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ORIGINAL PAPER

# Biopsychosocial Predictors of Couples' Trajectories of Sexual Function and Sexual Distress Across the Transition to Parenthood

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## Abstract

The prevailing narrative about sexual declines during the transition to parenthood is largely based on studies assessing the average couple, but there is increasing evidence of variability in the sexual well-being of new parents. We sought to establish distinct subgroups of couples based on sexual function and sexual distress trajectories and examine biopsychosocial risk and protective factors of these trajectories. A prospective cohort of 257 first-time parent couples reported on sexual function and sexual distress from 20-week pregnancy (baseline) to 6 months postpartum across four time-points. Biopsychosocial factors were assessed at baseline and 3 months postpartum. Dyadic latent class growth analysis identified two distinct sexual function classes (high, 85%; discrepant, 15%) and three sexual distress classes (low, 77%; moderate, 12%; discrepant, 11%). We identified biomedical (vaginal delivery, perineal tear, breastfeeding) and psychosocial (fatigue, stress, anxiety, depression, attitudes toward sex during pregnancy, relationship quality, perceived partner support) factors that can be assessed at critical time-points (i.e., 20-week pregnancy and 3 months postpartum) to identify high-risk couples. Current results indicate that the course of change in sexual well-being for new parents is heterogeneous, with most new parents retaining high function and low distress and only a minority showing trajectories in which mothers, but not fathers, experience clinically significant and persistent levels of low sexual function and high sexual distress. These results may facilitate more nuanced approaches to the assessment and intervention of new parents' sexual well-being.

**Keywords** Dyadic · Pregnancy · Postpartum · Sexual well-being · Sexual function · Sexual distress

## Introduction

Specific life periods represent stages of high vulnerability for sexual well-being, and one such period is the transition to parenthood—the period ranging from pregnancy up to 12 months postpartum—where new parents (as individuals) and new parent couples (as dyads) experience marked biopsychosocial changes that impact their sexuality (Fitzpatrick et al., 2021; McBride & Kwee, 2017). Sexual well-being can be defined as a state of physical, emotional, and social well-being in relation to sexuality (Mitchell et al., 2021; World Health Organization, 2010) and comprises two major components: the experience of unimpaired sexual function (e.g., desire, arousal, orgasm, absence of pain) and the lack of sexual distress (i.e., negative emotions associated with one's sexual life). Sexual well-being is linked to better mental and physical health over the entire life course and is one of the five most robust contributors to the quality of romantic relationships (Joel et al., 2020; Mitchell et al., 2021).

While a subset of new parents may fare well across the transition, others experience significant disruptions to their sexual well-being that might require clinical attention (Dawson et al., 2021; Rosen et al., 2020). The identification of distinct trajectories of sexual well-being and of factors that predict these patterns of change in new parents is essential to early assessment and intervention of high-risk couples during this critical period. Using a dyadic, longitudinal, group-based modeling approach, the objective of the current study was to ascertain unique dyadic trajectories of two core dimensions of sexual well-being—i.e., sexual function and sexual

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distress—across the transition to parenthood and to examine biopsychosocial variables associated with couples' membership in such trajectories.

## Sexual Function and Sexual Distress across the Transition to Parenthood

Changes to sexual function across the transition to parenthood are commonly reported by new parents (Fitzpatrick et al., 2021). However, not all changes to sexual function are experienced as difficult and, even when they are, sexual function changes may not translate to a sexual dysfunction. Indeed, referring to these changes alone as sexual dysfunction is inappropriate as it can lead to the pathologization of a common experience. For instance, new mothers and partners can experience changes to sexual function which are common (e.g., differences in sexual desire) and that may not translate into clinical levels of sexual distress (Rosen et al., 2021b). It is also possible for couples to experience clinically significant sexual distress due to other factors than changes to their sexual function (e.g., distress related to fears and negative attitudes about having sex during pregnancy; Tavares et al., 2021, 2022). Therefore, the concomitant presence of both clinically significant sexual distress and sexual function problems—two necessary markers of sexual dysfunction—is central to identify those couples who are most vulnerable across this period.

