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ORIGINAL PAPER

Translation and preliminary exploration of the psychometric properties of the Postpartum Specific Anxiety Scale in Slovak: PSAS-SK

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Abstract

Aim: The study aimed to investigate the level of postpartum anxiety in the research sample of women after childbirth and factors related to increased level of postpartum anxiety. The goal was also to establish the basic psychometric properties of the Postpartum Specific Anxiety Scale (PSAS-SK) in the Slovak language, and explore selected sociodemographic, perinatal, and anamnestic factors related to increased level of postpartum anxiety in a Slovak research sample. *Design:* Quantitative cross-sectional research study. *Methods:* The study involved 122 postpartum women (four-eight weeks postpartum, age 29.5; ± 4.8; 19–42). Data were collected using the standardized PSAS-SK questionnaire alongside sociodemographic and anamnestic data. Statistical analyses included nonparametric tests (Kruskal-Wallis test and Mann-Whitney U test) and confirmatory factor analysis (CFA) to assess the results. *Results:* Clinically significant levels of postpartum anxiety occurred in 25% of research participants. We found a significant relationship between perception of childbirth as traumatic and increased levels of postpartum anxiety. However, no significant relationship was confirmed between level of postpartum anxiety and education parity, type of childbirth, complications during pregnancy, perinatal loss, skin-to-skin contact, or health complications in the child. The PSAS-SK had high internal consistency in a Slovak research sample (Cronbach's alpha 0.96). Results of the CFA focusing on confirmation of the four-factor structure of the PSAS-SK indicated the following results: $\chi^2_{(df = 405)} = 2188.0$, $p < 0.001$, CFI = 0.07, RMSEA = 0.008. *Conclusion:* The Postpartum Specific Anxiety Scale is a valuable tool for the early detection of postpartum anxiety symptoms and for supporting interventions to manage heightened anxiety during the postpartum period, including recommendation of specialized mental health care when appropriate.

Keywords: mental health, motherhood, postpartum anxiety, postpartum care, Postpartum Specific Anxiety Scale, risk factors.

Introduction

Postnatal anxiety is an inappropriate, intense anxiety experienced by the mother or both parents after the birth of a child (Fallon et al., 2016). Women experience concerns not only for their children but often have fears about their own health and well-being. If these symptoms of anxiety or concerns affect the woman's daily life and abilities, it is more than likely that the woman is experiencing postpartum anxiety (Hengel, 2023). Clinically, anxiety is defined as an inappropriate anxiety that impedes proper functioning in daily activities (Zappas et al., 2021). According to Diagnostic and Statistical Manual of Mental Disorders (DSM-5), specific symptoms for diagnosing anxiety include excessive worries of various types associated with at least three physical or cognitive symptoms (nervousness, restlessness, fatigue, problems with concentration, irritability, etc.) that cannot be controlled by will and prevent the performance of everyday activities and duties during the day. These symptoms are not related to any other disease, mental disorder, or the effects of prescription drugs, alcohol, or drugs. Anxiety disorders are the most common group of mental disorders worldwide and occur more frequently among women (Jordan & Minikel, 2019).

The prevalence of anxiety in the postnatal period is approximately 15% to 20% (Zappas et al., 2021). Women with a history of anxiety, those suffering from post-traumatic stress disorder, and those with lower education and disrupted social relationships (partner violence) are more at risk. Similarly, lower

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age, primiparity, significant fear of childbirth, and lower satisfaction with childbirth are predictive factors for increased postpartum anxiety, together with operative or traumatic birth, premature birth, and significant health problems in a newborn (Hengel, 2023; Zappas et al., 2021). On the other hand, factors that are positive in terms of prevention and alleviation of anxiety symptoms include regular physical activity, which has a positive effect on mental well-being, mood, anxiety or depression symptoms, stress, and overall quality of life (Boisseau, 2022). Similarly, social support reduces the effect of postpartum anxiety in women during the postnatal period and can be considered a protective factor against the development of postpartum mental disorders (Bdier et al., 2023). Postpartum anxiety can have several negative consequences – it is associated with lower maternal self-confidence, increased risk of bonding disorders, breastfeeding problems, and increased crying and restlessness in the child (Ahmadpour et al., 2022; Ashford et al., 2017; Kucab et al., 2022).

