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Comparing Self-Reported Pain During Intercourse and Pain During a Standardized
Gynecological Exam at 12- and 24-Months Postpartum

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41 **Abstract**

42
43 **Background:** There is limited information about the physical indicators and biopsychosocial
44 predictors of self-reported pain during intercourse and pain during a gynecological
45 examination at 12- and 24-months following childbirth.

46 **Aim:** This longitudinal study aimed to 1) Compare the findings from gynecological exams at 12-
47 and 24-months postpartum for women with minimal vs. clinically significant pain during
48 intercourse; 2) Assess the biomedical and psychosocial correlates predictors of self-reported pain
49 during intercourse and the vestibular pain index (VPI) from the cotton-swab test at 12- and 24-
50 months postpartum; 3) Establish the relationship between self-reported pain during intercourse
51 and the cotton-swab test.

52 **Methods:** Women ($N = 97$ at 12 months postpartum and $N = 44$ at 24-months postpartum)
53 recruited from a local women's hospital completed online surveys in their first trimester of
54 pregnancy and at 12- and 24-months postpartum to assess pain during intercourse and
55 biopsychosocial variables. Those with clinically significant (pain $\geq 4/10$ on a visual analogue
56 scale) were matched with those reporting minimal pain (pain $< 3/10$) and underwent a
57 gynecological exam including a cotton-swab test. Descriptive analyses, multiple regressions,
58 and bivariate correlations were conducted to address each of the study aims, respectively.

59 **Main Outcome Measures:** (1) Findings from the gynecological examination (2) Numerical
60 rating scale for the VPI; (3) Visual analogue scale of pain during intercourse.

61 **Results:** The majority of women in both pain groups had normal physical findings in the
62 gynecological exam. Greater sexual distress and pain catastrophizing at 12- and 24-months
63 postpartum were significantly associated with greater pain during intercourse at each time-
64 point, respectively. Greater pain catastrophizing at 12 months postpartum was significantly

65 associated with greater pain during the cotton-swab test at that time-point. Lower relationship
66 satisfaction at 12 months postpartum was associated with greater VPI ratings at 24 months
67 postpartum. Pain during intercourse and the VPI were moderately and positively correlated.

68 **Clinical Implications:** Addressing psychosocial variables may interrupt the maintenance of
69 postpartum pain. Following an initial assessment, self-reported pain intensity may be a
70 suitable proxy for repeated examinations.

71 **Strengths & Limitations:** This study is the first to describe the physical findings and
72 psychosocial predictors of pain during intercourse and the VPI at 12- and 24-months postpartum.
73 The homogenous and small sample may limit generalizability.

74 **Conclusion:** There were no observable physical indicators of clinically significant
75 postpartum pain during intercourse. Psychosocial variables were linked to women's greater
76 postpartum pain during intercourse and VPI ratings.

77 **Keywords:** postpartum pain; pain during intercourse; gynecological examination; cotton-
78 swab test; biopsychosocial predictors

79

80 **Comparing Self-Reported Pain During Intercourse and Pain During a Standardized**
81 **Gynecological Exam at 12- and 24-Months Postpartum**

82 Postpartum pain during intercourse— often examined in the context of penile-
83 vaginal penetration —is a common and distressing condition for many women.¹ The
84 prevalence of this pain declines on average over the first year postpartum, however, this
85 pain persists for up to 8-33% of women between 12-to-18-months,¹ with very limited data
86 beyond this time-frame.² Pain during intercourse has consequences for women’s quality of
87 life¹ and sexual functioning (i.e., arousal, desire, lubrication, orgasm).³ Pain during
88 intercourse also serves as a risk factor for psychological distress including postpartum
89 depression,^{4,5} which has deleterious effects on maternal health and infant development (see
90 Liu et al. 2017 for review).⁶ Women who report persistent pain during intercourse to their
91 physician typically undergo a gynecological examination for assessment of their external
92 genitalia and internal structures, including the cotton-swab test (CST), a frequently used
93 assessment to determine the vestibular pain index (VPI) during gynecological
94 examinations.⁷⁻⁹ Yet, there are no studies reporting the findings of these exams in relation
95 to women’s self-reported postpartum pain during intercourse.

96 In the current study, we aimed to compare the clinical findings (e.g., pain intensity,
97 vulvar characteristics) from gynecological exams at 12- and 24-months postpartum for
98 women with minimal (≤ 3 out of 10 on a visual analog scale) and clinically significant
99 self-reported pain during intercourse (≥ 4 out of 10 on a visual analog scale).¹⁰⁻¹² We
100 then compared biopsychosocial predictors of self-reported pain during intercourse and the
101 VPI across these two time-points. Finally, we sought to establish the strength of the
102 association between self-reported postpartum pain during intercourse and the VPI.

103 Women who experience pain during intercourse outside of the perinatal period often have
104 no pain-related physical findings.¹³ However, in the postpartum period, issues such a
105 pelvic floor and perineal trauma from delivery and vulvovaginal atrophy resulting from
106 lactational amenorrhea may contribute to pain during intercourse.^{14–17} Examining whether
107 physical findings differ between women with minimal and clinically significant pain may
108 lead to the identification of anatomical indicators that could assist health care providers in
109 distinguishing women at risk of developing persistent pain during intercourse.

110 The development and maintenance of postpartum pain during intercourse likely involves
111 a complex interplay of biopsychosocial variables. Past research has focused on aspects of
112 childbirth, such as perineal trauma and instrumental delivery, as well as the hormonal effects of
113 breastfeeding, as risk factors for postpartum pain during intercourse (see Rosen & Pukall, 2017
114 for review).¹ Pre-existing non-genital chronic pain conditions (e.g., back pain) are also associated
115 with genital and pelvic pain more broadly in the early postpartum period.¹⁸ Although hormones
116 and physical recovery from childbirth have typically stabilized after this point¹⁹ and many
117 women are no longer breastfeeding,²⁰ these biomedical variables have rarely been examined
118 beyond the first year postpartum.¹ Furthermore, these variables have only been examined in
119 relation to self-reported pain during intercourse and not with VPI ratings.

120 Pain during intercourse that extends beyond 12 months postpartum may instead relate to
121 psychosocial variables, which are often persistent. Several psychosocial variables have been
122 shown to predict pain during intercourse outside and within the perinatal period.^{18,21,22} Pain
123 catastrophizing – overly intensified and negative thoughts about anticipated or actual pain²³ – has
124 been linked to an increased risk of pain during intercourse in the postpartum period.¹⁸ Several
125 studies have shown that greater postpartum depressive symptoms are associated with greater

126 intensity of postpartum pain during intercourse.^{24,25} Similarly, sexual distress – worries and
127 concerns about sex²⁶ – has been identified as a key factor in exacerbating experiences of painful
128 intercourse.^{27,28} Finally, greater postpartum sexual concerns has been associated with couples'
129 lower relationship satisfaction.²⁹ Identifying how psychosocial characteristics relate to persistent
130 postpartum pain during intercourse may elucidate risk factors that can be addressed at critical
131 time periods.