Cross-sectional and longitudinal studies have shown that, from pregnancy through postpartum, both mothers and partners experience marked changes to their sexual function. In pregnancy, as much as 36–88% of mothers and 19–47% of partners report sexual function difficulties (for a review, see Fitzpatrick et al., 2021). After childbirth, the prevalence of mothers and partners who report sexual function problems has been found to range from 10 to 83% and from 12 to 45%, respectively. Interestingly, sexual distress prevalence rates differ between couple members, with between 47 and 57% of mothers, compared to only 8–12% of partners, reporting clinically significant sexual distress across the first postpartum year (Fitzpatrick et al., 2021). There is considerable variability in these prevalence rates, in part due to different measures being used to assess sexual function or distress, or due to the timing of when they were assessed. Still, these prevalence rates indicate that sexual changes are, overall, common experiences for both new parents. However, they do not inform on whether the course of change for central markers of sexual well-being—such as sexual function and sexual distress—follows one uniform trajectory (i.e., homogeneity) among couples or whether there are groups of couples who follow unique and distinctive trajectories (i.e., heterogeneity) and, in this case, which groups are at heightened risk for experiencing sustained sexual difficulties.

Recent longitudinal studies have started to uncover some heterogeneity in couples' sexual well-being trajectories and found that, indeed, many couples are able to maintain their sexual well-being across the transition, with clinically significant sexual difficulties being experienced by only a subset of couples. Rosen et al. (2020) followed 203 new parent couples from mid-pregnancy to 1 year postpartum and observed two unique trajectories of sexual distress. One trajectory captured couples (76%) who were not experiencing clinically significant sexual distress throughout the transition. In this group of couples, mothers showed an overall increase in sexual distress over time but, at 1 year postpartum, both partners' levels of distress were still below the clinical range. A different trajectory captured couples (24%) who experienced a stable discrepancy in sexual distress over time (i.e., partners consistently reported different levels of distress). In this group, mothers' sexual distress was in the clinical range from pregnancy to 1 year postpartum, while partners' sexual distress was consistently below clinical cutoffs.

As for sexual function, only one study, to our knowledge, has examined group-based trajectories across the transition to parenthood and did so by only sampling new mothers (Dawson et al., 2020). This study revealed that mothers' sexual function followed three distinct trajectories, which differed based on the severity of sexual function problems at postpartum and on their degree of improvement over time. The majority (52%) of women reported minimal sexual function problems at 3 months postpartum and improved the least over time, a third of women (35%) reported moderate sexual function problems and improved the most over time, and 13% of women reported marked sexual function problems at 3 months postpartum and showed minimal improvement over time. These results reinforce the heterogeneity in sexual experiences across the transition to parenthood, but this study solely translates mothers', rather than couples' experiences. Examining these trajectories at the couple level and considering sexual function and sexual distress simultaneously is valuable given emerging evidence that partners also experience consequences to their sexual function from pregnancy to postpartum and that changes in sexual function and distress are highly interdependent between couple members (Chew et al., 2021; Dawson et al., 2021; Fitzpatrick et al., 2021).

## A Biopsychosocial Framework of New Parent Couples' Sexual Well-being

The question of what makes some couples retain high sexual well-being (i.e., high sexual function and low sexual distress) across the transition to parenthood while others evidence marked sexual difficulties has been examined by prior researchers based on a biopsychosocial framework. As supported by models of sexual function (e.g., Basson, 2000; Cranston-Cuebas & Barlow, 1990) and by recent

conceptualizations of postpartum couples' sexual well-being (Dawson et al., 2020b; Fitzpatrick et al., 2021; McBride & Kwee, 2017), new parents face a range of biological, psychological, and relational changes that impact their sexual function and sexual distress.