There is a significant relationship between postpartum depression and postpartum anxiety; anxiety symptoms often overlap with postpartum depression symptoms or postpartum anxiety may precede the onset of postpartum depression (Maria et al., 2021). The scope and prevalence of anxiety disorders (including generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, phobias, post-traumatic stress disorder, and social anxiety disorder) and depression are under-recognized during pregnancy and postpartum (Giakoumaki et al., 2009; Goodman & Tyer-Viola, 2010). Despite the growing amount of scientific research focused on postpartum depression and disrupted bonding and its effects on the child, preventive measures concerning psychiatric counseling or psychotherapy are still lacking in clinical practice (Dubber et al., 2015). Midwives and healthcare workers often report that they do not have enough suitable measurement tools, are unsure how to use the tools, and often experience anxiety when using them. A qualitative study (Ashford et al., 2017) based on interview analysis found problematic issues with diagnosing and screening postpartum anxiety and the need for midwives and healthcare workers to gain knowledge in this area through specialized training.

Several scales can be used for anxiety screening, for example, General Anxiety Disorder-7 (GAD-7), State-Trait Anxiety Inventory (STAI). However, results may be inaccurate in the pregnancy and postpartum period since postpartum anxiety is specific and may have different symptoms from anxiety in the general population. Therefore, measurement scales specific to pregnancy, e.g., Postpartum Specific Anxiety Scale (PSAS), Pregnancy-Related Anxiety Questionnaire (PRAQ) and postpartum have been developed, although scales focusing on postpartum depression, especially the Edinburgh Postnatal Depression Scale (EPDS), are better known. The EPDS scale is sometimes used to identify anxiety; however, this scale is probably less accurate when used for anxiety screening than specific anxiety measuring instruments (Fallon et al., 2016; Jordan & Minikel, 2019; Smith & Nielsen et al., 2021; Zappas et al., 2021). The PSAS, consisting of 51 items, was specifically designed for postpartum anxiety symptoms by Fallon et al. (2016). There is also a shortened version of the postpartum anxiety scale, the PSAS Research Short-Form Crises (PSAS-RSF-C) containing 12 items available (Silverio et al., 2021). A four-factor structure for the PSAS was suggested by the original validation study (Fallon et al., 2016) as well as some other validation studies (Fallon et al., 2022; Ionio et al., 2023). The PSAS has been translated into several languages, including Chinese French, Spanish, and Turkish (Costas-Ramón et al., 2023; Duran, 2020; Infante-Gil et al., 2022; Wang et al., 2023). Validation studies in an Italian sample have indicated good psychometric properties of the scale (Ionio et al., 2023).

Aim

The aims of the study were to explore the psychometric properties of the Postpartum Specific Anxiety Scale, Slovak version (PSAS-SK) in the research sample of Slovak postpartum women and to explore selected sociodemographic, perinatal, and anamnestic factors related to increased level of postpartum anxiety in a Slovak research sample.

Methods

Design

A quantitative cross-sectional research design was used to address the research objectives.

Sample

The research was carried out at the obstetrics unit of the regional hospital in Dolný Kubín in northern Slovakia. Two midwives approached women during their stay at the obstetrics unit after giving birth, informing them about the voluntary and anonymous nature of participation in the research, and about the research goals. Data collection was conducted online via a secure platform accessible to participants

through a link provided in the email sent to their e-mail addresses four-eight weeks postpartum. Efforts were made to ensure easy access and confidentiality. Data collection took place between October 2023 and February 2024. A convenience sampling method was used. The research group consisted of women between four and eight weeks after giving birth. Inclusion criteria were as follows: postpartum women aged 18 years or older who had given birth to a live child. Exclusion criteria included women who had experienced perinatal loss, those with significant pre-existing psychiatric conditions of a psychotic nature, and individuals unable to complete the online questionnaire due to lack of access or other logistical barriers. The total number of research participants was 122. The response rate was 78% (160 electronic forms were sent, 125 completed forms were returned, and three questionnaires were excluded due to incomplete data). The research project was approved by the Ethics Committee of the respective hospital.