132 Past research has used various singular pain assessment measures to examine postpartum
133 pain during intercourse.³⁰ The Initiative on Methods, Measurement, and Pain Assessment in
134 Clinical Trials (IMMPACT) advises using at least two different measures when assessing pain in
135 order to capture different facets of the pain experience.³¹ In the broader literature, few studies
136 have compared women's pain experiences using multi-method approaches.^{32,33} One cross-
137 sectional study examined the association between objective (i.e., vulvalgesiometer) and
138 subjective (numerical rating scale; NRS) pain assessment tools and pain-related outcomes in
139 women with pain during intercourse and found that psychological predictors were associated
140 with the NRS only.³² Self-reported pain during recalled experiences of intercourse via a Visual
141 Analog Scale (VAS) is another common and well-validated pain assessment method.³⁴ Despite
142 their frequent usage, our understanding of how various pain tools overlap in their measurement
143 of pain is limited, particularly in the postpartum period. Moreover, it is unknown whether there
144 are different biopsychosocial variables associated with different assessment tools. The context in
145 which the pain is elicited – in a clinical setting vs. with their partners during intercourse – and
146 the corresponding pain measurement tools may offer unique information about women's pain
147 that furthers our understanding of effective assessment.

171 Within a larger longitudinal study evaluating pain and sexuality across the transition to
172 parenthood, pregnant women were recruited during their 18- to 24-week ultrasound appointment
173 at the (*masked*) health care center from December 2015 to August 2017. Nulliparous women
174 aged 18 or older, fluent in English, and with an uncomplicated, singleton pregnancy were
175 eligible to participate. Women were excluded if they self-reported a severe or unmanaged
176 medical or psychiatric disease to a research assistant during the on-site screening.

177 For the current study, a sub-sample was recruited specifically to include a wide range of
178 women's experiences with pain during intercourse, that is, to include women experiencing
179 minimal (≤ 3 out of 10 on a visual analog scale) and clinically significant (≥ 4 out of 10 on a
180 visual analog scale) pain at 12- and 24-months postpartum. Participants in the minimal and
181 clinically significant pain groups were matched based on age (within 5 years in either direction),
182 mode of delivery (vaginal or caesarean), and history of chronic pain (e.g., yes/no responses to
183 migraine headaches, pain during intercourse, irritable bowel syndrome, fibromyalgia) as reported
184 in their baseline survey. Matched women with minimal and clinically significant pain were then
185 invited to undergo a standardized gynecological exam. Women were not contacted to participate
186 in the exam if they indicated a subsequent pregnancy at either the 12- or 24-month postpartum
187 time-points. At 12 months postpartum, from the full sample of women ($n = 709$), those who
188 reported clinically significant pain during intercourse were invited to undergo the gynecological
189 examination ($n = 90$ invited, $n = 46$ eligible and accepted). Then, matched participants with
190 minimal pain were invited to undergo the gynecological exam ($n = 119$ invited, $n = 51$ eligible
191 and accepted). The same process was repeated at 24 months postpartum. Out of the full sample
192 of women ($n = 682$), those with clinically significant pain during intercourse were invited for the
193 examination ($n = 98$ invited, $n = 21$ eligible accepted), and then matched participants were

194 invited ($n = 52$ invited, $n = 23$ eligible and accepted). Women with minimal pain were invited
195 until we obtained a matched sample to the number of women with significant pain who accepted
196 to participate. There were no significant differences in each pain grouping between women who
197 declined a gynecological exam and women who agreed to participate (at either 12 or 24 months)
198 for any of the sociodemographics or study variables (pain intensity, depression, sexual distress,
199 or pain catastrophizing). In sum, a total of 97 women at 12 months postpartum and 44 women at
200 24 months postpartum underwent a gynecological exam. Of these participants, fourteen
201 underwent examinations at both time-points. See Figure 1 and 2 for flow of recruitment at each
202 time-point.

203 **Measures**

204 *Sociodemographics and Biomedical Variables*

205 Women reported their sociodemographic data, including age, education level, cultural
206 background, relationship status, sexual orientation, and annual household income, in the baseline
207 survey. This information is presented in Table 1. Birth characteristics drawn from a medical
208 chart review, including mode of delivery, induction, episiotomy, vaginal or perineal tear, tear
209 degree, and epidural were dichotomized as yes/no. Breastfeeding status at 12- or 24-months
210 (from the respective self-reported surveys) and whether women endorsed a pre-existing, non-
211 pregnancy related chronic pain condition was collected via the self-reported baseline survey and
212 was also dichotomized as yes/no. This information is presented in Table 2.

213 *Pain Catastrophizing*

214 The 13-item Pain Catastrophizing Scale (PCS)²³ was used to measure exaggerated
215 negative thoughts and feelings about pain at baseline, 12-, and 24-months postpartum. It is a
216 reliable and valid tool assessing the key domains of catastrophizing, including rumination,

217 magnification, and helplessness.²³ The PCS has been used in samples of women with pain during
218 intercourse within the perinatal period.¹⁸ Items are summed to produce a total score ranging from
219 0 to 52 with higher scores indicating greater pain catastrophizing. The PCS demonstrated strong
220 internal consistency in the current study (baseline Cronbach's $\alpha = 0.91$, 12 months postpartum α
221 = 0.93, 24 months postpartum $\alpha = 0.94$).

222 *Depression*

223 The Edinburgh Postnatal Depression Scale (EPDS)³⁵ is a 10-item measure valid for
224 assessing depression in pregnancy and postpartum. The EPDS has been shown to have very good
225 psychometric properties,³⁵ and is the gold standard measure for the assessment of depressive
226 symptoms in postpartum samples.³⁶ Item responses are summed to produce a total score ranging
227 from 0 to 30. Higher scores indicate more depressive symptoms. The EPDS demonstrated strong
228 internal consistency at all time points in the current study (baseline Cronbach's $\alpha = 0.83$, 12
229 months postpartum $\alpha = 0.86$, 24 months postpartum $\alpha = 0.88$).

230 *Relationship Satisfaction*

231 The 4-item Couples Satisfaction Index (CSI-4)³⁷ was used to assess relationship
232 satisfaction. The CSI-4 has previously demonstrated good psychometric properties,³⁷ including
233 in samples of postpartum women and those coping with pain during intercourse outside the
234 postpartum period.^{21,38} The four items are summed to produce a total score ranging from 0 to 21,
235 with higher scores reflecting greater relationship satisfaction. The CSI-4 demonstrated strong
236 internal consistency at each time-point in the present study (baseline Cronbach's $\alpha = 0.92$; 12
237 months postpartum $\alpha = 0.90$; 24 months postpartum $\alpha = 0.96$).

238 *Sexual Distress*

239 Women's distress related to their sex lives was assessed with the 13-item Female Sexual
240 Distress Scale (FSDS).²⁶ The FSDS has good psychometric properties,²⁶ and has been previously
241 used in samples of women who experience pain during intercourse.²⁸ Total scores ranging from 0
242 to 52 are calculated by summing the items. Higher scores indicate greater sexual distress, with
243 scores above 11 suggesting the presence of clinically significant sexual distress.²⁶ In the present
244 study, the FSDS showed strong internal consistency at each survey time-point (baseline
245 Cronbach's $\alpha = 0.94$, 12 months postpartum $\alpha = 0.96$, 24 months postpartum $\alpha = 0.96$).

