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ORIGINAL RESEARCH

Pelvic floor-related sexual functioning in the first 24 months postpartum: Findings of a large cross-sectional study

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Abstract

Introduction: The pelvic floor is exposed to differing stresses and trauma depending on the mode of birth. At the same time, the pelvic floor plays a crucial role in female sexual functioning (FSF). Whereby FSF encompasses different dimensions, from subjective satisfaction to physiological aspects, such as lack of pain and orgasm ability. The aim of the study presented here is to assess FSF in relationship to postpartum pelvic floor disorder based on the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire, IUGA-Revised (PISQ-IR), in a large convenience sample and to identify whether there is an association between mode of birth as well as perineal injuries and FSF of women up to 24 months postpartum.

Material and Methods: We conducted a cross-sectional online survey and recruited via social media women up to 24 months after birth of their last child. FSF was surveyed using the PISQ-IR. Details were also collected on all previous births and birth-related perineal trauma, as well as current breastfeeding, obesity, and socio-demographics. Multivariate models were then calculated to determine a possible association between FSF and birth mode.

Results: The data basis is the responses of 2106 survey participants within the first 24 months postpartum. Even 12–24 months postpartum, 21% of respondents are not sexually active, which burdens almost 44% of these women. With regard to mode of delivery, differences in FSF are only evident in individual dimensions of the PISQ-IR. The dimensions "Condition Impact" and "Condition Specific" were significantly associated with more impairments in sexually active respondents up to 12 months postpartum whose last mode of delivery was forceps or vacuum extraction. If a perineal tear had occurred during last birth, this was significantly associated with a lower PISQ-IR subscore in the "Condition Impact," "Condition-Specific," "Global Quality," "Partner-Related," and "Arousal" models. The low variance explanation shows that further relevant factors on female sexuality may exist.

Abbreviations: CS, cesarean section; FSF, female sexual functioning; PISQ-IR, Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire, IUGA-Revised.

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Conclusions: The issue of impairments in FSF following childbirth, persisting for an extended period of time, is a significant postpartum concern. Due to the very different dimensions of FSF, the influence of the mode of delivery must be considered in a differentiated way.

KEYWORDS
birth mode, female sexual functioning, pelvic floor disorders, perineal tear, postpartum

1 | INTRODUCTION

Female sexual functioning (FSF) encompasses different dimensions, from subjective satisfaction to physiological aspects, such as the absence of pain and the capacity to achieve orgasm.[1] The postpartum period is considered to be a particularly vulnerable phase for female sexuality, although, at the same time, little attention is being paid to this important topic by obstetricians/gynecologists.[2,3] Although the prevalence of sexual dysfunction diminishes as more time elapses following childbirth, it remains significantly high, with 64% of women still affected 6 months postpartum.[4] Pelvic floor disorders have a significant impact on different dimensions of sexual functioning, such as dyspareunia, but also decreased arousal and vaginal dryness.[5,6] Accordingly, the influence of the mode of delivery, as well as of perineal trauma on the pelvic floor and subsequent on sexual functioning postpartum, is discussed.[4,7] A significant association between the mode of delivery (cesarean vs. spontaneous vaginal vs. vaginal operative) and pelvic floor disorders, such as prolapse or stress urinary incontinence, is evident.[8] Anal sphincter injuries, in particular, have been linked to an increased likelihood of dyspareunia and sexual dysfunction, while episiotomy has also been correlated with dyspareunia within the first year postpartum.[9] Various validated instruments are available to assess FSF, encompassing both general measures and those specifically tailored to evaluate pelvic floor symptoms and sexual function. Notably, the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire, IUGA-Revised (PISQ-IR),[10,11] is designed to explicitly address potential pelvic floor symptoms and their impact on sexual function. The PISQ-IR is based on the PISQ-12, a validated condition-specific female sexual function questionnaire, but extends it to women who do not have a partner or are not sexually active. Employed in women 6 months postpartum, no significant difference is shown with respect to the PISQ-12 mean score in relation to mode of delivery.[12] However, comparisons between elective cesarean sections (CSs) and uncomplicated vaginal deliveries reveal higher rates of incontinence at 6 years postpartum among women who delivered vaginally, yet lower rates of sexual pain compared to those who underwent elective CSs.[13]

Previous studies that have employed the PISQ-12 to investigate FSF and pelvic floor disorders have predominantly focused on primiparous women recruited in the clinical setting.[12,14,15] To the best of our knowledge, the PISQ-IR has not been previously utilized in a postpartum population, rendering this study particularly novel. Furthermore, there is a notable paucity of research examining this relevant topic in large real-life population-based samples. The present study aims to assess FSF in relationship to postpartum pelvic floor disorder based on the PISQ-IR within a substantial convenience sample and to identify factors associated with the FSF of women up to 24 months postpartum.

Key message

Sexual functioning, as well as sexual inactivity postpartum, is a relevant issue that can have a burdening impact on the women affected. There are significant associations between the birth mode (last birth) and individual dimensions of sexual functioning.