Data collection

The Postpartum Specific Anxiety Scale, Slovak version (PSAS-SK) was used for data collection. The back translation process was used when adapting the questionnaire from English to Slovak. The process of translation of the PSAS into Slovak was as follows: first, three independent professionals with a good background in English (two midwives and a psychologist) translated the original English PSAS into Slovak independently of one another. In the second step, these translations were sent back to the UK-based PSAS Working Group to check for major inconsistencies in the language of choice. After the translations were approved, an independent bilingual speaker was selected to back-translate the scale from Slovak back into English. In the final step, the UK-based PSAS Working Group was consulted, and checked the back-translation for accuracy against the original PSAS. Subsequently, we obtained the author's consent for the use of The Postpartum Specific Anxiety Scale in Slovak, abbreviated as PSAS-SK (to indicate the country of use). Additionally, a pilot test was conducted on a small sample (n = 10) to confirm the clarity and cultural appropriateness of the translated scale.

The PSAS, created by Fallon et al. (2016), examines the symptoms of anxiety in postpartum. It consists of 51 items, which are divided into four domains related to specific anxieties in the postpartum period. The first subscale (Maternal competence and attachment anxieties) contains 15 items that examine the mother's self-efficacy, the role of the parent, and the mother-child relationship. The second subscale (Infant safety and well-being anxieties) consists of 11 items related to concerns about the child's health i.e., various illnesses, accidents, and sudden death. In the third subscale (Practical infant care anxieties), seven items assess the experience of anxiety related to feeding, hygiene care, sleep, and daily routine. The fourth subscale (Psychosocial adjustment to motherhood) consists of 18 items that examine adaptation to the new situation after childbirth, namely the woman's concerns about her external appearance, sleep, fatigue, relationship with partner, family, support of family and friends, work, and finances. Each question has four possible answers, which are scored: 1 (not at all), 2 (less often), 3 (often), and 4 (almost always). The questionnaire contains items marked with an asterisk (*), which may not apply to any of the research participants or may not be relevant to their situation. The PSAS has a maximum total score of 204 points, while the cut-off score indicating postpartum anxiety was set at 112 points or more. Higher scores in the PSAS indicate higher anxiety scores. The PSAS questionnaire is designed and validated for use throughout the first year postpartum.

The PSAS-SK measure was used together with items related primarily to assess sociodemographic, perinatal, and anamnestic data: age, education, complications during pregnancy, perinatal loss, parity, type of delivery, the realization of skin-to-skin contact, health complications of the infant, and subjective perception of birth as traumatic (assessed on a Likert scale from 1 to 10; whereby 1 indicates that the birth was not traumatic at all, and the 10 indicates that it was extremely traumatic; values ranging from 1 to 5 were considered 'nontraumatic' perception of birth and values < 6 were considered 'perception of birth as traumatic').

Data analysis

The Jamovi statistical package (R Core Team, 2018; The Jamovi project, 2022) was used for statistical analysis of the results. The Non-parametric Kruskal-Wallis test (ANOVA) and Mann-Whitney U test (t-test) were used to analyze the statistical significance of differences between groups in levels of postpartum anxiety regarding individual sociodemographic, perinatal, and anamnestic characteristics (age, education, complications during pregnancy, perinatal loss, parity, type of delivery, skin-to-skin contact, health complications in the child, subjective perception of childbirth as traumatic. Cronbach's alpha and Spearman-Brown

coefficients were used as indicators of the reliability of the scale.

Confirmatory factor analysis (CFA) was performed to confirm the four-factor structural model of the PSAS-SK proposed in previous validation studies. A maximum likelihood approach to model estimation was adopted. Multiple goodness-of-fit tests were used to evaluate the models, including the chi-square statistic, comparative fit index (CFI), and root mean square error of approximation (RMSEA). A CFI greater than 0.90 was employed as an indicator of an acceptable fit to the data, and an RMSEA lower than 0.08 was the threshold for an acceptable fit to the data. An item loading significantly on a factor was determined by a loading of ≥ 0.3.