246 *Intensity of Pain During Intercourse*

247 A Visual Analogue Scale (VAS) was used to assess women's self-reported pain during
248 intercourse in the last four weeks at baseline, 12-, and 24-months postpartum. The VAS is an
249 IMMPACT recommended tool for assessing pain during intercourse.^{34,39} Women indicated their
250 average pain intensity during intercourse on a continuous scale from 0 (*no pain at all*) to 10
251 (*worst pain ever*). In accordance with IMMPACT guidelines and consistent with previous
252 research with samples of women who experience pain during intercourse within and outside of
253 the perinatal period, women's pain scores that were $\geq 4/10$ on the survey self-report VAS were
254 considered clinically significant pain (i.e., significant interference with daily functioning) and
255 used to classify women into the minimal and clinically significant pain groupings.¹⁰⁻¹²

256 *Standardized Gynecological Exam Assessment*

257 Upon presenting to the exam, the gynecologist was masked to the participant's pain
258 group, with the exception of five exams where the gynecologist learned of the participant's pain
259 status. The gynecologist reported whether the clitoris, labia minora, interlabial sulcus, and
260 vestibule presented normally or if there were notable anatomical pathologies. The clitoris was
261 inspected for partial hooding or complete phimosis (i.e., adherence between clitoral prepuce and

262 glans). The labia minora were examined for partial or complete fusion. The interlabial sulcus was
263 inspected for an old fissure scar or active fissure. The vestibule was examined for erythema (i.e.,
264 redness), fissures, or synechia (i.e., fusion). The gynecologist recorded active or previous
265 infections and whether the participant was currently or had previously utilized a treatment for the
266 infection. Any supplementary information related to vulvar characteristics was recorded.

267 The next part of the gynecological exam involved a CST, where pain ratings across
268 vulvar locations are averaged to create the Vestibular Pain Index (VPI), the validated and most
269 widely used metric for assessing pain during the CST.^{9,40} A standardized protocol was followed
270 whereby a cotton-swab is pressed perpendicular to the vestibular mucosa for two seconds in the
271 following order: 3 o'clock, 6 o'clock, 9 o'clock, and 12 o'clock. The gynecologist recorded the
272 participant's verbal rating of their pain on an NRS at each location with the anchors of 0 (*no pain*
273 *at all*) and 10 (*worst pain ever*). After the CST, the gynecologist rated the degree of erythema
274 present in the vestibule as normal, light, moderate, severe, or if a fissure and/or abrasion was
275 present.

276 The vagina, uterus, adnexa, and posterior cul-de-sac were then palpated in order to
277 describe any anomalies observed such as tenderness, abnormal uterine size, or adnexal masses.
278 The gynecologist selected from a list of potential causes of pain, including vulvar dermatoses
279 (lichen sclerosus, lichen planus), perineal inflammation/granulation, vulvovaginal atrophy,
280 vulvar dermatitis, vulvodynia/vestibulodynia, infection (vaginal, cervical, uterine), adnexal
281 pathology (e.g., ovarian cysts), endometriosis, uterine pathology (e.g., fibroids, adenomyosis),
282 prolapse, or urinary tract disease. The gynecologist recorded any recommendations for the
283 participant for follow-up. Following the examination, participants completed a single item (paper
284 survey) about whether the pain they experienced during the CST recreated the pain they

285 experience during intercourse (yes, no, maybe, or not applicable). The participant was instructed
286 to fold the survey to keep the gynecologist masked to their pain group.

287 **Procedure**

288 As part of the larger longitudinal study, all participants completed online surveys in
289 pregnancy (18-24 weeks pregnant) and the postpartum (2 weeks and 3-, 6-, 12-, and 24-months
290 postpartum). As we were interested in persistent pain experiences, the current study utilizes data
291 from the baseline (18-24 weeks pregnant), 12 months, and 24 months postpartum surveys only.
292 Women reported their sociodemographic data in the baseline survey and completed measures of
293 pain catastrophizing, postpartum depression, relationship satisfaction, sexual distress, and self-
294 reported pain during intercourse at baseline, 12 months, and 24 months postpartum. This design
295 allowed us to examine cross-sectional and longitudinal associations between pain during
296 intercourse and these psychosocial variables. Surveys were completed online via a link emailed
297 to their personal email accounts using Qualtrics survey software. Participants received a \$5
298 Amazon.ca gift card for the baseline survey and a \$10 Amazon.ca gift card for each postpartum
299 survey. Birth records were reviewed by a research assistant to collect birth characteristics (i.e.,
300 mode of delivery, induction, episiotomy, vaginal or perineal tear and degree, and epidural).

301 Following completion of the 12- and/or 24-month postpartum surveys, all women with
302 clinically significant pain and matched women with minimal pain were invited to participate in a
303 standardized gynecological exam. The standardized gynecological exams were conducted by one
304 of two collaborating gynecologists at the (*masked*) hospital or at the last-authors' laboratory-
305 based gynecological exam room. For completion of a gynecological exam, women were
306 compensated with a \$20 Amazon.ca gift card and had their parking expenses or bus fare
307 reimbursed. The study was approved by the Research Ethics Board at the (*masked*).

308 Data Analysis

309 Our first objective was to describe and compare the clinical profiles, obtained via
310 gynecological exam, of women who reported clinically significant or minimal postpartum pain
311 during intercourse on the surveys at 12- and 24-months postpartum. We conducted descriptive
312 analyses, including means, frequencies, and percentages across the two groups and two time-
313 points.

314 Our second objective was to determine whether pregnancy and postpartum biomedical
315 (i.e., pre-existing chronic pain conditions, breastfeeding status, and birth characteristics) and
316 psychosocial (i.e., pain catastrophizing, depression, relationship satisfaction, and sexual distress)
317 variables were associated with self-reported pain intensity experienced during intercourse and
318 the VPI for both pain groups at both time-points. First, bivariate or point-biserial correlations
319 were conducted between all potential predictors and the average pain intensity ratings during
320 intercourse and the VPI at each time-point. Variables that were significantly correlated with pain
321 intensity at 12- or 24-months postpartum were entered into a regression analysis separately for
322 each time-point (i.e., four models total). Data points were deemed univariate outliers if they
323 exceeded 1.5 interquartile range and multivariate outliers using Mahalanobis Distance. Two
324 univariate outliers were identified for pain catastrophizing at 12- and 24-months. No other
325 univariate outliers were found for the other psychosocial variables. For each model, all
326 assumptions for multiple regression analysis were met. However, one multivariate outlier in the
327 12-month pain during intercourse model and four multivariate outliers in the 24-month pain
328 during intercourse model were detected using Mahalanobis distance. In order to include as much
329 of the sample as possible and to maximize our power for the analyses, the results are presented
330 including outlier data points.⁴¹ However, each model was conducted with and without outliers

331 and any discrepancies are reported in Supplemental Materials. Discrepancies in the models as a
332 result of retaining and/or removing outliers may reflect effects that are not as robust.

333 Our third objective was to ascertain whether self-reported pain intensity during
334 intercourse was significantly correlated with the VPI. We conducted bivariate correlations
335 between the two pain variables for each pain group at 12- and 24-months postpartum.

336 Results

337 12 Months Postpartum: Gynecological Exam Findings Across Minimal and Clinically 338 Significant Pain Groups

339 Table 3 reports the findings from the standardized gynecological exam at 12 months
340 postpartum across pain groups, including pain intensities (during intercourse and the VPI),
341 vulvar presentations pre- and post-CST, internal anatomy, hypothesized causes of pain, and pain
342 recreation. The majority of women had normal clitorises, labia minora, and interlabial sulci, with
343 a similar number of women in both pain groupings demonstrating erythema on their vestibules
344 prior to the CST. Only one participant in the clinically significant pain group had partial fusion
345 of their labia minora and one had a vestibular fissure. After the CST, most women continued to
346 have normal vestibules although some women in both pain groups developed light or moderate
347 erythema. Following palpation of their vagina, uterus, adnexa, and posterior cul-de-sac, most
348 participants in both groups were classified as having normal anatomy, although some women in
349 each pain group experienced discomfort and/or tenderness during the exam (i.e., pelvic floor or
350 vaginal tenderness). Three women in the clinically significant pain group were found to have
351 anatomical anomalies including a large uterus and adnexa, an ovarian cyst, and vaginal erosion
352 due to a menstrual cup. Only one woman in each pain group had been treated for a recent
353 infection.