2 | MATERIAL AND METHODS

An anonymous online survey was conducted during September and October 2022. The target population comprised women in the first year following the birth of their last child, who were specifically reached through social media platforms. To recruit participants, content creators on social media (primarily Instagram) who cater to mothers were enlisted to share a link to the online survey. Data collection was conducted entirely anonymously using LimeSurvey. Given the exploratory nature of the study, which aimed to assess associations in a non-clinical sample, no power calculation was performed in advance. The recruitment period was determined by the response rate observed on social media, with the survey concluding once the response rate declined following the final call for participation.

The survey was created collaboratively by a team of researchers with expertise in clinical practice, therapy, and social sciences, while also incorporating the perspective of those directly affected. The survey consists of both literature self-developed and validated instruments and as a whole was tested for consistency, comprehensibility, and technical performance using a pretest of five women who had given birth within the last 24 months. The PISQ-IR was not pretested, as the validated German Version of the PISQ-IR was

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utilized.[16] Only the variables that were included in these analyses are described here.

2.1 | Main outcome measure: The PISQ-IR

To assess FSF, the PISQ-IR was employed, comprising six subscales for sexually active women and four subscales for sexually inactive women, with each subscale addressing a distinct dimension of sexuality (see Table 1).[17] No missing values were allowed when calculating the subscores. The German translation provided by the PISQ-IR working group was used here (PISQ-IR: iuga.org).[16] As it is not recommended to build the score from the subscales, multivariate linear regression models were calculated here in relation to the subscales (dependent variable).[17] Higher scores indicate greater impact on sexual inactivity among sexually inactive women and indicate better FSF among sexually active women.

Data for orgasm quality and dyspareunia are also derived from the PISQ-IR. Participants were asked as follows: "Compared to orgasms you have had in the past, how intense are your orgasms now?" (response categories: "much less intense," "less intense," "same intensity," "more intense," and "much more intense") and "How often do you feel pain during sexual intercourse" (response categories: "never," "rarely," "sometimes," "usually," and "always").

2.2 | Mode of birth and perineal trauma

For each previous birth after the 20th week of pregnancy, data were collected on the mode of birth, specifically CS, spontaneous vaginal delivery, or forceps/vacuum extraction. Additionally, information regarding perineal trauma, including episiotomy and perineal lacerations, was recorded. These details enabled the calculation of the time elapsed since the last birth and facilitated the identification of whether a vaginal birth, an episiotomy, or a perineal tear had occurred.

2.3 | Further information

Participants were asked whether they were currently breastfeeding at the time of the survey (yes/no). Additional variables included in the analysis as potential confounders were the current body mass index, categorized as obesity or not (yes/no), the age of the woman at the time of the survey, and her highest degree of education.

2.4 | Statistical analyses

For the analyses presented, only data from women whose last birth was 24 months or less prior to the survey were included. Four linear regression models were calculated for sexually inactive women, and six models were calculated for sexually active women, based on the different dimensions of the PISQ-IR (dependent variable). The explanatory variables in the models included mode of delivery regarding last birth, time postpartum, perineal trauma (perineal incision and perineal tear), as well as current breastfeeding status. Additionally, age at the time of the survey, highest level of education, number of births after 20 weeks gestation, and current body mass index were included as confounders.

Group differences in birth modes, sexual activity, and specific PISQ-IR items (dyspareunia and experienced quality of orgasms) were assessed using t-tests and Wilcoxon rank-sum tests. Results were considered statistically significant at a p-value threshold of less than 0.05.

The analyses were performed with R 4.3.0 using the packages psych[18] and performance.[19]

TABLE 1 Description of the PISQ-IR categories.

Characteristics	Description of subscale	Not sexually active	Sexually active
Global quality	This refers to the general satisfaction with one's own sex life, as well as the fit with age and life circumstances	x	x
Condition impact	Covers the influence of urinary leakage or prolapse symptoms on sexual life	x	x
Condition specific	Inquires the agreement not to be sexually active or to avoid sexual activity for condition-specific reasons, for example, due to prolapse, urinary or fecal incontinence, pain, or other health reasons	x	x
Partner related	Assesses the influence of a partner or lack of a partner on sexuality	x	x
Arousal, orgasm	Questions about the frequency of sexual arousal but also comparison of orgasms quality in the past and now		x
Desire	Covers the frequency and degree of sexual desire/interest		x

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3 | RESULTS

Data of 2106 participating women remained for the statistical analysis after excluding those whose last birth occurred more than 24 months prior to the survey.

The mean age of the participants was 32 years (SD: 3.97; min: 18; max: 49), with 69% being primiparous. The dataset includes 1185 (56%) women who had at least one spontaneous vaginal delivery and 378 (18%) women who had at least one delivery using forceps or vacuum extraction. In total, 587 (28%) underwent a CS (see Table 2).

