, and fetal characteristics * Country
		<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)			
Perception of Income ^b	Above average	–	–	222 (43.2)	49.05 (27.46)	137 (46.9)	45.65 (28.88)	48 (23.2)	33.10 (27.08)	407 (40.2)	46.03 (28.27)	$F(1,1007) = 4.98^{**}, \eta_p^2 = 0.005$	$F(2,1007) = 15.61^{***}, \eta_p^2 = 0.03$	$F(2,1007) = 0.11, \eta_p^2 = 0.00$
	Below average or average	–	–	292 (56.8)	52.62 (27.04)	155 (53.1)	49.85 (28.65)	159 (76.8)	39.19 (29.89)	606 (59.8)	48.39 (28.73)			
	Total by country	–	–	514 (100.0)	51.08 (27.25)	292 (100.0)	47.88 (28.78)	207 (100.0)	37.78 (29.31)	1013 (100.0)	47.44 (28.56)			
	Marital status ^c	1865 (95.4)	37.88 (22.89)	493 (95.9)	51.09 (27.14)	–	–	198 (94.3)	37.89 (29.76)	2556 (95.4)	40.43 (24.89)	$F(1,2673) = 0.01, \eta_p^2 = 0.00$	$F(2,2673) = 8.75^{***}, \eta_p^2 = 0.01$	$F(1,2673) = 0.06, \eta_p^2 = 0.00$
Education	Single/divorced/widow	90 (4.6)	39.42 (22.97)	21 (4.1)	50.93 (30.58)	–	–	12 (5.7)	37.63 (30.04)	123 (4.6)	41.21 (25.29)			
	Total by country	1955 (100.0)	37.95 (22.89)	514 (100.0)	51.08 (27.25)	–	–	210 (100.0)	37.88 (29.70)	2679 (100.0)	40.47 (24.90)			
	With higher education	1092 (55.7)	36.39 (21.89)	418 (81.3)	50.46 (27.22)	261 (89.4)	49.04 (28.17)	155 (72.8)	39.85 (27.73)	1926 (64.7)	41.44 (25.32)	$H(1) = 4.60^*$	$H(3) = 76.62^{***}$	$H(3) = 17.73^{***}$
	Without higher education	867 (44.3)	39.76 (23.96)	96 (18.7)	53.78 (27.36)	31 (10.6)	38.08 (32.37)	58 (27.2)	32.63 (34.01)	1052 (35.3)	40.60 (25.56)			
Parity	Total by country	1959 (100.0)	37.88 (22.89)	514 (100.0)	51.08 (27.25)	292 (100.0)	47.88 (28.78)	213 (100.0)	37.88 (29.66)	2978 (100.0)	41.14 (25.40)			
	No	–	–	–	–	–	–	84 (80.0)	29.13 (25.79)	84 (80.0)	29.13 (25.79)	$F(1,2965) = 3.99^*, \eta_p^2 = 0.00$	$F(3,2965) = 35.74^{***}, \eta_p^2 = 0.04$	$F(3,2965) = 4.59^{**}, \eta_p^2 = 0.00$
	Total by country	–	–	–	–	–	–	105 (100.0)	37.81 (30.75)	105 (100.0)	37.81 (30.75)			
	Primiparous	1566 (80.1)	37.72 (22.71)	359 (69.8)	50.14 (26.59)	205 (70.2)	50.70 (27.60)	130 (61.0)	40.27 (28.46)	2260 (76.0)	41.02 (24.77)			
Previous pregnancy loss	Multiparous	388 (19.9)	38.82 (23.80)	155 (30.2)	53.27 (28.70)	87 (29.8)	41.24 (30.54)	83 (39.0)	34.57 (31.47)	713 (24.0)	41.76 (27.43)	$F(1,2962) = 0.06, \eta_p^2 = 0.00$	$F(3,2962) = 30.10^{***}, \eta_p^2 = 0.03$	$F(3,2962) = 2.58, \eta_p^2 = 0.00$
	Total by country	1954 (100.0)	37.94 (22.93)	514 (100.0)	51.08 (27.25)	292 (100.0)	47.88 (28.78)	213 (100.0)	38.05 (29.73)	2973 (100.0)	41.20 (25.43)			
	Yes	409 (20.9)	39.60 (24.05)	98 (19.1)	50.81 (27.83)	57 (19.6)	51.68 (29.11)	58 (27.4)	31.97 (29.65)	622 (21.7)	41.76 (26.31)			
	No	1544 (79.1)	37.52 (22.54)	416 (80.9)	51.14 (27.15)	234 (80.4)	46.79 (28.64)	154 (72.6)	40.17 (29.56)	2348 (81.8)	41.03 (25.14)			
Obstetric complications	Total by country	1953 (100.0)	37.96 (22.87)	514 (100.0)	51.08 (27.25)	291 (100.0)	47.75 (28.74)	212 (100.0)	37.92 (29.74)	2870 (100.0)	41.18 (25.39)	$F(2,1009) = 13.61^{***}, \eta_p^2 = 0.03$	$F(2,1009) = 9.45^{***}, \eta_p^2 = 0.02$	$F(4,1009) = 0.87, \eta_p^2 = 0.00$
	Yes, major complications	–	–	14 (2.7)	69.29 (18.82)	28 (9.6)	64.52 (22.33)	13 (6.1)	48.38 (35.60)	55 (5.4)	61.92 (26.04)			
	Yes, minor complications	–	–	152 (29.6)	58.93 (27.57)	46 (15.8)	49.21 (28.30)	76 (35.7)	41.39 (30.01)	274 (26.9)	52.43 (29.31)			
	No	–	–	348 (67.7)	46.92 (26.39)	217 (74.6)	45.24 (28.82)	124 (58.2)	35.15 (28.52)	689 (67.7)	44.27 (27.86)			
Fetal complications ^f	Total by country	–	–	514 (100.0)	51.08 (27.25)	291 (100.0)	47.72 (28.67)	213 (100.0)	38.19 (29.63)	1018 (100.0)	47.42 (28.58)	$F(1,501) = 1.65, \eta_p^2 = 0.00$	$F(1,501) = 0.66, \eta_p^2 = 0.00$	$F(1,501) = 0.87, \eta_p^2 = 0.00$
	Yes	–	–	–	–	7 (2.4)	50.64 (31.66)	24 (11.3)	49.90 (30.38)	31 (6.1)	50.06 (30.13)			
	No	–	–	–	–	285 (97.6)	47.63 (28.60)	189 (88.7)	36.51 (29.39)	474 (93.9)	43.20 (29.39)			