354 After the examination, the gynecologist selected what they believed to be a potential
355 cause of the participant's pain (if any) from a checklist. For some women, the gynecologist
356 selected more than one potential cause of pain. More causes of pain were selected for women in
357 the clinically significant pain group compared to the women in the minimal pain group. Across
358 both groups, similar causes were identified such as perineal inflammation and vulvodynia.
359 Follow-up recommendations were provided to women in both groups, which predominately
360 included referrals to their family physician and specialists (e.g., urogynecologists, ultrasounds,
361 post-childbirth recovery clinics). When asked if the pain they experienced during intercourse was
362 similar to the VPI ratings, the majority of women in the minimal pain group endorsed that the
363 pain was either not recreated, maybe recreated, or that this question was not applicable (as they
364 did not experience pain during intercourse). Women in the clinically significant pain group were
365 mixed in their responses as a similar number reported that the pain did and did not recreate the
366 pain during intercourse.

367 **24 Months Postpartum: Gynecological Exam Findings Across Minimal and Clinically**
368 **Significant Pain Groups**

369 Table 4 reports the findings from the standardized gynecological exam at 24 months
370 postpartum across pain groups. The majority of women had normal clitorises, labia minora, and
371 interlabial sulci, with the exception of a few women in the clinically significant pain group with
372 partial hooding of their clitoris or fusion of their labia minora, and one woman in the minimal
373 pain group who had an active fissure on their interlabial sulcus. Before the CST, most women in
374 both groups demonstrated normal vestibules, with a similar number of women across groups
375 with erythema and one woman in the clinically significant pain group with a fissure. After the
376 CST, most women continued to have a normal vestibule with some women in both groups

377 exhibiting light to moderate erythema. Following palpation of their vagina, uterus, adnexa, and
378 posterior cul-de-sac, the majority of women in both groups were classified as having normal
379 anatomy. More women in the clinically significant pain group reported discomfort during the
380 exam than those in the minimal pain group. One woman in the clinically significant pain group
381 had a cervix that was flush with her vagina. Two women in the clinically significant pain group
382 had been treated for a recent infection.

383 More causes of pain were selected for women in the clinically significant pain group
384 compared to the women in the minimal pain group. Across groups, similar causes were again
385 identified, such as perineal inflammation and vulvodynia. Follow-up recommendations were
386 provided to women in both groups, which included referrals to their family physician. When
387 asked if the pain they experienced during intercourse was similar to the VPI, the majority of
388 women in the minimal pain group endorsed that this question was not applicable (as they did not
389 experience pain). The majority of the women in the clinically significant pain group reported that
390 the pain did recreate pain during intercourse.

391 **Factors Associated with Self-Reported Pain During Intercourse**

392 In this study, no biomedical variables (i.e., pre-existing chronic pain condition,
393 breastfeeding status, birth characteristics) were significantly correlated with pain during
394 intercourse at either 12- or 24-months postpartum (see Supplemental Table 1). Of note, only 22
395 women in the full sample across pain groupings and time-points indicated a pre-existing pain
396 condition, with only one woman in the clinically significant pain group endorsing pain during
397 intercourse prior to pregnancy. Table 5 reports the correlations amongst all psychosocial
398 variables and pain intensity during intercourse at 12- and 24-months postpartum. There was no
399 evidence of multicollinearity among the study variables. At 12 months postpartum, greater

400 sexual distress and greater pain catastrophizing were significantly associated with greater pain
401 intensity during intercourse. At 24 months postpartum, greater sexual distress at 12- and 24-
402 months postpartum, greater depressive symptoms at 12 months postpartum, and greater pain
403 catastrophizing at 12- and 24-months postpartum were associated with greater pain during
404 intercourse.

405 When entered into a multiple regression analysis (see Table 6), the overall model was
406 significant ($F(2,109) = 17.33, p < .001, R^2 = .24$), with greater sexual distress at 12 months
407 postpartum and greater pain catastrophizing at 12 months postpartum significantly associated
408 with greater pain intensity during intercourse at 12 months postpartum. When entered into a
409 multiple regression analysis, the overall model was significant ($F(5,90) = 9.54, p < .001, R^2$
410 $= .35$), with greater sexual distress and pain catastrophizing at 24 months postpartum associated
411 with greater pain intensity during intercourse at 24 months postpartum.

412 **Factors Associated with Gynecological Exam Pain Intensity**

413 As with self-reported pain during intercourse, no biomedical variables (i.e., pre-existing
414 chronic pain conditions, breastfeeding status, birth characteristics) were significantly correlated
415 with gynecological exam pain intensity at either 12- or 24-months postpartum (see Supplemental
416 Table 1). Table 5 reports the correlations amongst all psychosocial variables and pain intensity
417 during the gynecological exam at 12- and 24-months postpartum. Greater pain catastrophizing at
418 12 months postpartum was associated with greater VPI ratings at 12 months postpartum. Greater
419 depressive symptoms at baseline and 12 months postpartum were associated with higher VPI
420 ratings at 24 months postpartum. Poorer relationship satisfaction at 12 months postpartum was
421 associated with higher VPI ratings at 24 months postpartum.

422 When entered into a linear regression (Table 6), the overall model was significant (F
423 (1,94) = 4.673, $p = .03$, $R^2 = .05$), with greater pain catastrophizing at 12 months postpartum
424 significantly associated with greater VPI ratings at 12 months postpartum. When entered into a
425 multiple regression analysis, the overall model was significant (F (3,35) = 3.81, $p = .02$, $R^2 = .25$),
426 with only lower relationship satisfaction at 12 months postpartum uniquely associated with
427 higher VPI ratings at 24 months postpartum.

428 **Association Between Pain During Intercourse and the Vestibular Pain Index**

429 In relation to Objective 3, the VPI and self-reported pain intensity during intercourse at
430 both 12- and 24-months postpartum were significantly, moderately, and positively correlated
431 (Table 5).

432 **Discussion**

433 In this longitudinal study, we were the first, to our knowledge, to compare physical
434 findings from a gynecological exam in women with minimal and clinically significant
435 postpartum pain during intercourse at 12- and 24-months postpartum. We also explored
436 biomedical and psychosocial factors associated with pain experienced during intercourse and the
437 VPI and examined the relationship between these two common pain assessment tools. Overall,
438 we found that there were no distinguishing gynecological features between women in the
439 clinically significant and minimal pain during intercourse groups at 12- and 24-months
440 postpartum. Moreover, psychosocial variables emerged as predictors of pain during intercourse
441 and the VPI. A significant and positive association between pain assessment tools was also
442 evidenced, pointing towards both shared and unique contributions to postpartum pain
443 measurement. This study adds to the limited literature on persistent postpartum pain during

444 intercourse by utilizing a multimethod approach to assess persistent postpartum pain 12- to 24-
445 months following childbirth.