Results

Table 1 describes the sociodemographic, perinatal, and anamnestic characteristics of the research sample. The mean age of the respondents was 29.5 (± 4.8; 19–42). Over half of the women had a university education (53.3%) and were primiparas (53.3%). The most frequently occurring type of birth (up to 64.8%) was spontaneous, an acute cesarean section was performed among 17.2% of women, planned cesarean section among 11.5%, while 6.6% had an operative vaginal birth. Regarding the subjective perception of birth, 71.3% of women did not perceive their birth as traumatic (number 1–5 on a 10-point scale), and 28.7% of women considered their birth a traumatic experience (6 or higher on a 10-point scale). Skin-to-skin contact of the recommended minimum length of 45 minutes immediately after birth was implemented in 27.1%, while 42.6% of women experienced only partial skin-to-skin contact, and in 30.3% skin-to-skin contact was not implemented. In total, 20.5% of the newborns had less serious health complications, and 5.7% had serious complications; 22.9% of women had health complications during pregnancy, and 16.4% of women in the research group had experienced a perinatal loss in the past or miscarriage.

Table 1 Basic sociodemographic, anamnestic and perinatal characteristics of the sample

Variable	N (total sample = 122)	Mean PSAS-SK score	p-level
Education			0.153
high	65 (53.3%)	103.1 (±25.5)	
secondary with graduation	49 (40.2%)	92.8 (±26.6)	
primary and secondary without graduation	8 (6.5%)	108.1 (±24.3)	
Age			0.230
age ≤ 34	102 (83.6%)	105.58 (±26.0)	
age ≥ 35	20 (16.4%)	92.85 (±26.9)	
Parity			0.175
primiparas	65 (53.3%)	101.0 (±25.7)	
multiparas	57 (46.7%)	97.4 (±26.9)	
Type of birth			0.606
vaginal delivery	79 (64.8%)	97.0 (±24.3)	
assisted vaginal delivery (VEX, forceps)	8 (6.6%)	102.5 (±34.5)	
acute cesarean section	21 (17.2%)	105.5 (±29.2)	
planned cesarean section	14 (11.5%)	101.4 (±28.3)	
Subjectively traumatic birth (10-point scale)			0.004*
no (1–5)	87 (71.3%)	95.1 (±24.6)	
yes (≥ 6)	35 (28.7%)	110.0 (±27.5)	
Skin-to-skin contact			0.145
yes	33 (27.1%)	97.9 (±27.2)	
yes, limited	52 (42.6%)	95.5 (±24.7)	
no	37 (30.3%)	105.9 (±26.7)	
Health complications of the child			0.583
minor complications	25 (20.5%)	100.2 (±26,87)	
severe complications	7 (5.7%)	98.7 (±25,64)	
no	90 (73.8%)	89.6 (±19,62)	
Pregnancy complications			0.471
no	94 (77.1%)	98.4 (±26.9)	
yes	28 (22.9%)	102.5 (±24.1)	
Perinatal loss			0.324
no	102 (83.6%)	100.4 (±26.6)	
yes	20 (16.4%)	94.0 (±24.4)	

*PSAS-SK – Postpartum Specific Anxiety Scale, Slovak version; *statistically significant differences are in bold*

Table 1 also contains a comparison of mean PSAS-SK scores in groups of participants based on sociodemographic and anamnestic characteristics. Significant differences in postpartum anxiety levels measured by PSAS-SK were found only regarding subjective perception of birth. Women who perceived birth as more traumatic (≥ 6 points on the 10-point scale) reported significantly higher PSAS-SK levels compared to women with lower scores on the traumatic scale (1–5 points on the 10-point scale). No significant differences in PSAS-SK levels were found based on education, age, type of birth, skin-to-skin contact, health complications of the child, pregnancy complications, or perinatal loss.

Table 2 shows the descriptive characteristics of the PSAS-SK items in the research sample. There were items for which women achieved a higher average score (> 2.5) compared to other items. Higher values of the average score indicate a higher level of anxiety regarding the item, namely in item no. 26: 'I was more worried about finishing the housework than before I had a baby'; and in item no. 50: 'I repeatedly checked my child while he was sleeping'. Items no. 38: 'I felt that motherhood was much more difficult than I expected'; no. 29: 'I felt like I had less control over my day than before I had a baby'; no. 37: 'I was worried about getting enough sleep'; and no. 28: 'I was worried if my child had enough milk' achieved average values (M) > 2.5.