(continued on next page)

Table 3 (continued)

		FOBS scores in pregnancy										Effects ^a		
		Germany		Lithuania		Poland		Portugal		Total		Sociodemographic, obstetric, and fetal/neonatal characteristics	Country	Sociodemographic, obstetric, and fetal characteristics * Country
		n (%)	M (SD)	n (%)	M (SD)	n (%)	M (SD)	n (%)	M (SD)	n (%)	M (SD)			
Potentially traumatic lifetime events	Total by country	–	–	–	–	292 (100.0)	47.70 (28.62)	213 (100.0)	38.01 (29.73)	505 (100.0)	43.62 (29.46)	$F(1,712) = 6.98^{**}, \eta_p^2 = 0.01$	$F(1,712) = 17.36^{***}, \eta_p^2 = 0.02$	$F(1,712) = 5.19^*, \eta_p^2 = 0.01$
	Yes	–	–	263 (51.2)	51.52 (27.09)	–	–	60 (29.7)	46.84 (30.72)	323 (45.1)	50.65 (27.81)			
	No	–	–	251 (48.8)	50.62 (27.46)	–	–	142 (70.3)	34.65 (28.97)	393 (54.9)	44.85 (29.02)			
Previous diagnosis of mental health problems	Total by country	–	–	514 (100.0)	51.08 (27.25)	–	–	202 (100.0)	38.27 (29.95)	716 (100.0)	47.47 (28.61)	$t(205) = -2.49^*, d = 0.42$		
	Yes	–	–	–	–	–	–	44 (21.3)	46.98 (30.08)	44 (21.3)	46.98 (30.08)			
	No	–	–	–	–	–	–	163 (78.7)	34.64 (28.87)	163 (78.7)	34.64 (28.87)			
Clinically significant symptoms of depression ^d	Total by country	–	–	–	–	–	–	207 (100.0)	37.26 (29.50)	207 (100.0)	37.26 (29.50)	$F(1,2427) = 120.07^{***}, \eta_p^2 = 0.05$	$F(2,2427) = 15.71^{***}, \eta_p^2 = 0.01$	$F(2,2427) = 6.28^{**}, \eta_p^2 = 0.01$
	Yes	134 (6.9)	54.91 (27.06)	–	–	28 (9.6)	73.25 (23.64)	18 (8.6)	72.97 (20.48)	180 (7.4)	59.57 (27.05)			
	No	1798 (93.1)	36.53 (21.95)	–	–	263 (90.4)	45.19 (28.01)	192 (91.4)	34.68 (27.94)	2253 (92.6)	37.38 (23.46)			
Clinically significant symptoms of anxiety ^e	Total by country	1932 (100.0)	37.81 (22.82)	–	–	291 (100.0)	47.89 (28.80)	210 (100.0)	37.96 (29.38)	2433 (100.0)	39.03 (24.44)	$t(103) = -6.99^{***}, d = 1.71$		
	Yes	–	–	–	–	–	–	21 (20.0)	75.52 (23.99)	21 (20.0)	75.52 (23.99)			
	No	–	–	–	–	–	–	84 (80.0)	29.13 (25.79)	84 (80.0)	29.13 (25.79)			
Previous traumatic childbirth	Total by country	–	–	–	–	–	–	105 (100.0)	37.81 (30.75)	105 (100.0)	37.81 (30.75)	$t(81) = -2.85^{**}, d = 0.73$		
	Yes	–	–	–	–	–	–	20 (24.1)	51.35 (25.57)	20 (24.1)	51.35 (25.57)			
	No	–	–	–	–	–	–	63 (75.9)	29.25 (31.47)	63 (75.9)	29.25 (31.47)			
	Total by country	–	–	–	–	–	–	83 (100.0)	34.57 (31.47)	83 (100.0)	34.57 (31.47)			

“–”: data not available.

^a Non-parametric tests were performed when the assumptions of parametric tests were not met. The non-parametric two-way ANOVA was reported for education, as the assumptions were not met and the non-parametric test results differed from the parametric results. In all other cases, parametric tests were reported as the parametric and non-parametric tests provided the same results.

^b Below-average and the average groups were combined, as Lithuania and Poland had few women in the below-average group of perception of income.

^c Poland was removed from the analysis, as only three women reported that they were single.

^d Edinburgh Postnatal Depression Scale ≥ 13 .

^e State Anxiety Inventory ≥ 45 . ^f Categories of minor and major fetal/neonatal complications were combined, as Poland had few women in these groups.

* $p < .050$.

** $p < .010$.

*** $p < .001$.

Table 4

Known-groups validity of the Fear of Birth Scale in postpartum: differences in Fear of Birth Scale scores according to sociodemographic, obstetric, and fetal/neonatal characteristics, and mental health-related factors, by country.