446 Women in the clinically significant pain during intercourse group reported greater VPI
447 ratings relative to women with minimal pain, however, findings from the gynecological exam
448 revealed that the majority of women in both pain groups had normal physical findings (i.e.,
449 normal vulvas and internal structures). When anomalies did exist (e.g., erythema, fissures), they
450 were in comparable frequencies between groups. The current findings are consistent with the
451 broader pain during intercourse literature, whereby there are many potential causes and no
452 consistent physical abnormalities.¹³

453 In the current study, no biomedical variables were associated with pain during intercourse
454 or the VPI at 12- or 24-months postpartum. Prior research has found that pre-existing pain
455 conditions are often associated with pain during intercourse outside the postpartum period.^{18,42,43}
456 Notably, a limited number of women endorsed a pre-existing pain condition, with only one
457 participant in the clinically significant pain group indicating pain during intercourse prior to
458 pregnancy. It is possible that our smaller sample size precluded us from establishing this
459 relationship in the postpartum period. Our findings are consistent with the understanding that
460 hormonal and physical recovery from childbirth have typically stabilized by one year postpartum
461 and thus there may be minimal influence on pain experiences.¹⁹

462 Indeed, psychosocial factors in the postpartum period did emerge as relevant to women's
463 persistent pain experiences. None of the baseline psychosocial variables assessed in pregnancy
464 were associated with pain intensity ratings during intercourse or the VPI at either postpartum
465 time-point. The salience of psychosocial variables may change over time, particularly following
466 repeated pain experiences. As hypothesized, greater sexual distress and pain catastrophizing at

467 12- and 24-months postpartum were significantly associated with greater pain during intercourse
468 at 12- and 24-months, respectively. Greater pain catastrophizing at 12 months was associated
469 with greater VPI ratings at 12 months postpartum and lower relationship satisfaction at 12
470 months was associated with greater VPI ratings at 24 months postpartum. Thus, both cognitive-
471 affective and relational variables were linked to women's pain experiences, highlighting the
472 importance of assessing psychosocial variables. As most of our findings were cross-sectional, it
473 is possible that there may be a bidirectional association between pain during intercourse and the
474 psychosocial variables, whereby greater postpartum pain during intercourse precipitates greater
475 pain catastrophizing and/or sexual distress. However, we also found emerging longitudinal
476 evidence suggesting a link between relationship satisfaction and depressive symptoms at 12
477 months postpartum and the VPI ratings at 24 months postpartum. Establishing these cross-
478 sectional and preliminary longitudinal associations will inform future longitudinal research to
479 further examine the direction of these effects.

480 Our findings are consistent with theoretical models such as the Fear-Avoidance Model of
481 Pain.⁴⁴ Pain catastrophizing is thought to generate fear and hypervigilance of pain, leading to
482 avoidance of potentially painful activities (e.g., sexual activity), distress, reduced arousal, and
483 subsequently greater pain.⁴⁵ Moreover, increased sexual distress may interfere with sexual
484 function, including arousal and vaginal lubrication, perpetuating the pain experience.⁴⁶ We also
485 found that lower relationship satisfaction at 12 months was associated with greater pain during
486 intercourse at 24 months postpartum. This finding is consistent with prior research implicating
487 relationship dynamics in the reinforcement of pain experienced during intercourse.^{22,47} Indeed,
488 dyadic influences on women's pain experiences outside of the perinatal period have been
489 established (e.g., partner responses to pain).²² However, there is a very limited understanding of

490 how partner factors are associated with women's experience of *postpartum* pain during
491 intercourse,⁴⁸ which may differ given the changes to their sexual relationship during this
492 period.⁴⁹ More research is needed to replicate these preliminary findings and to parse out the
493 individual and dyadic underpinnings of these unique relationships with pain outcomes.

494 We found that there was a significant positive association between self-reported pain
495 during intercourse and VPI ratings at both time-points. These findings are consistent with the
496 few prior studies examining the relationships between various pain assessment tools in samples
497 of women with pain during intercourse and adds to the literature by examining these associations
498 in the postpartum period.^{32,50} Consistent with previous research,⁷ the VPI was lower than the pain
499 reported during intercourse. Furthermore, the majority of women in the clinically significant pain
500 group indicated that the CST did not replicate the pain they experienced during intercourse. Pain
501 during intercourse may be heightened due to the dynamic nature of the stimulation (e.g.,
502 increased friction and more active movements) as well as other contextual and relationship
503 factors (e.g., intimacy with a partner), which are not recreated by the CST. Following an initial
504 gynecological examination to rule out any pathology, and given that pain ratings tend to be
505 higher for self-reported pain during intercourse and have greater ecological validity, self-reported
506 pain may be a suitable proxy for repeated uncomfortable and painful examinations. When
507 physical examinations are necessary, clinicians might consider longer appointments to allow for
508 consideration of psychosocial issues and an educational pelvic exam.

509 This study was the first to our knowledge to examine and compare gynecological exam
510 findings in women with clinically significant and minimal postpartum pain during intercourse
511 12- and 24-months after childbirth. Moreover, we extend our understanding of the importance of
512 psychosocial variables in the experience of persistent postpartum pain, with longer follow-up

513 time-points than typically found in the literature. We are also the first to compare two
514 recommended pain assessment tools for the measurement of postpartum pain during intercourse.

515 There are also several limitations to these findings. Recruitment was conducted via a local
516 ultrasound clinic in a city with a predominantly White population. Thus, our sample was
517 primarily composed of White, heterosexual, [country masked for review] women who were
518 highly educated and financially secure, limiting the generalizability of our findings. Notably,
519 genital pain experienced by individuals in racial minority groups is more often underdiagnosed
520 and undertreated compared to White individuals.⁵² Furthermore, data suggests that women from
521 racial minority groups often experience higher rates of birth complications⁵³ and interventions
522 such as Caesarean sections⁵⁴ and episiotomies⁵⁵ than White women. Additionally, racial
523 differences have been identified in pain catastrophizing^{56,57} and postpartum depression,⁵⁸ which
524 could affect the strength of the effect size that we found and suggest that race might be an
525 important moderator to examine in future research. Taken together, future research should
526 expand recruitment sources to include greater racial, cultural, and gender diversity, as well as a
527 range of socioeconomic backgrounds. In addition, the acceptance rate for participating in the
528 gynecological exam was low. Thus, our smaller sample size may have limited our statistical
529 power to detect effects. Future research should replicate our findings in a larger and more diverse
530 sample.

531 Previous research has predominantly focused on pain experienced during penile-vaginal
532 penetration.¹ One study reported that penile penetration is the most pain-triggering activity for
533 women with genital and/or pelvic pain postpartum compared to penetration with a digit or sex
534 toy, or via non-penetrative sexual activities.⁴³ However, women who do not engage in penile-
535 vaginal intercourse, such as women who have sex with women, may have unique pain

536 experiences. Indeed women in same-sex relationships appear to report less pain during sex than
537 heterosexual women.⁵⁹ In future studies, the measurement of self-reported pain during
538 intercourse should be adapted to encompass a broader range of sexual activities that may or may
539 not involve penetration with a penis, as is suggested by the term “intercourse,” to better
540 understand the nuances of these experiences. Finally, the VPI is the most widely used and
541 validated approach to assessing pain during the CST; however, clinicians might also consider the
542 highest pain rating across vulvar locations (e.g., site of an episiotomy), which may better capture
543 the severity of pain and its interference.