Biological factors include those related to hormonal changes of pregnancy and postpartum (e.g., breastfeeding) and those related to the characteristics of the birth (e.g., epidural, induction, mode of delivery, episiotomy, degree of perineal tear). Current evidence on the contribution of biological factors to new parents' sexual well-being does not support a strong influence, with results showing non-significant or minimal effects of biomedical aspects on both partners' sexual function more generally and on specific sexual problems more particularly (e.g., pain during vaginal intercourse; Rosen et al., 2021a). Some factors (i.e., vaginal delivery with perineal tearing, episiotomy, breastfeeding) have shown some consistency in increasing the risk, albeit slightly, of mothers experiencing poorer sexual function (e.g., poorer overall sexual function, increased genital pain, decreased desire and arousal) at 6 months postpartum and at later time-points, cross-sectionally (Fitzpatrick et al., 2021), but biomedical factors did not influence women's trajectory of sexual function across the transition, when assessed longitudinally (Dawson et al., 2020).

Psychological factors have shown a stronger contribution to both partners' sexual function and sexual distress across the transition to parenthood. The change in roles and routines that comes with the birth of a child is typically accompanied by heightened stress and fatigue, which have in turn been found to negatively influence both parents' sexual well-being, cross-sectionally and longitudinally. Mothers who report greater fatigue at 3 months postpartum are more likely to follow trajectories involving marked and moderate sexual function problems across the transition rather than a trajectory of minimal sexual problems (Dawson et al., 2020). Mothers and partners who experience greater stress at postpartum are more likely to experience greater sexual function difficulties (e.g., dyspareunia, lower desire) at that time-point and beyond (Alligood-Percoco et al., 2016; Tavares et al., 2019). There is also robust evidence supporting the contribution of mood (i.e., anxiety, depression) to sexual function and distress (Atlantis & Sullivan, 2012; Cranston-Cuebas & Barlow, 1990; Norton & Jehu, 1984). Cross-sectional and longitudinal studies have linked greater anxiety and depression symptoms to greater sexual distress and sexual function difficulties, for both the birthing individual (Asselmann et al., 2016; Dawson et al., 2021) and the non-birthing partner (Dawson et al., 2020, 2022). Furthermore, couples who demonstrate more positive attitudes to having sex during pregnancy—i.e., less fears and negative beliefs about the potential negative impacts of sex on their baby's and on the mothers' health—show better sexual function and lower distress relative to couples who hold less positive attitudes to sex during pregnancy (Beveridge et al., 2018; Tavares et al., 2021, 2022).

As postulated by cognitive-motivational and information-processing models of sexual response (Barlow, 1986; Basson, 2000; Cranston-Cuebas & Barlow, 1990), these psychological factors (e.g., low mood, fatigue, fears and negative attitudes about sex during pregnancy) may interfere with sexual function by deviating one's focus of attention away from sexual cues or by inhibiting the experience of pleasure. Because these psychological factors can also induce negative cognitions and affect (e.g., nonsexual or negative thoughts, anhedonia) that promote avoidance of sexual activity, they can contribute to more persistent sexual difficulties over time (Tavares et al., 2020) and, ultimately, to higher sexual distress.

Lastly, social and relational factors—including poor relationship quality and low perceived social support from one's partner—are thought to inhibit sexual well-being by reducing feelings of intimacy and connectedness between partners (Basson, 2000; McBride & Kwee, 2017). These relational factors have all been associated with poorer sexual well-being, including in new parents (Dawson et al., 2020; Lorenz et al., 2020), emphasizing the important interpersonal nature of the sexual relationship. Couples with interpersonal dynamics of lower quality may be less able to deal with the demands of the transition to their sexual lives (Fitzpatrick et al., 2021; Shapiro et al., 2000), and it is thus likely that couples who have a strong prenatal bond to their partner will show reduced odds of experiencing trajectories characterized by lower sexual function and heightened sexual distress. However, no study to date has examined prevalence of membership in sexually high-risk classes (i.e., couples who experience clinically significant changes to sexual function and clinically significant sexual distress) nor which factors are associated with couples' membership in these classes. This information is essential for the early detection of couples who are more vulnerable to sustained sexual problems across this period.