		FOBS scores in postpartum						Effects ^a		
		Australia		Lithuania		Total		Sociodemographic/ obstetric/neonatal characteristics	Country	Sociodemographic, obstetric, and fetal/ neonatal characteristics * Country
		<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	<i>M</i> (<i>SD</i>)			
Perception of income ^b	Above average	44 (17.1)	39.53 (31.76)	61 (33.2)	43.32 (27.74)	105 (23.8)	41.73 (29.40)	$F(1,437) = 0.69, \eta_p^2 = 0.00$	$F(1,437) = 2.10, \eta_p^2 = 0.01$	$F(1,437) = 0.13, \eta_p^2 = 0.00$
	Below average	213 (82.9)	41.16 (31.29)	123 (66.8)	47.48 (30.38)	336 (76.2)	43.47 (31.06)			
	Total by country	257 (100.0)	40.88 (31.31)	184 (100.0)	46.10 (29.52)	441 (100.0)	43.06 (30.65)			
	Marital status ^c	232 (89.9)	40.98 (30.83)	–	–	232 (89.9)	40.98 (30.83)			
Education	Married/cohabiting	26 (10.1)	39.79 (35.44)	–	–	26 (10.1)	39.79 (35.44)	$t(256) = 0.18, d = 0.04$		
	Single/divorced/widow	258 (100.0)	40.86 (31.25)	–	–	258 (100.0)	40.86 (31.25)			
	Total by country	193 (74.8)	41.02 (31.27)	130 (70.7)	48.11 (29.49)	323 (73.1)	43.87 (30.72)			
	Without higher education	65 (25.2)	39.60 (30.82)	54 (29.3)	41.27 (29.30)	119 (26.9)	40.36 (30.03)			
Parity	Total by country	258 (100.0)	40.66 (31.11)	184 (100.0)	46.10 (29.52)	442 (100.0)	42.93 (30.54)	$F(1,438) = 0.04; \eta_p^2 = 0.00$	$F(1,438) = 2.71, \eta_p^2 = 0.01$	$F(1,438) = 0.68, \eta_p^2 = 0.00$
	Primiparous	127 (49.2)	38.13 (29.80)	109 (59.2)	47.82 (29.81)	236 (53.4)	42.61 (30.13)			
	Multiparous	131 (50.8)	43.50 (32.50)	75 (40.8)	43.61 (29.12)	206 (46.6)	43.54 (31.24)			
	Total by country	258 (100.0)	40.86 (31.25)	184 (100.0)	46.10 (29.52)	442 (100.0)	43.04 (30.62)			
Previous pregnancy loss	Yes	64 (48.9)	48.29 (32.58)	51 (27.9)	43.68 (29.77)	115 (36.6)	46.24 (31.32)	$F(1,310) = 0.61, \eta_p^2 = 0.00$	$F(1,310) = 0.25, \eta_p^2 = 0.00$	$F(1,310) = 3.07, \eta_p^2 = 0.01$
	No	67 (51.1)	38.93 (31.99)	132 (72.1)	47.26 (29.48)	199 (63.4)	44.45 (30.52)			
	Total by country	131 (100.0)	43.50 (32.50)	183 (100.0)	46.26 (29.53)	314 (100.0)	45.11 (30.78)			
	Obstetric complications	25 (9.5)	67.64 (30.95)	15 (8.2)	64.27 (28.84)	40 (8.9)	66.38 (29.85)			
Fetal/ neonatal complications	Yes, major complications	112 (42.6)	41.40 (30.10)	44 (23.9)	40.35 (26.86)	156 (34.9)	41.11 (29.14)	$F(2,441) = 12.18^{***}, \eta_p^2 = 0.05$	$F(1,441) = 0.25, \eta_p^2 = 0.00$	$F(2,441) = 2.00, \eta_p^2 = 0.01$
	Yes, minor complications	126 (47.9)	35.67 (30.09)	125 (67.9)	45.95 (29.84)	251 (56.2)	40.79 (30.35)			
	No	263 (100.0)	41.15 (31.38)	184 (100.0)	46.10 (29.52)	447 (100.0)	43.19 (30.69)			
	Total by country	14 (5.3)	65.57 (34.83)	–	–	14 (5.3)	65.57 (34.83)			
Type of delivery	Yes, major complications	63 (24.0)	41.69 (31.40)	–	–	63 (24.0)	41.69 (31.40)	$F(2,259) = 4.70^{**}, \eta_p^2 = 0.04$		
	Yes, minor complications	185 (70.6)	39.34 (30.44)	–	–	185 (70.6)	39.34 (30.44)			
	No	262 (100.0)	41.30 (31.34)	–	–	262 (100.0)	41.30 (31.34)			
	Total by country	124 (47.1)	37.82 (29.71)	138 (75.0)	43.13 (27.24)	262 (58.6)	40.62 (28.50)			
Potentially traumatic lifetime events	Vaginal	20 (7.6)	38.48 (30.71)	8 (4.3)	58.31 (37.50)	28 (6.3)	44.14 (33.34)	$H(3) = 7.228$	$H(1) = 4.762^*$	$H(3) = 0.346$
	Instrumental vaginal	46 (17.5)	48.18 (33.31)	28 (15.2)	55.70 (32.50)	74 (16.6)	51.03 (32.99)			
	Emergency Cesarean	73 (27.8)	43.10 (32.82)	10 (5.4)	50.50 (39.86)	83 (18.6)	43.99 (33.56)			
	Elective Cesarean	263 (100.0)	41.15 (31.38)	184 (100.0)	46.10 (29.52)	447 (100.0)	43.19 (30.69)			
Type of delivery	Section	166 (63.1)	44.18 (31.85)	97 (52.7)	50.12 (29.87)	263 (58.8)	46.37 (31.21)	$F(1,443) = 7.91^{**}, \eta_p^2 = 0.02$	$F(1,443) = 3.82, \eta_p^2 = 0.01$	$F(1,443) = 0.00, \eta_p^2 = 0.00$
	Total by country	97 (36.9)	35.96 (30.02)	87 (47.3)	41.63 (28.64)	184 (41.2)	38.64 (29.43)			
	Yes	263 (100.0)	41.15 (31.38)	184 (100.0)	46.10 (29.52)	447 (100.0)	43.19 (30.69)			
	No	–	–	–	–	–	–			