Regarding sexual activity, over 28% ($n=506$) of respondents reported that they are not sexually active, either with a partner or alone (see Table 3). A significant difference (Wilcoxon signed-rank test: $p<0.001$) was observed between sexually active and sexually inactive women in relation to the time since their last birth. Among women whose last birth was less than 6 months ago, almost 33% reported being sexually inactive, while this proportion decreased to 19% at 12 months postpartum or later. Sexual inactivity was associated with a substantial burden, with 20% of women feeling very burdened, 33% somewhat burdened, and 66% agreeing with the statement, "My sex life frustrates me." A significant correlation was found between the time postpartum and the burden experienced due to sexual inactivity (linear regression coefficient: 0.019; $p=0.013$). Furthermore, the likelihood of being sexually active decreases significantly (Pearson's chi^2: 55.9; $p<0.001$) among women who were currently breastfeeding, even after considering the time postpartum (logistic regression: OR=0.45 (0.35–0.58); $p<0.001$). Women who were not sexually active and were not currently breastfeeding reported feeling especially burdened.

3.1 | Sexually inactive women

Among sexually inactive women, 2% reported being "very much" satisfied with their sex life, 6% "quite a bit," 25% "moderately," 43% "rather disagree," and 24% "totally disagree." Overall, the value of the global quality (sub-dimension) score of the PISQ-IR was 3.2 (SD=0.80; min: 1.00, max: 4.50; $n=482$). With the exception of the partner-related and the condition-specific (only >12–24 months) subscales, all PISQ-IR subscales demonstrated significant correlations with the global quality score. The multivariate analyses (see Tables 4a and 4b) assessing the mode of delivery for the last birth only indicated a significant association for CS compared to spontaneous vaginal delivery in terms of global assessment of quality. However, the results for the other explanatory variables were inconsistent, and the overall explanatory power of the individual models was low.

3.2 | Sexually active women

Among sexually active women, 6% reported being "very much" satisfied with their sex life, 31% "quite a bit," 36% "moderately," 22% "rather disagree," and 5% "totally disagree." Overall, the value of the global quality (sub-dimension) score of the PISQ-IR was 3.2 (SD=0.88; min: 1.00, max: 4.75; $n=1270$). All subscales of the PISQ-IR correlated significantly with the global quality score, with the highest correlation coefficients found between the global quality score and the partner-related and arousal/orgasm scores for up to 24 months postpartum (partner related: coeff. 0.53, 95% CI (0.49–0.58) and arousal/orgasm: coeff. 0.52, 95% CI (0.48–0.56)).

When comparing women who had a CS vs those who did not at their last birth, significant differences were observed in the PISQ-IR subscales "Condition Impact" (Welch's two-sample t-test: $p<0.001$; indicating better sexual function for CS) and "Desire" (t-test $p=0.007$; indicating better sexual function for CS). However, no significant differences were found regarding dyspareunia (PISQ-IR item 11) and the experienced quality of orgasms (PISQ-IR item 10) in relation to mode of birth regarding the last delivery (CS yes/no) (Wilcoxon–Mann–Whitney: dyspareunia: $p=0.24$; orgasm quality: $p=0.19$) or whether the woman had ever had a vaginal birth (Wilcoxon–Mann–Whitney: dyspareunia: $p=0.14$; orgasm quality: $p=0.44$). Pain during intercourse was reported by 23% of the participants "sometimes," 11% "often," and 4% "always."

Regarding the first 12 months postpartum, the mode of last birth was significantly associated with FSF in the "Condition Impact," "Condition Specific," and "Arousal" subscales. Specifically, delivery via forceps or vacuum extraction was significantly negatively associated with "Condition Impact," "Condition Specific," and "Arousal," while CS showed a significant negative association with "Condition Specific" and "Arousal." The occurrence of a perineal tear during the last birth was significantly associated with lower PISQ-IR subscores in all dimensions except "Desire." In contrast, no significant negative relationship was observed for episiotomy. Additionally, ongoing breastfeeding was significantly negatively associated with lower subscores in the domains "Desire" and "Arousal." Overall, the variance resolution is very low for all models (see Tables 5a and 5b).

Extending the postpartum period to 12–24 months, the only significant associations that remained were between CS and "Desire" and between perineal tear and "Condition specific."

4 | DISCUSSION

Even 12–24 months postpartum, 21% of women reported that they were neither sexually active with a partner nor alone. Overall, more than 50% of non-sexually active women felt burdened by this and 66% expressed that they are somewhat or strongly frustrated with their sex life. Among sexually active women, 27% reported dissatisfaction with their sexual life.

The influence of the mode of delivery on pelvic floor functionality and consequently on sexuality is being discussed,[20,21] with recent studies increasingly highlighting the protective effects of CS, and in reducing rates of incontinence, pelvic floor impairment[22] and sexual dysfunction.[23] Similar to the longitudinal study by Martin et al.,[21] we observed that the effect of birth mode

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TABLE 2 Demographic and obstetric characteristics of the study population.