Table 2 Descriptive characteristics of the PSAS-SK items

	PSAS1	PSAS2	PSAS3	PSAS4	PSAS5	PSAS6	PSAS7	PSAS8
Mean	2.34	1.58	1.85	2.19	1.66	2.10	2.12	2.16
Median	2.00	1.00	2.00	2.00	1.00	2.00	2.00	2.00
Mode	2.00	1.00	2.00	2.00	1.00	2.00	1.00	2.00
SD	0.799	0.861	0.840	0.856	0.879	0.866	0.950	0.918
	PSAS9	**PSAS10**	**PSAS11**	**PSAS12**	**PSAS13**	**PSAS14**	**PSAS15**	**PSAS16**
Mean	2.24	1.85	1.48	1.65	1.71	2.03	1.87	1.86
Median	2.00	2.00	1.00	1.00	2.00	2.00	2.00	2.00
Mode	2.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00
SD	0.882	0.951	0.752	0.802	0.798	0.781	0.792	0.903
	PSAS17	**PSAS18**	**PSAS19**	**PSAS20**	**PSAS21**	**PSAS22**	**PSAS23**	**PSAS24**
Mean	1.75	2.11	1.98	1.42	1.51	1.86	1.69	2.13
Median	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00
Mode	2.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00
SD	0.764	0.855	0.881	0.725	0.683	0.875	0.783	0.936
	PSAS25	**PSAS26**	**PSAS27**	**PSAS28**	**PSAS29**	**PSAS30**	**PSAS31**	**PSAS32**
Mean	2.05	2.66	1.40	2.46	2.51	1.81	1.93	1.47
Median	2.00	3.00	1.00	2.50	2.00	2.00	2.00	1.00
Mode	1.00	3.00	1.00	3.00	2.00	1.00	1.00	1.00
SD	0.952	0.868	0.723	0.946	0.981	0.921	0.920	0.718
	PSAS33	**PSAS34**	**PSAS35**	**PSAS36**	**PSAS37**	**PSAS38**	**PSAS39**	**PSAS40**
Mean	2.42	2.34	1.76	1.32	2.51	2.55	2.22	1.78
Median	2.00	2.00	1.00	1.00	3.00	3.00	2.00	1.00
Mode	2.00	2.00	1.00	1.00	3.00	2.00	2.00	1.00
SD	0.861	0.860	1.01	0.620	0.902	0.928	1.02	0.966
	PSAS41	**PSAS42**	**PSAS43**	**PSAS44**	**PSAS45**	**PSAS46**	**PSAS47**	**PSAS48**
Mean	1.88	1.05	1.92	2.07	1.90	2.00	1.60	1.34
Median	2.00	1.00	2.00	2.00	2.00	2.00	1.00	1.00
Mode	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
SD	0.839	1.21	0.976	1.01	0.991	1.04	0.757	0.723
	PSAS49	**PSAS50**	**PSAS51**					
Mean	2.23	2.59	2.40					
Median	2.00	3.00	2.00					
Mode	3.00	3.00	3.00					
SD	0.934	0.800	0.942					

PSAS – Postpartum Specific Anxiety Scale; SD – standard deviation

These questions are related to the experience of motherhood and childcare. Lower average values of individual items indicate a low anxiety score regarding these items among participants. Item no. 42: 'I was afraid of going back to work' was rated lowest. This could be explained by the high percentage of women who were not permanently employed, i.e., they were on maternity leave, unemployed, or students in our sample. Other low-rated items included item no. 36: 'I felt that someone else would take better care of my child'; and no. 48: 'I felt resistance towards my partner / husband', for which the research participants most often answered with the option 'not at all' (value 1). These questions concern the experience of motherhood, while item no. 36 refers to the relational bond between mother and child.

Table 3 shows the average values of the total score of the PSAS-SK questionnaire in the research sample. The mean of the total score of the PSAS-SK questionnaire in our research sample was 98.9. SD was 26.2. The minimum value of the total score in the research sample was 51 points, while the maximum was 161 points. The threshold of anxiety that can be considered clinically significant is a PSAS total score ≥ 112. In our research sample, 30 (24.6%) postpartum women out of a total of 122 showed significantly increased levels of postpartum anxiety.