(continued on next page)

Table 4 (continued)

		FOBS scores in postpartum						Effects ^a		
		Australia		Lithuania		Total		Sociodemographic/ obstetric/neonatal characteristics	Country	Sociodemographic, obstetric, and fetal/ neonatal characteristics * Country
		n (%)	M (SD)	n (%)	M (SD)	n (%)	M (SD)			
Previous diagnosis of mental health problems	Yes	99 (37.9)	45.78 (32.56)	11 (6.1)	38.05 (19.08)	110 (24.9)	45.00 (31.49)	$F(1,438) = 0.02, \eta_p^2 = 0.00$	$F(1,438) = 0.00, \eta_p^2 = 0.00$	$F(1,438) = 2.33, \eta_p^2 = 0.01$
	No	162 (62.1)	38.55 (30.45)	170 (93.9)	46.53 (30.13)	332 (75.1)	42.63 (30.50)			
	Total by country	261 (100.0)	41.29 (31.40)	181 (100.0)	46.01 (29.61)	442 (100.0)	43.22 (30.73)			
Clinically significant symptoms of depression ^d	Yes	35 (13.4)	62.99 (30.92)	37 (20.1)	55.72 (26.71)	72 (16.2)	59.3 (28.9)	$F(1,441) = 23.33^{***}, \eta_p^2 = 0.05$	$F(1,441) = 0.03, \eta_p^2 = 0.00$	$F(1,441) = 2.92, \eta_p^2 = 0.01$
	No	226 (86.6)	37.77 (30.16)	147 (79.9)	43.68 (29.79)	373 (83.8)	40.10 (30.11)			
	Total by country	261 (100.0)	41.15 (31.41)	184 (100.0)	46.10 (29.52)	445 (100.0)	43.20 (30.71)			
Previous traumatic childbirth	Yes	83 (63.8)	48.04 (31.04)	23 (30.7)	47.35 (29.45)	106 (51.7)	47.89 (30.57)	$F(1,201) = 3.90^*, \eta_p^2 = 0.02$	$F(1,201) = 0.50, \eta_p^2 = 0.00$	$F(1,201) = 0.72, \eta_p^2 = 0.00$
	No	47 (36.2)	34.51 (33.17)	52 (69.3)	41.96 (29.11)	99 (48.3)	38.42 (31.17)			
	Total by country	130 (100.0)	43.15 (32.37)	75 (100.0)	43.61 (29.12)	205 (100.0)	43.32 (31.15)			

“—”: data not available.

^a Non-parametric tests were performed when the assumptions of parametric tests were not met. Parametric tests were reported as the parametric and non-parametric tests provided the same results.

^b Below-average and the average groups were combined, as Lithuania had few women in the below-average group of perception of income.

^c Lithuania was removed from the analysis, as all women were married or cohabiting.

^d Edinburgh Postnatal Depression Scale $\geq 13, \eta_p^2 =$ partial eta squared.

* $p < .050$.

** $p < .010$.

*** $p < .001$.

event, or reported current clinically significant depressive symptoms (EPDS ≥ 13), reported higher FOBS total scores in postpartum than women who did not experience potentially traumatic lifetime events or reported current non-clinically significant depressive symptoms (EPDS < 13) (see Table 4).

3.2.2. Convergent validity

Medium-to-large-sized associations were found among FOBS total scores, depressive and anxiety symptoms, and birth trauma perception, r s range = 0.36–0.71, all p s < 0.001 . The weaker associations were among FOBS total score in postpartum, depressive symptoms, and birth trauma perception, in women from Lithuania, r s = 0.28, both p s < 0.001

Table 5

Concurrent and convergent validity of the Fear of Birth Scale in pregnancy and in postpartum: correlations with anxiety and depressive symptoms, birth trauma perception, and tokophobia severity. ***,**

			Pregnancy			Postpartum			
FOBS			Depressive symptoms	Anxiety symptoms	Tokophobia severity	Depressive symptoms	Anxiety symptoms	Birth trauma perception	Tokophobia severity
Pregnancy	Germany	r (n)	0.36*** (1932)	—	—	—	—	—	—
	Lithuania	r (n)	—	—	0.68*** (197)	—	—	—	—
	Poland	r (n)	0.41*** (291)	0.38*** (293)	—	—	—	—	—
	Portugal	r (n)	0.61*** (210)	0.71*** (105)	0.68*** (205)	—	—	—	—
	Total	r (n)	0.39*** (2433)	—	0.69*** (402)	—	—	—	—
Postpartum	Australia	r (n)	—	—	—	0.41*** (261)	—	0.60*** (262)	0.67*** (258)
	Lithuania	r (n)	—	—	—	0.28*** (184)	—	0.28*** (184)	0.50*** (184)
	Total	r (n)	—	—	—	0.36*** (445)	—	0.46*** (446)	0.60*** (442)

Notes. FOBS = Fear of Birth Scale; Depressive symptoms were assessed by Australia, Germany, Poland and Portugal using the Edinburgh Postnatal Depression Scale; Anxiety symptoms were assessed by Poland using the Short Anxiety Scale and Portugal using the State Anxiety Inventory; Tokophobia severity was assessed by Australia, Lithuania, and Portugal using the Tokophobia Severe Scale “—”: data not available.

* $p < .050$.