Characteristic	Up to 12 months postpartum				>12 and up to 24 months postpartum			
	Overall, *N* = 1391	Vaginal delivery, no use of birth instruments, *N* = 817	Obstetrics by forceps or vacuum extraction, *N* = 197	Cesarean section, *N* = 377	Overall, *N* = 715	Vaginal delivery, no use of birth instruments, *N* = 435	Obstetrics by forceps or vacuum extraction, *N* = 108	Cesarean section, *N* = 172
Current age, mean (SD)	31.9 (3.9)	31.8 (3.9)	31.5 (3.6)	32.5 (4.2)	33.0 (3.9)	32.7 (3.8)	33.4 (3.8)	33.4 (4.2)
Unknown	205	114	28	63	78	49	14	15
Highest level of education, *n* (%)								
Lower secondary school-leaving certificate or equivalent	12 (1.0)	7 (1.0)	2 (1.2)	3 (1.0)	6 (0.9)	3 (0.8)	1 (1.1)	2 (1.3)
Intermediate secondary school-leaving certificate	106 (9.0)	57 (8.1)	16 (9.5)	33 (11)	64 (10)	38 (9.8)	7 (7.4)	19 (12)
General or subject-related qualification for university entrance	323 (27)	200 (28)	42 (25)	81 (26)	164 (26)	106 (27)	23 (24)	35 (22)
Higher education degree	742 (63)	438 (62)	109 (64)	195 (63)	402 (63)	239 (62)	63 (67)	100 (64)
Unknown	208	115	28	65	79	49	14	16
Obesity according to BMI (WHO, 2008), *n* (%)	128 (11)	59 (8.5)	13 (7.7)	56 (18)	87 (14)	50 (13)	11 (12)	26 (17)
Unknown	217	120	29	68	80	51	14	15
Number of births, *n* (%)								
1	978 (70)	531 (65)	176 (89)	271 (72)	491 (69)	267 (61)	98 (91)	126 (73)
2	328 (24)	219 (27)	21 (11)	88 (23)	169 (24)	126 (29)	8 (7.4)	35 (20)
3 or more	85 (6.1)	67 (8.2)	0 (0)	18 (4.8)	55 (7.7)	42 (9.7)	2 (1.9)	11 (6.4)
Perineal tear, during the last birth, *n* (%)	414 (30)	336 (42)	78 (40)	0 (0)	229 (32)	191 (44)	38 (35)	0 (0)
Unknown	9	9	0	0	4	4	0	0
Episiotomy, during the last birth, *n* (%)	190 (14)	96 (12)	94 (48)	0 (0)	85 (12)	44 (10)	41 (38)	0 (0)
Unknown	9	9	0	0	4	4	0	0
Time postpartum (months), Mean (SD)	6.6 (3.4)	6.8 (3.4)	6.6 (3.3)	6.4 (3.2)	17.5 (3.4)	17.3 (3.3)	17.7 (3.4)	17.7 (3.4)
Current breastfeeding, *n* (%)	1088 (79)	666 (83)	151 (78)	271 (72)	335 (48)	221 (51)	48 (45)	66 (39)
Unknown	18	12	3	3	10	4	2	4

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TABLE 3 Mean scoring of the PISQ-IR.

	Up to 12 months postpartum				>12 and up to 24 months postpartum			
	Not sexually active[a] $N = 375$		Sexually active[b] $N = 826$		Not sexually active[a] $N = 131$		Sexually active[b] $N = 508$	
Characteristic	Mean (SD)	Correlation with global quality subscale[c]	Mean (SD)	Correlation with global quality subscale[c]	Mean (SD)	Correlation with global quality subscale[c]	Mean (SD)	Correlation with global quality subscale[c]
Global quality	3.15 (0.80)	–	3.26 (0.84)	–	3.35 (0.78)	–	3.09 (0.94)	–
Unknown	20		34		4		30	
Condition impact	1.44 (0.77)	0.22***	3.65 (0.60)	0.42***	1.54 (0.94)	0.36***	3.61 (0.62)	0.38***
Unknown	61		199		24		117	
Condition specific	1.67 (0.68)	0.20***	4.42 (0.54)	0.48***	1.62 (0.71)	0.17	4.35 (0.60)	0.40***
Unknown	38		16		19		8	
Partner related	2.12 (0.47)	−0.02	3.38 (0.47)	0.51***	2.17 (0.41)	−0.14	3.33 (0.50)	0.56***
Unknown	19		90		11		94	
Arousal, orgasm	–	–	3.62 (0.68)	0.52***	–	–	3.66 (0.69)	0.56***
Unknown			79				28	
Desire	–	–	3.10 (0.68)	0.25***	–	–	3.06 (0.72)	0.23***
Unknown			53				32	

[a]Higher scores indicate greater impact on sexual inactivity.

[b]Higher scores indicate better sexual function.

[c]Pearson's product–moment correlation (*$p<0.05$; **$p<0.01$; ***$p<0.001$).

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TABLE 4A Multivariate models—not sexually active (PISQ-IR) up to 12 months postpartum.