Reliability of the scale was assessed based on internal consistency analysis (Cronbach's alpha), and analysis of split-half reliability (Spearman-Brown coefficient). A criterion of 0.70 was considered the minimum acceptable level regarding both reliability coefficients. The value of 0.96 for Cronbach's alpha and 0.93 for the Spearman-Brown coefficient indicates high reliability of the questionnaire in the Slovak sample. High internal consistency was shown also for the four subscales of the PSAS-SK (Table 4).

Table 3 Descriptive characteristics of the total score of the PSAS-SK and its subscales

Descriptives	PSAS total score	Maternal competence and attachment anxieties	Infant safety and well-being anxieties	Practical infant care anxieties	Psychosocial adjustment to motherhood
N	122	122	122	122	122
Mean	98.8	29.39	21.68	14.25	36.2
Median	92.5	28	20		34
Mode	89.0		17	16	29
Standard deviation	27.5	9.15	6.13	4.07	11.04
Minimum	26.2	15	11	7	19
Maximum	161	53	39	24	67

PSAS – Postpartum Specific Anxiety Scale

Table 4 Reliability analysis of the PSAS-SK – total score and subscales

	Cronbach's alpha
PSAS-SK – 51 items	0.96
Maternal competence and attachment anxieties	0.93
Infant safety and well-being anxieties	0.86
Practical infant care anxieties	0.81
Psychosocial adjustment to motherhood	0.91

PSAS-SK – Postpartum Specific Anxiety Scale, Slovak version

Results of the Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was performed to confirm the four-factor structural model proposed in previous validation studies of the PSAS, consisting of first factor: Maternal competence and attachment anxieties (15-items); second factor: Infant safety and well-being anxieties (11-items); third factor: Practical infant care anxieties (7-items); and fourth factor: Psychosocial adjustment to motherhood (18-items).

Results of the confirmatory factor analysis focusing on the confirmation of a four-factor structure for the PSAS-SK indicated the following results: $\chi^2_{(df = 405)} = 2188.0$, $p < 0.001$, fit indices were 0.7 (CFI) and 0.08 (RMSEA). Items factor loading are shown in Table 5.

Table 5 Results of the CFA: item factor loadings

Factor 1		Factor 2		Factor 3		Factor 4	
Item 4	0.518	**Item 3**	0.551	**Item 13**	0.367	**Item 1**	0.456
Item 7	0.428	**Item 8**	0.581	**Item 14**	0.448	**Item 2**	0.471
Item 9	0.528	**Item 15**	0.492	**Item 28**	0.626	**Item 5**	0.569
Item 11	0.504	**Item 16**	0.569	**Item 34**	0.411	**Item 6**	0.532
Item 17	0.556	**Item 19**	0.422	**Item 41**	0.600	**Item 10**	0.606
Item 18	0.698	**Item 22**	0.435	**Item 47**	0.495	**Item 12**	0.595
Item 20	0.524	**Item 27**	0.334	**Item 49**	0.701	**Item 21**	0.457
Item 23	0.570	**Item 31**	0.609			**Item 26**	0.552
Item 24	0.716	**Item 33**	0.525			**Item 29**	0.634
Item 25	0.694	**Item 35**	0.651			**Item 30**	0.440
Item 36	0.387	**Item 50**	0.490			**Item 32**	0.417
Item 38	0.663					**Item 37**	0.587
Item 39	0.727					**Item 42**	0.484
Item 40	0.748					**Item 43**	0.623
Item 45	0.769					**Item 44**	0.561
						Item 46	0.666
						Item 48	0.381
						Item 51	0.576