## The Current Study

This study aimed to improve current understanding of couples' sexual function and sexual distress across the transition to parenthood by prospectively assessing new parent couples and by employing group-based modeling, rather than assessing average trajectories (Foran & Kliem, 2015; Jung & Wickrama, 2008). Prior studies have typically sampled individuals rather than couples, employed correlational or retrospective approaches and, if prospective, focused solely on average change and not on the variability within sexual well-being outcomes trajectories, a finding that has been advanced by recent studies. It is particularly noteworthy that no study has examined sexual function and sexual distress

concomitantly in both new parents, although these are central markers of sexual dysfunction. Sexual distress, in particular, has received little attention in the context of couples' postpartum sexual well-being.

As such, the goals of the current study were threefold: (1) to identify subgroups (i.e., classes) of dyadic sexual function and sexual distress trajectories from mid-pregnancy to 6 months postpartum; (2) to establish the prevalence of simultaneous membership (i.e., overlap) in the identified sexual function and distress trajectories; and (3) to identify biopsychosocial factors that were associated with membership in the distinct sexual well-being trajectories. Although several potential risk and protective factors underlying mothers' and partners' sexual well-being have been previously identified, no study has established whether particular biopsychosocial factors might be more relevant for a subsection of couples (i.e., high-risk couples) and which can therefore be specifically targeted in future early assessment and interventions. Given prior research, we hypothesized that first-time couples' sexual function and sexual distress would exhibit multiple distinct trajectories, although the exact number of classes for each outcome is exploratory. Based on models of sexual well-being in the postpartum period and existing literature (Basson, 2000; Fitzpatrick et al., 2021; McBride & Kwee, 2017), we hypothesized that biopsychosocial factors (i.e., biomedical risk factors, fatigue, stress, depression, anxiety, less positive attitudes to sex during pregnancy, as well as lower levels of relationship quality and perceived partner support) would be associated with those trajectories that captured couples' poorer sexual function and higher sexual distress over time.

## Method

### Participants

Couples who were expecting their first child were recruited during pregnancy ($M = 22.8$ weeks, range = 20–24 weeks, SD = 1.48) from June 2019 to April 2021. The inclusion criteria for both members of the couple included: (a) being in a committed romantic relationship with each other for at least six months; (b) being at least 18 years of age; and (c) being able to read and write in Portuguese. One member of the couple was additionally required to: (d) currently have an uncomplicated, singleton pregnancy between 20 and 24 weeks and (e) have not given birth previously. Participants who self-reported currently suffering from a severe unmanaged medical or psychiatric illness were ineligible. Figure 1 depicts a flowchart of participant recruitment and attrition. Two hundred and fifty-seven couples were eligible to be included in the current analyses (see Fig. 1), a sufficient sample size to detect small groups of subpopulations within a sample (Foran & Kliem, 2015). All participants who gave birth described their gender/sex as woman/female and all partners self-identified as man/male; we therefore refer to these participants collectively as "mothers" and "fathers", respectively. Participants ranged in age from 19 to 47 years old (mothers: $M = 29.92$, SD = 4.74; fathers: $M = 31.61$, SD = 4.87) and were in a relationship for an average of 7 years ($M = 87.5$ months, range = 6–255 months, SD = 55.5 months). The majority of couples (68%) was married or common-law, and 32% of couples were dating. All participants were currently in a mixed-gender/sex relationship, although the study was inclusive of couples of all genders and identities. Most mothers (93%) and fathers (95%) identified as exclusively heterosexual, 6% of mothers and 4% of fathers identified as predominantly heterosexual, 1% of mothers identified as predominantly lesbian, and 1% of fathers identified as bisexual. Around 61% of mothers and 43% of fathers had some form of higher education, 32% of mothers and 42% of fathers completed 12 years of education, and 7% of mothers and 15% of fathers completed 9 years of education. Monthly household income ranged from less than €1050 (27% of mothers, 20% of fathers), 1050€–2095€ (49% of mothers, 55% of fathers), to over 2095€ (24% of mothers, 25% of fathers). Participants were predominantly White (87% mothers, 89% fathers) and some were Hispanic or Latino/a/x (11% mothers, 8% fathers) or Black (2% mothers, 3% fathers). Most couples described their pregnancy as planned (80%), and few (8%) reported prior fertility complications (e.g., infertility, recurrent pregnancy loss).