** $p < .010$.

*** $p < .001$.

(see Table 5).

3.3. FOBS concurrent validity

Large-sized associations were found between FOBS total scores and tokophobia severity measured by the TSS, r s range = 0.50–0.69, all p s < 0.001 (see Table 5).

3.4. FOBS predictive validity

The regression models predicting anxiety ($R^2 = 0.21$) and depressive symptoms in postpartum ($R^2 = 0.06$), and type of birth (Nagelkerke $R^2 = 0.09$) were statistically significant (all p s < 0.001). In women from Portugal, FOBS total scores in pregnancy were associated with higher anxiety symptom severity in postpartum, $\beta = 0.46$, $p < .001$. In women from Poland and Portugal, FOBS total scores were associated with higher depressive symptom severity in postpartum, $\beta = 0.24$, $p < .001$, and with a higher possibility of experiencing cesarean section instead of vaginal birth, $OR = 1.02$. The odds of having a cesarean section (elective or emergency cesarean) instead of a vaginal birth increased by 2 % for each unit increase in FOBS score. The regression model predicting birth trauma perception was not significant ($R^2 = 0.02$) (see Table 6).

3.5. FOBS clinical validity

The FOBS overall predictive ability to discriminate between women with clinically significant FOC in pregnancy (TSS ≥ 11 Lithuania; TSS ≥ 12 Portugal) versus those without (TSS < 11 Lithuania; TSS < 12 Portugal) was acceptable to exceptional in women from Portugal (AUC = 0.81, 95 % CI = 0.75–0.87) and acceptable to good in women from Lithuania (AUC = 0.82, 95 % CI = 0.76–0.88). In pregnancy, the optimal balance between sensitivity and specificity was at the FOBS cut-off score of 44 for women from Lithuania and 45 for women from Portugal. At

these cut-offs, 77.2 % of women from Lithuania and 75.1 % of women from Portugal were correctly identified (see Table 7 and Fig. 1A).

The FOBS overall predictive ability to discriminate between non-clinical and clinical women with (TSS ≥ 11) and without (TSS < 11) clinically significant FOC in postpartum was good to exceptional in women from Australia (AUC = 0.86, 95 % CI = 0.81–0.91) and acceptable to good in women from Lithuania (AUC = 0.79, 95 % CI = 0.73–0.86). In postpartum, the optimal balance between sensitivity and specificity was at the FOBS cut-off score of 35.75 for women from Australia and 49.75 for women from Lithuania. At these cut-offs, 81.4 % of women from Australia and 74.5 % of women from Lithuania were correctly identified (see Table 7 and Fig. 1B).

4. Discussion

Findings from this study provided evidence of the psychometric properties of the FOBS in assessing FOC in women in pregnancy and postpartum, from five countries. Good to excellent reliability was found for FOBS in all countries in both pregnancy and postpartum (George and Mallery, 2019), consistent with the results of the original version in pregnancy (Haines et al., 2011). Cronbach's alpha values ranged from 0.88 to 0.94 and large-sized item correlations were observed in all study countries, in pregnancy and postpartum either regarding past (data from Lithuania) or future (data from Australia) childbirths. These results suggest that FOBS items measure the same construct in the perinatal period in all countries.

Evidence of known group validity was found. Women's perception of income was the only sociodemographic characteristic with criterion validity for FOBS in all the study countries. Women reporting income below average or average (versus above average) reported higher FOC scores, in line with previous reports (Phunyammalee et al., 2019). Socio-economic disadvantage is associated with lower access and quality of maternal healthcare (Hertle et al., 2023), which can increase

Table 6

Predictive validity of the Fear of Birth Scale in pregnancy: linear and multinomial regressions of Fear of Birth Scale scores as predictor of postpartum depressive and anxiety symptoms, birth trauma perception, and type of delivery.

	<i>F</i>	<i>df1,df2</i>	<i>R</i> ²	<i>B</i>	95 % <i>CI</i>	β	<i>t</i>
Postpartum depression symptoms ^a	12.27***	2409	0.06	–	–	–	–
FOBS total score	–	–	–	0.01	0.02–0.05	0.24	4.93***
Postpartum anxiety symptoms	30.76***	1117	0.21	–	–	–	–
FOBS total score	–	–	–	0.01	0.01–0.01	0.46	5.55***
Birth trauma perception	1.90	1117	0.02	–	–	–	–
FOBS total score	–	–	–	0.01	–0.00–0.03	0.13	1.38
Country	–	–	–	–0.11	–1.02–0.80	–0.01	–0.24

	χ^2	<i>df</i>	<i>R</i> _N ²	<i>B</i>	Wald	<i>OR</i>	<i>OR</i> 95 % <i>CI</i>
Type of delivery ^a	71.63***	6*	0.18	–	–	–	–
FOBS total score	27.63***	3	–	–	–	–	–
Country	47.15***	3	–	–	–	–	–
Vaginal versus elective caesarian							
FOBS total score	–	–	–	–0.02	16.04***	0.98	0.97–0.99
Country	–	–	–	1.28	16.61***	3.59	1.94–6.63
Instrumental vaginal versus elective caesarian							
FOBS total score	–	–	–	–0.01	2.26	0.99	0.97–1.00
Country	–	–	–	–1.40	6.88**	0.25	0.09–0.70
Emergency caesarian versus elective caesarian							
FOBS total score	–	–	–	–0.00	0.11	1.00	0.99–1.01
Country	–	–	–	1.05	8.30**	2.87	1.40–5.88

^a Model was adjusted for country: 0 = Portugal (reference group) and 1 = Poland; Type of birth: vaginal ($n = 223$), instrumental vaginal ($n = 28$), emergency cesarean ($n = 87$), elective cesarean (reference group; $n = 66$); $R_N^2 = \text{Nagelkerke } R^2$; *OR* = Odds Ratio; FOBS = Fear of Birth Scale; Postpartum anxiety symptoms were assessed by Portugal ($n = 118$) using the State Anxiety Inventory; Postpartum depression symptoms were assessed by Poland ($n = 293$) and Portugal ($n = 119$) using the Edinburgh Postnatal Depression Scale; Birth trauma perception was assessed by Portugal using one item from the sociodemographic questionnaire ($n = 119$); Type of delivery was collected by Poland and Portugal from the sociodemographic questionnaire.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 7

Clinical validity the Fear of Birth Scale in pregnancy and postpartum: screening performance to detect women with and without clinically significant fear of childbirth (%).