	Condition impact (*N* = 294)	Condition specific (*N* = 314)	Global quality (*N* = 332)	Partner related (*N* = 330)
Characteristic	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**
Mode of delivery during the last birth				
Vaginal delivery, no use of birth instruments	—	—	—	—
Obstetrics by forceps or vacuum extraction	0.01 (−0.27, 0.30)	−0.08 (−0.32, 0.17)	−0.02 (−0.27, 0.23)	−0.11 (−0.27, 0.05)
Cesarean section	−0.15 (−0.40, 0.10)	0.06 (−0.14, 0.27)	**0.31 (0.09, 0.53)****	−0.04 (−0.18, 0.10)
Number of births after the 20th week of pregnancy				
1	—	—	—	—
2	0.00 (−0.22, 0.22)	−0.02 (−0.21, 0.17)	**−0.21 (−0.41, −0.01)***	0.08 (−0.05, 0.21)
3 or more	−0.07 (−0.51, 0.36)	0.04 (−0.33, 0.41)	−0.12 (−0.52, 0.28)	0.09 (−0.16, 0.34)
Time postpartum (months)	0.00 (−0.03, 0.03)	0.00 (−0.02, 0.03)	**0.07 (0.04, 0.09)*****	0.01 (−0.01, 0.03)
Current age	0.02 (0.00, 0.05)	−0.01 (−0.03, 0.01)	−0.01 (−0.03, 0.02)	0.00 (−0.02, 0.01)
Current breastfeeding	−0.19 (−0.47, 0.08)	−0.10 (−0.34, 0.14)	**−0.43 (−0.68, −0.17)****	0.05 (−0.11, 0.21)
Perineal tear, during the last birth	0.13 (−0.09, 0.35)	0.16 (−0.02, 0.35)	−0.04 (−0.23, 0.16)	−0.08 (−0.20, 0.04)
Episiotomy, during the last birth	0.23 (−0.08, 0.54)	**0.43 (0.16, 0.70)****	−0.07 (−0.34, 0.21)	0.12 (−0.05, 0.30)
Obesity according to BMI (WHO, 2008)	−0.07 (−0.38, 0.24)	−0.06 (−0.31, 0.19)	−0.07 (−0.34, 0.20)	**0.22 (0.05, 0.39)***
Education				
Lower secondary school-leaving certificate or equivalent	—	—	—	—
Intermediate secondary school-leaving certificate	**−1.1 (−1.8, −0.37)****	−0.09 (−0.69, 0.52)	**−0.78 (−1.4, −0.15)***	0.31 (−0.09, 0.70)
General or subject-related qualification for university entrance	**−0.83 (−1.5, −0.17)***	0.18 (−0.39, 0.75)	−0.42 (−1.0, 0.16)	0.16 (−0.21, 0.53)
Higher education degree	**−0.98 (−1.6, −0.33)****	0.05 (−0.51, 0.61)	**−0.59 (−1.2, −0.01)***	0.25 (−0.12, 0.61)
R^2	0.087	0.071	0.181	0.066

Abbreviation: CI, confidence interval.

*$p<0.05$. **$p<0.01$. ***$p<0.001$.

varies depending on the specific dimension of sexuality under consideration.

Within our data, delivery via forceps/vacuum extraction was associated with possible pelvic floor function limitations (PISQ-IR: condition specific and condition impact). Conversely, CS was negatively associated with arousal for women within the first 12 months postpartum. This finding aligns with the review by Hicks et al., which associates forceps/vacuum extraction with some kind of sexual dysfunction.[24] Across all women in our study, mode of birth (for the last delivery) only correlates significantly with individual FSF dimensions. With regard to perineal trauma (perineal tear and episiotomy), a significant influence was observed only on specific dimensions, with perineal tears negatively affecting all dimensions except "Desire."

The reported rates of dyspareunia in our study are consistent with those reported in the literature.[26] Similar to Dean et al., we also did not observe a significant association between mode of delivery and the presence of dyspareunia.[25]

An episiotomy or perineal tear during the last birth was included in the analyses, but not any prior perineal injuries, so that effects and confounding may not have been taken into account here.[14] Furthermore, the significance of associations between birth mode and FSF diminishes after 12–24 months postpartum, with the exception of the association between CS and "Desire." The association between perineal tear and condition specific also remains significant during this period.

Although the proportion of sexually inactive women in our sample is higher than reported in studies like that of Dahlgren et al.,[26] we also detect a significant relationship between breastfeeding and sexual activity. The influence of breastfeeding in our data was particularly evident in the dimensions "Arousal" and "Desire" among sexually active respondents. The biological mechanisms underlying sexual dysfunction due to breastfeeding likely include hormonal effects on libido and vaginal dryness.[27,28] Sexually inactive women who are still breastfeeding may report higher satisfaction than those who are not breastfeeding because they anticipate an improvement

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TABLE 4B Multivariate models—not sexually active (PISQ-IR) >12 months postpartum and up to 24 months postpartum.