Discussion

In our research sample, we found clinically significant postpartum anxiety in 25% of postpartum women when using the PSAS-SK cut-off score ≥ 112, which was set in the original Italian study (Fallon et al., 2016). One possible explanation for the high prevalence of elevated anxiety rates may be the period after childbirth in which research was carried out. We sent out the questionnaires between four and eight weeks after giving birth, that is, in the early postpartum period. Several studies point to the fact that the prevalence of postpartum anxiety has a decreasing tendency with a greater time interval after childbirth. The decrease in the rates of postpartum anxiety symptoms might be explained by the fact that with time, the level of successful adaptation to motherhood increases, especially with a good level of social support (Mahamid et al., 2023; Dennis et al., 2017). At the same time, the prevalence of postpartum anxiety in research studies varies between 13% and 40% (Field, 2018), and depends not only on the time that has passed since the birth but also on the methodology used to measure anxiety (e.g., when using the STAI scale, there was a higher prevalence of postpartum anxiety; with the GAD-7 scale there were lower rates of postpartum anxiety). In our study, data were collected in the early postpartum period, which might partially explain the high percentage of clinically significant postpartum anxiety (25%) in the research sample. In the future, it would be useful to assess the prevalence of postpartum anxiety symptoms a longer period after childbirth to establish whether the incidence of postpartum anxiety has a decreasing tendency and to find out the number of women in which it has a persistent character. Since 2024, the competencies of midwives in Slovakia have included home visits six weeks postpartum (covered by health insurance); however, in practice, these home visits are still seldom carried out. If community postpartum care becomes more developed in the future, it would be useful to include mental health problems screening, including postpartum anxiety, in the home visits. Visits of midwives and community nurses and the implementation of the service of community teams for perinatal mental health might help reduce the risk of postnatal mental health problems (Gurol-Urgancy et al., 2024; Knight et al., 2024).

When comparing the mean scores for individual questions of the questionnaire, the highest scores were found in items expressing anxieties related to coping with household duties and control over the day, as well as practical infant care anxieties related to milk intake and sleep. The high score for the item indicating that motherhood was much more difficult than expected points to the difference in expectations and subsequent reality of motherhood and coping with a new life situation. These results are in some regards similar to findings in other validation studies of the PSAS questionnaire, for instance in France (Infante-Gil et al., 2022) or Spain (Costas-Ramón et al., 2023); however, cultural differences in some items were noticed as well. In the French study, (Infante-Gil

et al., 2022), the item expressing anxieties concerning completion of household duties was found to be of low significance; while in our study, high mean scores were found for this item. In contrast to studies from Turkey and Great Britain (Duran, 2020; Fallon et al., 2016), in our research sample, the item regarding concern about returning to work had the lowest mean score. This might be related to the fact that maternity leave in Slovakia usually lasts up to three years and returning to work might only be a concern for women later after birth. The item related to the concern that someone else would take better care of the child or the item related to the feeling of resistance towards the partner was also rated very low in the Slovak sample compared to other studies (Duran, 2020; Fallon et al., 2016; Infante-Gil et al., 2022).

The confirmatory factor analysis focused on validating a four-factor model for the PSAS-SK, based on the original Italian validation (Fallon et al., 2016). An RMSEA value of 0.08 or lower, combined with a p-value below 0.05, indicates a good model fit, while a value of 0.10 or higher suggests a poor fit. In our study, RMSEA was found to be statistically significant ($p < 0.001$), indicating a good model fit. Additionally, all items on the PSAS-SK had factor loadings above 0.30, further supporting the model's fit. However, one of the fit indices (CFI = 0.7) fell below the threshold value for acceptable fit (0.9). Validation studies of the PSAS in France, Spain, Turkey, and China have generally supported a four-factor structure, though some inconsistencies have been noted. For instance, in the Spanish and French versions (Costas-Ramón et al., 2023; Infante-Gil et al., 2022), certain items exhibited low factor loadings. In the French version (Infante-Gil et al., 2022), items 2, 7, 42, and 43 were found to have low factor loadings, suggesting cultural differences in how women interpret and respond to these items. In the Iranian version, only item 15 had the same problem. Given these findings, it may be necessary to conduct a cross-cultural measurement invariance study.