Pregnancy	TSS $\geq$ 11					
	FOBS Threshold	Sensitivity	Specificity	PPV	NPV	Accuracy
Lithuania ^a (n = 197)	42.75	76.9	75.3	77.7	74.5	76.1
	43.25	76.9	76.3	78.4	74.7	76.6
	44.00	76.9	77.4	79.2	75.0	77.2
	44.75	76.0	77.4	79.0	74.2	76.6
	45.50	73.1	78.5	79.2	72.3	75.6
	47.25	72.1	78.5	78.9	71.6	75.1
Portugal ^b (n = 205)	TSS $\geq$ 12					
	43.75	73.3	74.8	69.5	78.2	74.1
	44.25	73.3	75.7	70.2	78.4	74.6
	45.00	73.3	76.5	71.0	78.6	75.1
	45.75	72.2	76.5	70.7	77.9	74.6
	46.25	72.2	79.1	73.0	78.4	76.1
	46.75	71.1	79.1	72.7	77.8	75.6
Postpartum	TSS $\geq$ 11					
	FOBS Threshold	Sensitivity	Specificity	PPV	NPV	Accuracy
Australia ^c (n = 258)	33.75	83.1	77.9	76.0	84.5	80.2
	34.75	83.1	79.3	77.2	84.7	81.0
	35.75	83.1	80.0	77.8	84.8	81.4
	36.75	82.2	80.0	77.6	84.2	81.0
	38.00	81.4	80.7	78.0	83.7	81.0
	38.75	80.5	80.7	77.9	83.1	80.6
Lithuania ^d (n = 184)	45.75	75.0	73.0	70.0	77.7	73.9
	47.75	73.8	74.0	70.5	77.1	73.9
	49.75	73.8	75.0	71.3	77.3	74.5
	50.25	70.2	77.0	72.0	75.5	73.9
	51.00	70.2	78.0	72.8	75.7	74.5
	51.75	70.2	79.0	73.8	76.0	75.0

Notes. FOBS = Fear of Birth Scale; TSS = Tokophobia Severe Scale; PPV = Positive predictive value; NPV = Negative predictive value; For Australia and Lithuania, TSS $\geq$ 11 = women with clinically significant fear of childbirth and TSS < 11 = women without clinically significant fear of childbirth; For Portugal, TSS $\geq$ 12 = women with clinically significant fear of childbirth and TSS < 12 = women without clinically significant fear of childbirth. FOBS clinical validity was not tested for Germany and Poland, since these countries did not have any measure that could be used as a gold standard. Values in bold represent the most adequate balance between sensitivity and specificity.

^a n = 104 women with TSS $\geq$ 11 and n = 93 women with TSS < 11.

^b n = 90 women with TSS $\geq$ 12 and n = 115 women with TSS < 12.

^c n = 118 women with TSS $\geq$ 11 and n = 140 women with TSS < 11.

^d n = 84 women with TSS $\geq$ 11 and n = 100 women with TSS < 11.

uncertainty and perception of lack of control regarding childbirth, and thus FOC (Kim et al., 2018).

Obstetric and fetal/neonatal complications and type of birth showed criterion validity for FOBS in all the study countries. Women who experienced obstetric complications (versus those who did not) reported higher FOBS scores in pregnancy. Women who experienced fetal/neonatal complications (versus those who did not; data from Australia) reported higher FOBS scores in postpartum. The experience of obstetric or fetal/neonatal complications can be associated with more negative cognitions and increased FOC (Korukcu et al., 2019; Vaajala et al., 2023a). Moreover, women who experienced emergency cesarean section reported higher FOBS scores in postpartum (than those who had a vaginal birth). This result is in line with previous studies showing that emergency cesarean section increases the risk of secondary FOC fivefold (Rouhe et al., 2009; Vaajala et al., 2023a).

Mental health-related factors showed criterion validity for FOBS in all the study countries. Women reporting current clinically significant (versus non-clinically) depressive symptoms reported higher FOBS scores in pregnancy and postpartum. Moreover, women with (versus without; data from Portugal) previous diagnosis of mental health problems, previous traumatic childbirth, or reporting current clinically significant (versus non-clinically) anxiety symptoms reported higher FOBS scores in pregnancy. This is coherent with previous reports on the association between previous or current mental health problems and traumatic birth experiences, and negative beliefs and negative

expectations about birth (Dencker et al., 2019; Nath et al., 2021).

Age and education showed criterion validity for FOBS only in two countries. Women's age was associated with higher FOBS scores in Germany, similar to previous evidence (Räisänen et al., 2014). However, in other studies, age was associated with lower FOC (Zhou et al., 2021). Results regarding education were different in Germany and Portugal. Women from Germany without (versus with) higher education reported higher FOBS scores, while women from Portugal without (versus with) higher education reported lower FOBS scores. Previous studies are also ambiguous on this topic, with some reporting higher education and some reporting lower education to be associated with higher FOC (Ryding et al., 2015; Størksen et al., 2015). Women with more education may have more information about potential childbirth-related risks, which can increase FOC (Størksen et al., 2015). On the other hand, less education can be a proxy of socio-economic disadvantage, associated with lower access and quality in maternal healthcare leading to insecurity about childbirth and FOC (Hertle et al., 2023). Further multi-country studies are needed to clarify the association between age, education, and FOC. Parity showed criterion validity for FOBS in pregnancy in Poland. Primiparous women reported higher FOBS scores than multiparous women. Since evidence suggests that primiparous women are more likely to have higher FOC (Rouhe et al., 2009), we were expecting to observe this association in all the study countries. Further multicountry studies are necessary to understand the link between parity and FOC.