	Condition impact (*N* = 102)	Condition specific (*N* = 106)	Global quality (*N* = 118)	Partner related (*N* = 114)
Characteristic	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**
Mode of delivery during the last birth				
Vaginal delivery, no use of birth instruments	—	—	—	—
Obstetrics by forceps or vacuum extraction	0.29 (−0.27, 0.84)	0.11 (−0.36, 0.57)	0.24 (−0.23, 0.70)	0.04 (−0.22, 0.31)
Cesarean section	−0.14 (−0.66, 0.37)	−0.06 (−0.45, 0.34)	0.12 (−0.30, 0.54)	0.04 (−0.20, 0.28)
Number of births after the 20th week of pregnancy				
1	—	—	—	—
2	0.11 (−0.34, 0.56)	0.07 (−0.28, 0.41)	0.02 (−0.35, 0.39)	−0.04 (−0.24, 0.16)
3 or more	0.61 (−0.40, 1.6)	−0.20 (−0.87, 0.47)	0.30 (−0.42, 1.0)	−0.36 (−0.80, 0.07)
Time postpartum (months)	0.00 (−0.07, 0.07)	0.01 (−0.04, 0.07)	0.03 (−0.03, 0.09)	0.00 (−0.03, 0.03)
Current age	−0.01 (−0.07, 0.05)	−0.01 (−0.06, 0.03)	−0.02 (−0.06, 0.03)	0.01 (−0.02, 0.03)
Current breastfeeding	−0.15 (−0.58, 0.27)	−0.12 (−0.46, 0.21)	−0.26 (−0.62, 0.10)	0.04 (−0.15, 0.24)
Perineal tear, during the last birth	**0.54 (0.09, 0.99)***	0.09 (−0.26, 0.44)	0.21 (−0.15, 0.57)	−0.07 (−0.27, 0.14)
Episiotomy, during the last birth	0.23 (−0.36, 0.82)	**0.66 (0.18, 1.1)****	−0.21 (−0.71, 0.28)	0.16 (−0.13, 0.45)
Obesity according to BMI (WHO, 2008)	−0.05 (−0.63, 0.53)	−0.17 (−0.61, 0.27)	0.14 (−0.34, 0.63)	0.09 (−0.18, 0.36)
Education				
Lower secondary school-leaving certificate or equivalent	—	—	—	—
Intermediate secondary school-leaving certificate	0.61 (−1.3, 2.5)	−0.29 (−1.8, 1.2)	0.24 (−1.5, 2.0)	−0.25 (−1.2, 0.69)
General or subject-related qualification for university entrance	0.16 (−1.7, 2.0)	−0.42 (−1.9, 1.0)	−0.07 (−1.7, 1.6)	−0.30 (−1.2, 0.61)
Higher education degree	0.05 (−1.8, 1.9)	−0.47 (−1.9, 0.99)	0.12 (−1.5, 1.8)	−0.28 (−1.2, 0.62)
R^2	0.157	0.147	0.106	0.060

Abbreviation: CI, confidence interval.

*$p<0.05$. **$p<0.01$. ***$p<0.001$.

in their sexual function once breastfeeding ceases, an observation that is well known. Additionally, breastfeeding induces the production of oxytocin, which reduces cortisone levels, leading to lower stress and a more balanced mental state.[29]

While sexual dysfunction postpartum affects many women, the inconsistent findings in our study and the literature, combined with the low variance explained by the models, underscore the complexity of female sexuality,[30,31] particularly in the postpartum period.[32] It should be emphasized that the "Global Quality" score correlates particularly with the "Partner Related" and "Arousal/Orgasm" scores and thus these two subscales correlate the most with overall satisfaction. As all our models show a very low explanation of variance, this suggests that other factors not observable here play a greater role than the clinical conditions described here.

The advantages and disadvantages of the study are related to the recruitment method via social media. Unlike recruitment through clinical settings, using social media ensures the inclusion of a larger, more diverse, and geographically not restricted[33] population, making the findings broadly applicable.

However, the sample may be biased, it is rare for individuals in this age group in Germany not to use social media, although not everyone does. Through this approach, we obtained a large convenience sample of women ($n = 2.106$ women) within 24 months postpartum, capturing the broad spectrum of postpartum experiences. However, online recruitment may disproportionately attract individuals who are more severely affected and therefore more likely to engage with the topic online.[34] The results do not improve if the sample is weighted according to sociodemographic factors known to influence study participation like younger age, higher education, and white race.[35] However, similar biases have been observed in other studies relying on voluntary participation, where a high non-response rate does not necessarily compromise validity but may nonetheless limit the generalizability of the findings. As such, the descriptive results should be interpreted as reflecting this specific sample rather than being generalizable.

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TABLE 5A Multivariate models—sexually active (PISQ-IR) up to 12 months postpartum.