### Procedure

Participants were recruited either in-person during their routine appointments at a large obstetrics outpatient unit in Portugal (81%) or via community (i.e., hospital bulletin boards, pregnancy-related services) or online advertisements (19%), as part of a larger study on couples' relationships during the transition to parenthood (viz., Tavares et al., 2022). Participants recruited through advertisements completed all materials online. For in-person recruitment, participants were recruited through gynecologists' referral and those who were interested and eligible were invited to speak to the study coordinator (either in person or via telephone) who described the aims and procedures of the study and confirmed eligibility. Couples were invited to complete the surveys online, which were separately sent to each partners' e-mail address. There were no significant differences in demographic characteristics or in the variables included in the analyses between participants who were recruited in-person or online. All individuals gave informed consent online before accessing the first survey. Data were obtained from both couple members at four time-points, two pre- and two postnatal: 20-week pregnancy (T1, baseline), 32-week pregnancy (T2),

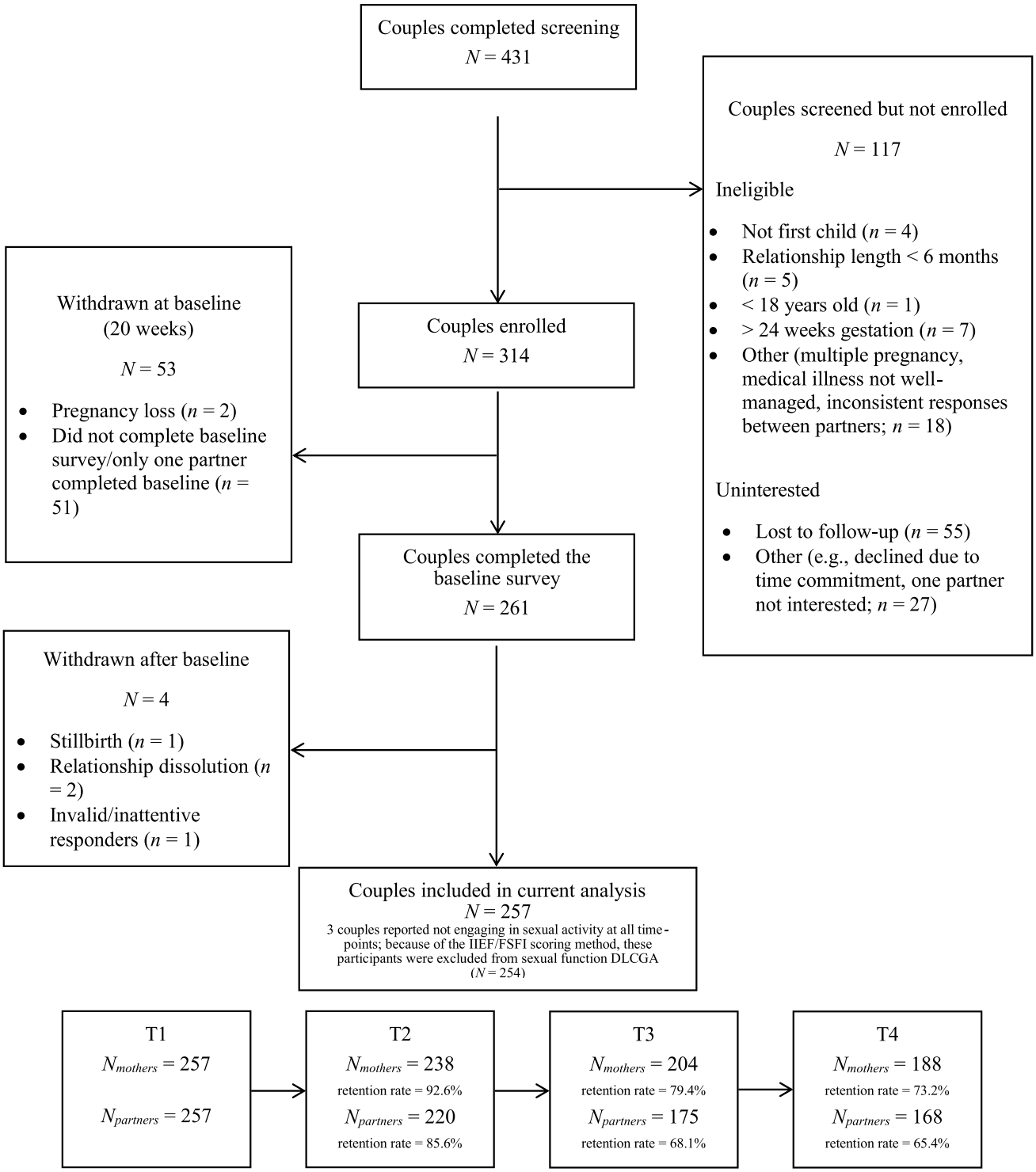


**Fig. 1** Participants' recruitment flow

3 months postpartum (T3), and 6 months postpartum (T4). Couple members were given 4 weeks to complete each survey. Retention strategies to promote participation included reminder e-mails 1 week prior to receiving each follow-up survey (i.e., an e-mail including educational information on fetus or infant development at that time-point), as well as reminder emails and/or phone-calls if they did not complete a survey within 48–72 h and at one and 3 weeks after receiving it. After participation of both couple members, then each couple was compensated with a 10€ voucher at every other

time-point of the study. The study was approved by the ethical review boards at the Faculty of Psychology and Educational Sciences at the University of Porto and at the Centro Materno-Infantil do Norte.

## Measures

Mothers and fathers reported on sociodemographic information at baseline. All participants reported on their sexual well-being at all time-points. Labor and delivery characteristics were collected via chart review (i.e., epidural, induction, mode of delivery, episiotomy, and degree of perineal tearing), when available, and/or at the 3-months postpartum survey (i.e., breastfeeding). The psychological and social variables were evaluated at both baseline and 3 months postpartum. We used time-invariant predictors because these factors can be assessed at relevant time-points (i.e., pregnancy, early postpartum) and are therefore of greater clinical utility for identifying risk/protective factors for persistent sexual difficulties.