We found a significant relationship between perceiving childbirth as traumatic and increased levels of postpartum anxiety. However, compared to the traumatic experience of childbirth, we did not find a significant relationship between the level of postpartum anxiety and objective obstetric complications during birth resulting in operative birth. It seems that subjective experiences of the birth and perception of the birth might be influenced by factors other than objective complications (for instance communication and support from the healthcare professionals, previous experiences of women, etc.). Our results are in line with the findings of some other studies, for instance, Field (2018), where, in a larger sample of 4,657 women, anxiety was not related to the type of delivery, but to the experience of delivery. The subjective experience of childbirth includes factors such as the feeling of self-control, the possibility of participating in the decisions during the process of childbirth, or on the other hand, experiencing fear and traumatic experiences during childbirth.

In contrast, no significant relationship was confirmed between level of postpartum anxiety and sociodemographic factors (education, age), and perinatal or anamnestic factors: such as parity, complications during pregnancy, perinatal loss, skin-to-skin contact, or health complications of the child. This is contrary to some other studies, in which the authors have found a significant relationship between higher levels of postpartum anxiety and higher age (Hijazi et al., 2021). Differences in postpartum anxiety levels according to parity have been found in a study by Mahamid et al. (2023), in which primiparas and secundiparas were found to be at higher risk of experiencing increased postpartum anxiety compared to multiparas. Health complications of the infant or problems with their health or sleep have also been shown to be associated with a higher risk of developing postpartum anxiety among women four to six months after birth (Clout & Brown, 2015).

Another important factor that might be related to postpartum anxiety, but was not assessed in our study, is the level of social support. The results of a study by Mahamid et al. (2023) showed that the provision of emotional support at a high level by loved ones and the provision of sufficient information by healthcare providers were protective factors for reducing the level of postpartum anxiety regarding the safety and well-being of infants. The research also showed that pregnant mothers who perceived high informational support from healthcare providers had lower levels of postpartum anxiety on the Caring for Baby's Basic Needs subscale (Mahamid et al., 2023).

Limitation of study

A key limitation of this study is the lack of proportional representation of lower socioeconomic groups and educational diversity in the sample, potentially affecting the generalizability of the findings. Additionally, although attempts were made to include a broad

range of factors influencing postpartum anxiety, certain variables require further exploration in future studies. These factors include birth weight of the newborn, gestational age (premature or full-term), maternal income and employment status, marital status, method of infant feeding (e.g., breastfeeding or formula feeding), medication use, and pre-existing psychological conditions. Completing the questionnaire electronically also introduced certain drawbacks, especially as online samples tend to underrepresent lower socioeconomic groups. Future research could benefit from continued validation of the Postpartum Specific Anxiety Scale in Slovak settings (construct validity) and from a broader assessment of potential risk factors, such as positive psychiatric history and social support, within a more representative sample of postpartum women.

Conclusion

The Postpartum Specific Anxiety Scale is a valuable tool for the early detection of postpartum anxiety symptoms, with the Slovak version (PSAS-SK) demonstrating good reliability. Confirmatory factor analysis of a four-factor structure model indicated a relatively good fit for the Slovak data. Further construct validity analysis of the PSAS-SK would be beneficial in future research.

Greater attention should be devoted to women's mental health during pregnancy, childbirth, and the postpartum period. Addressing postpartum anxiety is particularly crucial, as its prevalence appears high, as indicated in our study. The postpartum period is a sensitive time when various factors can impact women's mental well-being. Preventing postpartum anxiety should emphasize identifying risk factors, early diagnosis, and screening for women at higher risk of mental health issues, including postpartum anxiety.

The Postpartum Specific Anxiety Scale, developed specifically for the postpartum period and validated across multiple countries, aids in early detection and allows for the implementation of preventive measures. By facilitating early identification, it opens avenues for supportive interventions and, where necessary, referral to specialized mental health care aimed at helping women manage heightened anxiety during the postpartum period.

Ethical aspects and conflict of interest

The authors declare that the research was carried out in accordance with the 1964 Helsinki Declaration and its latest revision, published in 2013. Research respondents were informed in advance in writing about the aims of the research, that their participation in the research was voluntary and anonymous, and that all data obtained would remain confidential.

Participants received information about study aims, each participant signed the informed consent letter before administering the questionnaire, study was approved by the Ethics Committee of the respective hospital.

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Author contributions

Conception and design (ZS, BG), data analysis and interpretation (ZS, BG), manuscript draft (ZS), critical revision of the manuscript (ZS, BG), final approval of the manuscript (ZS).

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