	Condition impact (*N* = 368)	Condition specific (*N* = 465)	Global quality (*N* = 448)	Partner related (*N* = 387)	Desire (*N* = 445)	Arousal, orgasm (*N* = 447)
Characteristic	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**
Mode of delivery during the last birth						
Vaginal delivery, no use of birth instruments	—	—	—	—	—	—
Obstetrics by forceps or vacuum extraction	−0.08 (−0.28, 0.11)	−0.05 (−0.21, 0.12)	−0.14 (−0.41, 0.13)	−0.05 (−0.20, 0.11)	0.01 (−0.20, 0.21)	−0.04 (−0.24, 0.16)
Cesarean section	0.14 (−0.04, 0.32)	−0.06 (−0.21, 0.08)	0.02 (−0.22, 0.26)	−0.14 (−0.28, 0.00)	**0.30 (0.12, 0.48)****	−0.08 (−0.25, 0.09)
Number of births after the 20th week of pregnancy						
1	—	—	—	—	—	—
2	−0.08 (−0.24, 0.08)	−0.11 (−0.25, 0.02)	0.01 (−0.21, 0.23)	0.07 (−0.06, 0.20)	0.04 (−0.13, 0.21)	−0.07 (−0.23, 0.09)
3 or more	0.18 (−0.06, 0.42)	0.02 (−0.19, 0.23)	**0.46 (0.12, 0.79)****	0.16 (−0.04, 0.35)	0.13 (−0.13, 0.39)	**0.25 (0.01, 0.50)***
Time postpartum (months)	0.00 (−0.02, 0.02)	0.00 (−0.01, 0.02)	−0.01 (−0.03, 0.02)	0.00 (−0.02, 0.01)	−0.01 (−0.03, 0.01)	0.01 (−0.01, 0.03)
Current age	−0.01 (−0.03, 0.01)	0.01 (−0.01, 0.02)	−0.01 (−0.03, 0.02)	−0.01 (−0.02, 0.01)	−0.02 (−0.04, 0.00)	0.00 (−0.02, 0.02)
Current breastfeeding	0.04 (−0.09, 0.17)	0.01 (−0.10, 0.12)	−0.13 (−0.31, 0.05)	−0.01 (−0.12, 0.09)	−0.10 (−0.23, 0.04)	−0.12 (−0.25, 0.01)
Perineal tear, during the last birth	−0.01 (−0.16, 0.14)	**−0.16 (−0.28, −0.03)***	0.02 (−0.19, 0.23)	0.00 (−0.12, 0.11)	0.11 (−0.05, 0.27)	0.06 (−0.09, 0.21)
Episiotomy, during the last birth	−0.06 (−0.29, 0.16)	−0.13 (−0.32, 0.06)	0.07 (−0.23, 0.38)	0.04 (−0.14, 0.21)	0.04 (−0.19, 0.28)	−0.14 (−0.36, 0.08)
Obesity according to BMI (WHO, 2008)	0.00 (−0.18, 0.19)	0.05 (−0.11, 0.20)	0.17 (−0.08, 0.42)	0.02 (−0.13, 0.18)	0.05 (−0.15, 0.24)	**0.37 (0.19, 0.56)*****
Education						
Lower secondary school-leaving certificate or equivalent	—	—	—	—	—	—
Intermediate secondary school-leaving certificate	0.15 (−0.43, 0.74)	**0.95 (0.40, 1.5)*****	0.49 (−0.39, 1.4)	−0.14 (−0.62, 0.33)	0.09 (−0.58, 0.76)	0.24 (−0.40, 0.87)
General or subject-related qualification for university entrance	0.37 (−0.20, 0.93)	**0.93 (0.40, 1.5)*****	0.80 (−0.05, 1.6)	0.03 (−0.43, 0.49)	0.03 (−0.62, 0.68)	0.39 (−0.23, 1.0)
Higher education degree	0.40 (−0.15, 0.96)	**1.1 (0.54, 1.6)*****	0.79 (−0.06, 1.6)	0.04 (−0.41, 0.50)	−0.12 (−0.77, 0.52)	0.48 (−0.13, 1.1)
R^2	0.048	0.071	0.041	0.032	0.054	0.077

Abbreviation: CI, confidence interval.

*$p<0.05$. **$p<0.01$. ***$p<0.001$.

The multivariate association analyses, on the other hand, can provide relevant information about possible factors influencing postpartum sexuality as within-subject analyses are less susceptible to selection bias.[35] One limitation of the PISQ-IR is its ability to compare "arousal/orgasm" before and after birth but not dyspareunia, potentially overlooking health conditions that influenced the mode of birth. Therefore, it is possible that certain health conditions may have influenced the mode of birth, but cannot be accounted for in this study due to the absence of specific information on sexuality before birth.

Furthermore, the PISQ-IR does not assess the perception of vaginal tightness, an aspect of sexuality that can be affected by the mode of delivery.[36] Data were self-reported and may be biased by social desirability. However, participants had the option to skip questions, and the low number of missing values suggests a high level of engagement with the survey. Due to the difficulty of retrospectively assessing the degree of perineal injuries by the mothers, only the presence of an episiotomy or perineal laceration was queried. Other birth injuries such as vaginal tears or levator avulsion were not surveyed, which may have led to inaccuracies in self-reported medical details.

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TABLE 5B Multivariate models—sexually active (PISQ-IR) >12 months postpartum and up to 24 months postpartum.