544 Our findings indicate that in our sample, observable physical indicators of pain did not
545 differentiate women who reported pain during intercourse from those who did not report this
546 pain, via self-report or during a gynecological exam. Although biomedical factors may still be
547 involved in the development of this pain for some women (especially in light of our small sample
548 size), our findings suggest that in our sample, psychosocial . Psychosocial variables including
549 pain catastrophizing, sexual distress, and relationship satisfaction are associated with both self-
550 reported pain during intercourse and the VPI at 12- and 24-months postpartum. Clinicians might
551 offer referrals to evidence-based interventions that target these psychosocial variables, such as
552 cognitive behavioural therapy.⁶⁰ The enduring nature of this pain for some women suggests that
553 postpartum pain during intercourse should not be readily perceived as a condition that will
554 resolve on its own. It is crucial that clinicians identify, act upon, and monitor pain experienced
555 during intercourse following childbirth.

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Figure 1

Flow of recruitment at 12-months postpartum for each pain group.

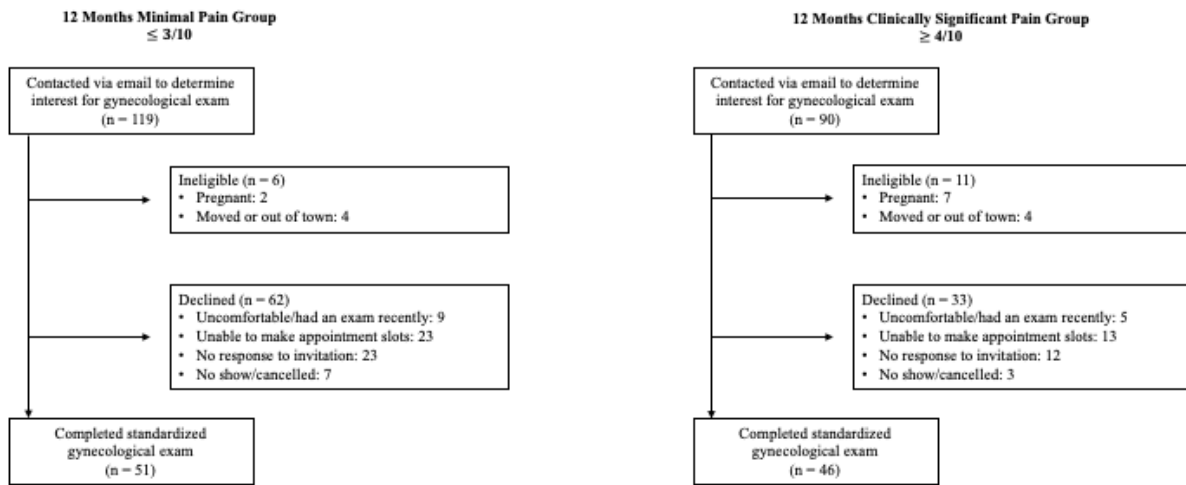


Figure 2

Flow of recruitment at 24 months postpartum for each pain group.

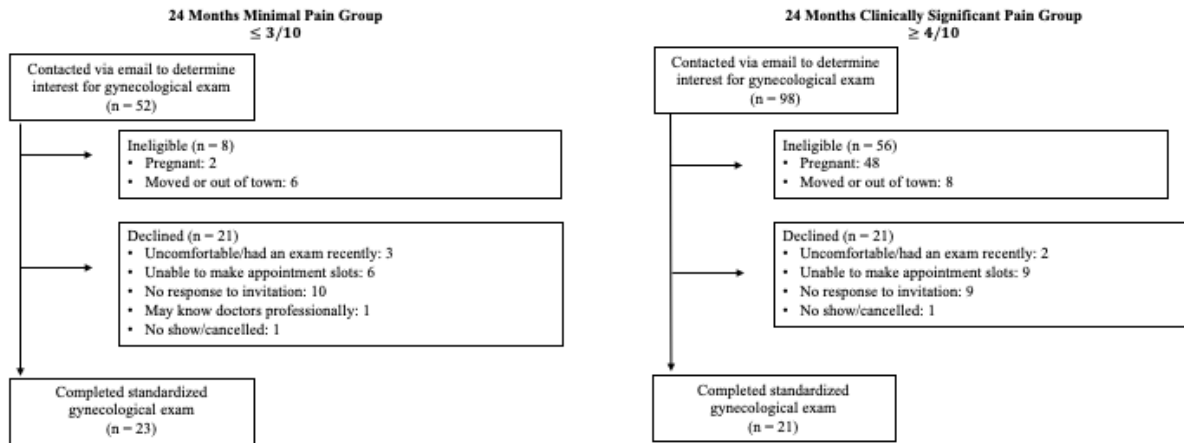


Table 1.

Sociodemographic characteristics of women who completed the standardized gynecological exam at 12- and 24-months postpartum.

	12 months postpartum			24 months postpartum		
	<i>(n = 97)</i>			<i>(n = 44)</i>		
	<i>M (range) or N</i>	<i>SD</i>	<i>%</i>	<i>M (range) or N</i>	<i>SD</i>	<i>%</i>
Age	30.37 (22-38)	3.45	-	29.16 (20-35)	4.18	-
Education level						
High school diploma or GED	8		8.2	5		11.4
Community college or diploma	20		20.6	7		15.9
University degree or higher	69		71.1	32		72.7
Culture (Background)						
^a Canadian	90		92.8	40		91.0
^b Other	7		2.1	4		0
Relationship status (12-month <i>n</i> = 96)						
Married	72		75.0	26		59.1
Common-law/Living with a partner	17		17.7	10		22.7

PERSISTENT POSTPARTUM PAIN DURING INTERCOURSE

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In a relationship	5	5.2	4	9.1
Separated/divorced	1	1.0	1	2.3
No regular partner	1	1.0	3	6.8
Sexual orientation				
Heterosexual/straight	85	87.6	41	93.2
Lesbian/gay	3	3.1	-	-
Bisexual	8	8.2	3	6.8
Questioning	1	1.0	-	-
Annual household income (12-month $n = 95$)				
\$0-\$29,999	4	4.2	3	6.8
\$30,000-\$59,999	12	12.6	12	27.2
\$60,000-\$89,999	28	29.5	7	15.9
\$90,000 and over	51	53.7	22	50.0

^a12 month postpartum “Canadian” refers to English Canadian ($n = 85$), French Canadian ($n = 3$), African Canadian ($n = 2$). 24 month postpartum “Canadian” refers to English Canadian ($n = 38$), African Canadian ($n = 1$), First Nations Canadian ($n = 1$).

^b12 month postpartum “other” refers to: Western European ($n = 3$), American ($n = 2$), English Canadian/Inuit ($n = 1$) and Metis (native)/African Canadian/White ($n = 1$). 24 month postpartum “other” refers to: American ($n = 1$), Asian ($n = 1$) Middle Eastern ($n =$

1), and Caribbean ($n = 1$)

Table 2.

Breastfeeding status, birth characteristics, and pre-existing chronic pain conditions of women by pain group at 12- and 24-months postpartum.