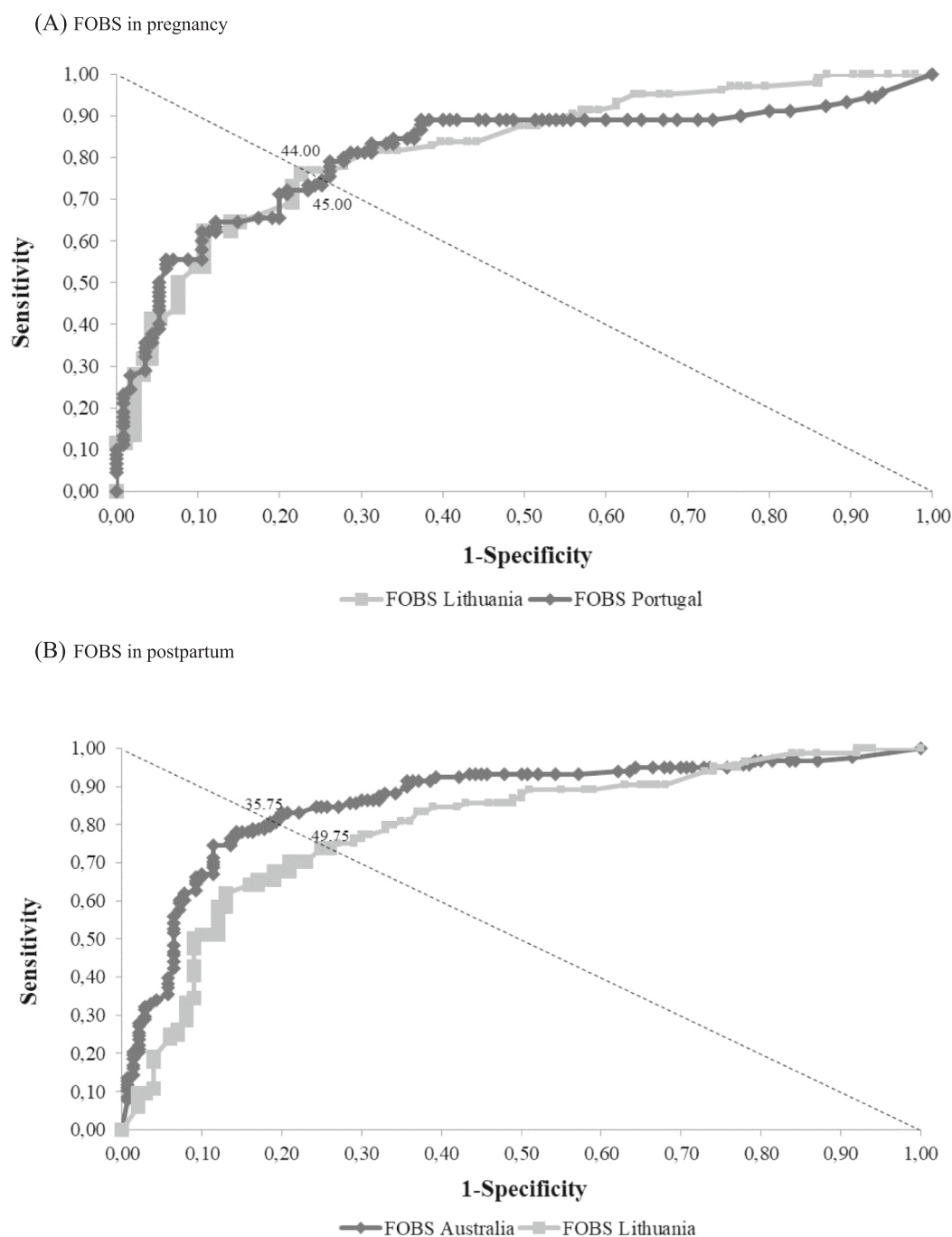


Fig. 1. Receiver operating curve to determine the cut-off value of FOBS with the best performance to identify women with and without clinically significant fear of childbirth.

Notes. FOBS = Fear of Birth Scale; TSS = Tokophobia Severe Scale; For Australia and Lithuania, $TSS \geq 11$ = women with clinically significant fear of childbirth and $TSS < 11$ = women without clinically significant fear of childbirth; For Portugal, $TSS \geq 12$ = women with clinically significant fear of childbirth and $TSS < 12$ = women without clinically significant fear of childbirth; (A) FOBS pregnancy data, Lithuania: $n = 104$ women with $TSS \geq 11$ and $n = 93$ women with $TSS < 11$, Portugal: $n = 90$ women with $TSS \geq 12$ and $n = 115$ women with $TSS < 12$; (B) FOBS postpartum data, Australia: $n = 118$ women with $TSS \geq 11$ and $n = 140$ women with $TSS < 11$, Lithuania: $n = 84$ women with $TSS \geq 11$ and $n = 100$ women with $TSS < 11$.