	Condition impact (*N* = 579)	Condition specific (*N* = 745)	Global quality (*N* = 733)	Partner related (*N* = 682)	Desire (*N* = 714)	Arousal, orgasm (*N* = 690)
Characteristic	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**	**Beta (95% CI)**
Mode of delivery during the last birth						
Vaginal delivery, no use of birth instruments	—	—	—	—	—	—
Obstetrics by forceps or vacuum extraction	**−0.19 (−0.35, −0.04)***	**−0.19 (−0.31, −0.06)****	−0.04 (−0.23, 0.15)	0.02 (−0.09, 0.13)	0.08 (−0.08, 0.24)	**−0.16 (−0.32, 0.00)***
Caesarean section	0.00 (−0.13, 0.13)	**−0.12 (−0.22, −0.01)***	−0.13 (−0.29, 0.04)	−0.01 (−0.11, 0.08)	0.06 (−0.07, 0.19)	**−0.16 (−0.29, −0.03)***
Number of births after the 20th week of pregnancy						
1	—	—	—	—	—	—
2	−0.06 (−0.19, 0.06)	−0.03 (−0.12, 0.07)	−0.04 (−0.19, 0.12)	0.00 (−0.09, 0.09)	0.01 (−0.12, 0.13)	0.06 (−0.07, 0.18)
3 or more	**−0.26 (−0.48, −0.03)***	−0.15 (−0.32, 0.01)	0.02 (−0.23, 0.28)	0.00 (−0.14, 0.14)	−0.02 (−0.23, 0.19)	0.13 (−0.08, 0.35)
Time post partum (months)	−0.01 (−0.03, 0.00)	0.00 (−0.01, 0.01)	−0.02 (−0.03, 0.00)	0.00 (−0.01, 0.01)	−0.01 (−0.02, 0.01)	0.00 (−0.02, 0.01)
Current age	−0.01 (−0.02, 0.01)	**0.01 (0.00, 0.02)***	0.00 (−0.02, 0.01)	0.00 (−0.01, 0.01)	**−0.01 (−0.03, 0.00)***	0.01 (−0.01, 0.02)
Current breastfeeding	0.02 (−0.10, 0.13)	0.07 (−0.02, 0.16)	−0.07 (−0.21, 0.08)	−0.03 (−0.11, 0.05)	**−0.13 (−0.25, −0.02)***	**−0.15 (−0.27, −0.04)***
Perineal tear, during the last birth	**−0.28 (−0.40, −0.16)*****	**−0.17 (−0.27, −0.07)*****	**−0.28 (−0.43, −0.13)*****	**−0.11 (−0.20, −0.03)***	−0.12 (−0.24, 0.01)	**−0.20 (−0.32, −0.07)****
Episiotomy, during the last birth	−0.08 (−0.24, 0.08)	−0.06 (−0.19, 0.07)	0.02 (−0.18, 0.22)	−0.02 (−0.14, 0.09)	0.04 (−0.13, 0.20)	−0.12 (−0.29, 0.05)
Obesity according to BMI (WHO, 2008)	−0.01 (−0.17, 0.16)	−0.01 (−0.14, 0.11)	−0.02 (−0.21, 0.18)	**−0.19 (−0.30, −0.07)****	0.00 (−0.15, 0.16)	0.11 (−0.05, 0.27)
Education						
Lower secondary school-leaving certificate or equivalent	—	—	—	—	—	—
Intermediate secondary school-leaving certificate	−0.07 (−0.68, 0.54)	−0.02 (−0.56, 0.52)	−0.62 (−1.5, 0.23)	−0.22 (−0.68, 0.25)	−0.66 (−1.3, 0.02)	−0.14 (−0.82, 0.54)
General or subject-related qualification for university entrance	−0.14 (−0.74, 0.45)	−0.07 (−0.60, 0.47)	−0.53 (−1.4, 0.30)	−0.24 (−0.70, 0.22)	**−0.70 (−1.4, −0.04)***	−0.14 (−0.81, 0.53)
Higher education degree	−0.09 (−0.68, 0.50)	−0.02 (−0.55, 0.51)	−0.55 (−1.4, 0.28)	−0.20 (−0.66, 0.25)	**−0.75 (−1.4, −0.09)***	−0.08 (−0.75, 0.58)
R^2	0.079	0.043	0.029	0.031	0.037	0.050

Abbreviation: CI, confidence interval.
*$p<0.05$. **$p<0.01$. ***$p<0.001$.

5 | CONCLUSION

Postpartum sexuality and its limitations are relevant topics to address, even years after the last birth. In relation to the sexual functionality of the pelvic floor, CS seems to have a protective influence, but not in relation to sexual functioning as a multidimensional construct in the population studied here. Awareness and information about postpartum pelvic floor disorder and their influence on sexuality should be addressed early on by midwives and obstetricians.

For research purposes, the need to identify other influencing factors besides the clinical factors that affect postpartum sexual experience is apparent. Additionally, there is a lack of evidence-based interventions capable of improving sexual functioning. Overall, this target group shows good acceptance of the PISQ-IR.

AUTHOR CONTRIBUTIONS

The manuscript is based on a survey designed by Nadine Scholten and Fabinshy Thangarajah and programmed by Johannes Soff. The research question and data analysis were designed by Carsten Hagenbeck

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and Nadine Scholten and conducted by Nadine Scholten, Johannes Soff, and Jan Kössendrup. The manuscript was drafted by Carsten Hagenbeck together with Nadine Scholten. All co-authors have read and jointly revised the paper, and accept responsibility for the paper.

CONFLICT OF INTEREST STATEMENT

All authors report no conflict of interest.

ETHICS STATEMENT

The medical faculty of the University of Cologne gave a positive ethical vote for the survey (no: 21-1542_1) on April 27, 2022. The anonymous survey was conducted after the participants had been informed and had given their anonymous implicit consent to participate in the survey. It was explicitly pointed out that no directly personal identifying information should be given.

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