	Minimal Pain (<i>n</i> = 47)	Clinically Significant Pain (<i>n</i> = 44)	Minimal Pain (<i>n</i> = 21)	Clinically Significant Pain (<i>n</i> = 18)
	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Breastfeeding (<i>n</i> = 16[^])				
Exclusively breastfed	10 (21.3)	20 (45.5)	5 (23.8)	6 (33.3) [^]
Exclusively bottle-fed with breastmilk	4 (8.5)	-	-	-
Exclusively bottle-fed with formula	9 (19.1)	5 (11.4)	5 (23.8)	-
Bottle and breastfed breastmilk/formula	24 (51.1)	19 (43.2)	11 (52.4)	10 (88.9) [^]
Mode of delivery				
Vaginal delivery	30 (63.8)	24 (54.5)	12 (57.1)	9 (50.)
Instrumental delivery: forceps	2 (4.3)	2 (4.5)	-	1 (5.6)
Instrumental delivery: vacuum extraction	6 (12.8)	7 (15.9)	-	3 (16.7)

PERSISTENT POSTPARTUM PAIN DURING INTERCOURSE

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Caesarean section	9 (19.1)	11 (25)	9 (42.9)	5 (27.8)
Delivery tear				
Yes, first-degree tear	8 (17)	6 (13.6)	2 (9.5)	3 (16.7)
Yes, second-degree tear	21 (44.7)	17 (38.6)	10 (47.6)	9 (50.0)
Yes, third-degree tear	6 (12.8)	5 (11.4)	-	-
Yes, fourth-degree tear	-	-	-	-
Yes, degree not specified	1 (2.1)	-	-	1 (5.6)
No	1 (2.1)	5 (11.4)	-	-
Unsure/do not know	1 (2.1)	-	-	-
N/A	9 (19.1)	11 (25)	9 (42.9)	5 (27.8)
Induced				
Yes	18 (38.3)	14 (31.8)	11 (52.4)	4 (22.2)
No	29 (61.7)	24 (54.5)	9 (42.9)	13 (72.2)
N/A (e.g., planned Caesarean section)	-	6 (13.6)	1 (4.8)	1 (5.6)
Epidural				
Yes	33 (70.2)	33 (75)	14 (66.7)	16 (88.9)

PERSISTENT POSTPARTUM PAIN DURING INTERCOURSE

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No	14 (29.8)	11 (25)	7 (33.3)	2 (11.1)
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Episiotomy

Yes	8 (17)	8 (18.2)	1 (4.8)	2 (11.1)
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No	30 (63.8)	23 (52.3)	11 (52.4)	11 (61.1)
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Unsure/do not know	-	1 (2.3)	-	-
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N/A	9 (19.1)	12 (27.3)	9 (42.9)	5 (27.8)
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Pre-existing chronic pain condition^a

Yes	8 (17)	9 (20.5)	3 (14.3)	4 (22.2)
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No	39 (83)	35 (79.5)	18 (85.7)	14 (77.8)
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^aTwenty-two women in the full sample endorsed a pre-existing chronic pain condition. Although the sample size in the table reflects a total of 24 women endorsing a pain condition, the difference in sample sizes is attributable to (1) four women completing the gynecological exam at both time-points and their data being accounted for twice and (2) three women who were not included in pain groupings at a particular time point due to not having a pain intensity score to categorize.

Table 3.

Gynecological exam findings at 12 months postpartum.

	Minimal Pain (<i>n</i> = 47)	Clinically Significant Pain (<i>n</i> = 44)
	<i>M</i> (range; <i>SD</i>)	<i>M</i> (range; <i>SD</i>)
Pain Intensity - Survey	.70 (0-3; .98)	5.02 (4-8; 1.23)
Pain Intensity - CST	1.24 (0-6.25; 1.55)	1.98 (0-5.75; 1.61)
	<i>n</i> (%)	<i>n</i> (%)
^aDescription of the vulva: Clitoris		
Normal	47 (100.0%)	44 (100.0%)
Description of the vulva: Labia minora		
Normal	47 (100.0%)	43 (97.7%)
Partial fusion	0 (0%)	1 (2.3%)
Description of the vulva: Interlabial sulcus		
Normal	47 (100.0%)	43 (97.7%)
^b Other	0 (0%)	1 (2.3%)

Description of the vulva: Vestibule (before CST)

Normal	38 (80.9%)	33 (75.0%)
Erythema	9 (19.1%)	10 (22.7%)
Fissure	0 (0%)	1 (2.3%)

Description of the vulva: Vestibule (after CST)

Normal	31 (66%)	30 (68.2%)
Light erythema	10 (21.3%)	6 (13.6%)
Moderate erythema	6 (12.8%)	8 (18.2%)

Internal anatomy exam

Normal	42 (89.4%)	33 (75.0%)
Discomfort/tenderness	5 (10.6%)	8 (18.2%)
Anatomical anomaly	0 (0%)	3 (6.8%)

Use of treatment for infection ($n = 46^{\#}$)

^c Yes	1 (2.1%) [#]	1 (2.3%) [#]
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Potential cause(s) of pain selected by examiner?

Yes	27 (57.4%)	33 (75.0%)
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^dChecklist item(s) selected as potential cause of pain

Perineal inflammation/granulation	18 (62.1%)	15 (41.7%)
Vulvodynia/vestibulodynia	6 (20.7%)	10 (27.7%)
Vulvovaginal atrophy	1 (3.45%)	5 (13.9%)
Vulvar dermatoses (e.g., lichen sclerosis or lichen planus)	0 (0%)	1 (2.8%)
Pain related to healing of perineal tear	0 (0%)	3 (8.3%)
Pelvic floor dysfunction	2 (6.85%)	1 (2.8%)
Uterine pathology (e.g., fibroids, adenomyosis)	1 (3.45%)	0 (0%)
^e Other	1 (3.45%)	1 (2.8%)

^gVPI recreates pain during intercourse (*n* = 45[^])

Yes	7 (14.9%) [^]	15 (34.1%)
No	13 (27.7%) [^]	17 (38.6%)
Maybe	13 (27.7%) [^]	9 (20.5%)
Not applicable	12 (25.5%) [^]	3 (6.8%)

^aDuring examination of the vulva, the gynecologist recorded supplementary information for two participants in the minimal pain group (Bartholin's cyst (not associated with pain) and erythema on the labia majora) and four participants in the clinically significant

pain group (copper IUD, dry skin near episiotomy site, vaginal odour since delivery, and pale vaginal mucosa/low lubrication).

^b“Other” refers to someone with “right erythema/lichenification.

^cMinimal pain: unspecific infection treated with Diflucan; Clinically significant pain: treated with antibiotics for mastitis.

^dFor some participants, the examiner selected more than one potential cause of pain from the checklist. Therefore, the percentage was calculated based off the total number of selections for those who were deemed to have a potential cause of pain.

^eMinimal pain: “other” not specified; Clinically significant pain: “other” related to concurrent breastfeeding.

Note. Six women who completed the gynecological exam did not provide a self-report pain intensity during their survey. As such, they could not be correctly categorized into the clinically significant or minimal pain groups and their gynecological characteristic data could not be reported.

Table 4.

Gynecological exam findings at 24 months postpartum.

	Minimal Pain (<i>n</i> = 21)	Clinically Significant Pain (<i>n</i> = 18)
	<i>M</i> (range) <i>SD</i>	<i>M</i> (range; <i>SD</i>)
Pain Intensity - Survey	.81 (0-3; .1.08)	5.33 (4-9; 1.57)
Pain Intensity – CST (n = 20[#])	.59 (0-3; 0.89) [#]	2.14 (0-5.50; 1.59)
	<i>n</i> (%)	<i>n</i> (%)
^aDescription of the vulva: Clitoris		
Normal	21 (100.0%)	17 (94.4%)
Partial hooding	0 (0%)	1 (5.6%)
Description of the vulva: Labia minora		
Normal	21 (100.0%)	17 (94.4%)
Partial fusion	0 (0%)	1 (5.6%)
Description of the vulva: Interlabial sulcus		
Normal	20 (95.2%)	18 (100.0%)

Active fissure	1 (4.8%)	0 (0%)
Description of the vulva: Vestibule (before CST)		
Normal	17 (81.0%)	13 (72.2%)
Erythema	4 (19.0%)	4 (22.2%)
Fissure	0 (0%)	1 (5.6%)
Description of the vulva: Vestibule (after CST)		
Normal	15 (71.4%)	13 (72.2%)
Light erythema	4 (19.0%)	3 (16.7%)
Moderate erythema	2 (9.50%)	2 (11.1%)
Internal anatomy exam		
Normal	19 (90.5%)	10 (55.6%)
Discomfort/tenderness	2 (9.50%)	7 (38.9%)
Anatomical anomaly	0 (0%)	1 (5.5%)
Use of treatment for infection		
^b Yes	0 (0%)	2 (11.1%)
Potential cause(s) of pain selected by examiner?		