FOBS' association with depressive and anxiety symptoms, and birth trauma perception are evidence of convergent validity and are in line with previous studies (Dencker et al., 2019; Nath et al., 2021; Rondung et al., 2016). The cognitive biases associated with depressive symptoms can contribute to negative feelings and low self-efficacy regarding childbirth (Nath et al., 2021). These results are also in line with evidence describing FOC as an anxiety disorder (Rondung et al., 2016). In addition, women who experienced traumatic childbirth may have greater

FOC associated with insecurity and high fear of subsequent childbirth (Olsen et al., 2022).

Evidence of FOBS' concurrent validity was found, through the associations between FOBS and tokophobia severity as reported in all countries with these data available (Australia, Lithuania, and Portugal). As far as we are aware, this is the first study providing evidence of FOBS' concurrent validity using a measure of tokophobia (severe FOC). Concurrent validity results suggest that FOBS measures a similar construct

as TSS. FOC-related feelings assessed by FOBS seem to be associated with FOC-related cognitions and behaviors assessed by TSS.

Evidence of FOBS' predictive validity was found as FOBS scores in pregnancy predicted cesarean section (versus vaginal birth) and depressive and anxiety symptoms in postpartum in countries with these data available (Poland and Portugal). Results are in line with research demonstrating that the feelings of lack of control regarding vaginal birth can increase the odds of cesarean section (Wigert et al., 2020). FOC in pregnancy can also negatively affect women's postpartum mental health due to the distress experienced during childbirth (Massae et al., 2021).

Evidence of FOBS' clinical validity was found, with good classification accuracy, to identify women with and without clinically significant FOC in pregnancy and postpartum in all countries with these data available (Australia, Lithuania, and Portugal). FOBS accurately identified 75.1 % to 77.2 % of women in pregnancy and 74.5 % to 81.4 % of women in postpartum. So far, only one general cut-off of 50 was proposed for Sweden and Australia in pregnancy to identify clinically significant FOC (Haines et al., 2011). The current study proposed country-specific FOBS cut-offs to identify clinically significant FOC in pregnancy and postpartum for three countries.

4.1. Strengths and limitations

The main strength was the use of multicountry data, which allowed for the psychometric analysis of FOBS in the perinatal period in a large sample of women from five countries. Although not available in all countries, data on sociodemographic, obstetric, and neonatal characteristics, previous and current mental health-related factors, current symptoms of mental health problems (depressive and anxiety symptoms), birth trauma, and tokophobia severity in the perinatal period allowed to provide evidence of several psychometric properties of FOBS.

The main limitations included different recruitment and data collection strategies and inclusion criteria, which may be associated with heterogeneity in sample characteristics between countries and may have influenced the study results. Nevertheless, criterion validity analyses were conducted considering the country. This study would have benefited from additional information about why elective cesarean section was chosen, for testing predictive validity and from having a clinical interview as the gold standard for testing the clinical validity of the FOBS. Although the TSS assesses both behavioral and cognitive aspects of tokophobia aligned with the diagnostic criteria proposed by the ICD-11 and the DSM-5-TR, it does not assess distress or impairment. Considering that the FOBS is a 2-item unidimensional self-reported measure, measurement invariance analyses were not performed. However, large-sized inter-item correlations were observed either in pregnancy or postpartum in all the study countries.

4.2. Implications for clinical practice and research

FOBS may be a valid and cost-effective screening tool to be used as part of routine perinatal care appointments to identify women with clinically significant FOC and those who may need specialized mental healthcare. Women with clinically significant FOC are more likely to have mental health problems, traumatic childbirth, lower birth rates (Rouhe et al., 2011; Størksen et al., 2012; Vaajala et al., 2023b), or postpone their plans for further pregnancies (Vaajala et al., 2024). Pregnancy and postpartum can be opportunistic points for timely screening of clinically significant FOC which could mitigate some of the negative consequences related to future reproductive choices and/or the persistence of clinically significant FOC into future pregnancies. The use of FOBS can contribute to improving timely mental health screening in maternal healthcare services, and follow-up women in need, supporting them and their families to manage their family planning, thus improving mental health, well-being, and quality of life. Our findings can also contribute to informing mental healthcare approaches and individualized mental healthcare for FOC in maternal healthcare services, by

enquiring about potential risk factors of FOC during the perinatal period.

In some of the study countries, this scale was adapted, and psychometric evidence was provided for the first time, thus becoming a valuable tool for both clinical and research purposes. Future studies on FOBS should analyze clinical validity using a clinical interview and additional psychometric properties (e.g., discriminant validity) in different populations (e.g., nulliparous women, fathers) and countries.

4.3. Conclusion

This multicountry study suggested that FOBS is a psychometrically strong self-reported FOC measure that can effectively screen clinically significant FOC in the perinatal period. Findings provided evidence of reliability, criterion, convergent, concurrent, predictive, and clinical validity for the FOBS either in pregnancy or postpartum.

CRediT authorship contribution statement

Matilde Sousa: Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Daniela Fidalgo:** Writing – review & editing, Writing – original draft, Data curation. **Cláudia Sousa:** Writing – original draft, Formal analysis, Data curation. **Susan Garthus-Niegel:** Writing – review & editing, Data curation. **Olga Riklikienė:** Writing – review & editing, Data curation, Conceptualization. **Paulina Pawlicka:** Writing – review & editing, Data curation, Conceptualization. **Julie Jomeen:** Writing – review & editing, Data curation, Conceptualization. **Inés Jongenelen:** Writing – review & editing, Data curation. **Lara Seefeld:** Writing – review & editing, Data curation, Conceptualization. **Gabija Jarašiūnaitė-Fedosejeva:** Writing – review & editing, Data curation. **Barbara Baranowska:** Writing – review & editing, Data curation. **Kathleen Baird:** Writing – review & editing, Data curation, Conceptualization. **Diogo Lamela:** Writing – review & editing, Data curation. **Raquel Costa:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Tiago Miguel Pinto:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization.

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Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2025.01.063>.

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