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Yes	10 (47.6%)	15 (83.3%)
^cChecklist item(s) selected as potential cause of pain		
Perineal inflammation/granulation	3 (18.75%)	4 (15.4%)
Vulvodynia/vestibulodynia	4 (25%)	9 (34.62%)
Vulvovaginal atrophy	2 (12.5%)	3 (11.54%)
Vulvar dermatoses (e.g., lichen sclerosus or lichen planus)	1 (6.25%)	1 (3.84%)
Urinary tract disease	1 (6.25%)	2 (7.7%)
Pelvic floor dysfunction	2 (12.5%)	1 (3.84%)
Adnexal pathology (e.g., ovarian cysts)	0 (0%)	1 (3.84%)
Infection (vaginal, cervical, or uterine)	0 (0%)	1 (3.84%)
Endometriosis	1 (6.25 %)	1 (3.84%)
^d Other	2 (12.5%)	3 (11.54%)
VPI recreates pain during intercourse (<i>n</i> = 20)[±]		
Yes	4 (20.0%) [±]	9 (50.0%)
No	3 (15%) [±]	4 (22.2%)

Maybe	1 (5.0%) [±]	5 (27.8%)
Not applicable	12 (60%) [±]	0 (0%)

^aDuring examination of the vulva, the gynecologist recorded supplementary for two participants in minimal pain group (yeast in groins and mild atrophy) and five participants in the clinically significant pain group (atrophy and erythema of vestibule, Mirena IUD in, mild erythema of labia majora bilaterally, pallor of the vagina, and pale vaginal mucosa).

^bClinically significant pain: UTI and BV treatment (Flagyl).

^cFor some participants, the examiner selected more than one potential cause of pain from the checklist. Therefore, the percentage was calculated based off the total number of selections for those who were deemed to have a potential cause of pain.

^dMinimal pain: “other” related to concurrent breastfeeding and the strings of an IUD not being visible; Clinically significant pain: pain at episiotomy site, UTI, and vaginismus.

Note. Five women who completed the gynecological exam did not provide a self-report pain intensity during their survey. As such, they could not be correctly categorized into the clinically significant or minimal pain groups and their gynecological characteristic data could not be reported.

Table 5.

Descriptive statistics and bivariate correlations among the psychosocial study variables and pain outcomes.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SEX12M	-	.35**	.29**	.54**	-.04	-.12	-.10	.01	.44**	.15	-.02	.16	.20*	.13	.39**	.13
2. SEX24M	-	-	.26*	.57**	-.03	-.12	-.11	.08	.29**	.39**	.16	.29**	.15	.02	.25**	.49**
3. VPI12M	-	-	-	.43	-.04	-.02	.06	.13	.14	.10	.07	.15	-.12	.04	.22*	.15
4. VPI24M	-	-	-	-	.03	-.34*	-.28	-.03	.10	.13	.34*	.37*	.18	.17	.16	.21
5. CSIBL	-	-	-	-	-	.51**	.45**	-.25**	-.14	.00	-.22*	-.05	.01	-.10	-.29**	.10
6. CSI12M	-	-	-	-	-	-	.61**	-.30**	-.36**	-.18	-.13	-.30**	-.04	-.09	-.21*	.05
7. CSI24M	-	-	-	-	-	-	-	-.25**	-.28**	-.28**	-.28**	-.31**	-.40**	-.16	-.30**	-.16
8. FSDSBL	-	-	-	-	-	-	-	-	.57**	.48**	.36**	.41**	.15	.21*	.25**	.22*
9. FSDS12M	-	-	-	-	-	-	-	-	-	.53**	.14	.44**	.28**	.15	.42**	.13
10. FSDS24M	-	-	-	-	-	-	-	-	-	-	.26**	.34**	.30**	.09	.22*	.31**
11. EPDSBL	-	-	-	-	-	-	-	-	-	-	-	.53**	.43**	.30**	.35**	.38**
12. EPDS12M	-	-	-	-	-	-	-	-	-	-	-	-	.55**	.06	.43**	.31**
13. EPDS24M	-	-	-	-	-	-	-	-	-	-	-	-	-	.12	.28**	.39**

14.PCSBL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.35**	.22*
15.PCS12M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.39**
16.PCS24M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean	2.48	1.86	1.54	1.38	17.98	15.01	14.74	12.72	14.24	12.58	5.56	5.60	6.15	10.25	4.27	4.27
SD	2.35	2.15	1.59	1.50	2.78	4.01	4.28	9.36	11.08	11.00	3.94	4.54	4.79	8.09	6.49	6.56
Range	0-8	0-9	0-6.25	0-5.5	4-21	0-21	0-21	0-41	0-52	0-52	0-18	0-19	0-24	0-37	0-33	0-35

Note. BL = baseline, 12M = 12 months, 24M = 24 months, SEX = pain intensity during intercourse, VPI = vestibular pain index, CSI

= Couples Satisfaction Index, FSDS = Female Sexual Distress Scale, EPDS = Edinburgh Postnatal Depression Scale, PCS = Pain

Catastrophizing Scale

Sample sizes varied across each measure between $n = 14 - 127$

* $p < .05$, ** $p < .01$

Table 6.

Psychosocial predictors of pain intensity during CST and intercourse at 12- and 24-months postpartum.

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	95% CI [LL, UL]
Pain Intensity During Intercourse at 12 Months Postpartum					
Sexual Distress (12M)	.09	.02	.33	3.62**	[.03, .12]
Pain Catastrophizing (12M)	.07	.04	.24	2.63*	[.02, .16]
Pain Intensity During Intercourse at 24 Months Postpartum					
Sexual Distress (12M)	.02	.02	.10	.77	[-.03, .06]
Sexual Distress (24M)	.05	.02	.22	2.10*	[.00, .10]
Depression (12M)	.05	.05	.12	1.06	[-.05, .12]
Pain Catastrophizing (12M)	-.02	.04	-.05	-.46	[-.09, .06]
Pain Catastrophizing (24M)	.16	.05	.43	4.50***	[.09, .22]
Pain Intensity During CST at 12 Months Postpartum					
Pain Catastrophizing (12M)	.05	.02	.22	2.16*	[.00, .10]
Pain Intensity During CST at 24 Months Postpartum					

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Relationship satisfaction (12M)	-.11	.05	-.30	-2.04*	[-.21, .00]
Depression (BL)	.07	.05	.22	1.28	[-.04, .18]
Depression (12M)	.06	.05	.21	1.21	[-.04, .17]

Note. BL = baseline, 12M = 12 months, 24M = 24 months.

* $p < .05$, ** $p < .01$, $p < .001$