### Sexual Function

At each time-point, mothers' and fathers' sexual function in the prior 4 weeks was assessed using the well-validated 19-item Female Sexual Function Index (FSFI; Rosen et al., 2000) and 15-item International Index of Erectile Function (IIEF; Rosen et al., 1997), respectively. An example item of these measures includes: "Over the past 4 weeks, how often did you feel sexual desire or interest?" As per current recommendations, women and men indicating no sexual activity in the preceding 4 weeks (6% of women and 10% of men at T1, 12% of women and 14% of men at T2, 14% of women and 16% of men at T3, and 11% of women and 12% of men at T4) did not receive a total score for that time-point to prevent artificially low scores, which would indicate the absence of sexual activity rather than sexual difficulties (Meston et al., 2020; Meyer-Bahlburg & Dolezal, 2007). Total scores resulting from this scoring method range from 7.2 to 36 for FSFI, IIEF total scores range from 15 to 75; higher scores denote better sexual function. Both the FSFI and the IIEF have previously demonstrated strong psychometric properties (Rosen et al., 1997, 2000) and have been used to assess sexual function in pregnant and postpartum samples (Dawson et al., 2021). In the current sample, both measures showed excellent internal consistency at all time-points ($\alpha_{mothers}$ = .96–.98 for the FSFI; $\alpha_{fathers}$ = .93–.96 for the IIEF). To permit sexual function scores to be comparable across participants, FSFI scores were re-scaled to the same metric as the IIEF using the following adjustment: $[(\chi-2)\times(75/34)]$ (Dawson et al., 2021). Sexual function trajectories were interpreted based on established cutoffs for the FSFI denoting clinically significant problems with sexual function (i.e., < 26.55, adjusted score < 54.15; Wiegel et al., 2005). For the IIEF, clinical cutoffs have not been established, but a total score lower than 55 is used as indicative of clinically significant problems with sexual function, as this cutoff has been demonstrated to successfully differentiate men with and without a diagnosis of sexual dysfunction (Forbes et al., 2014; Rosen et al., 1997).

### Sexual Distress

At all time-points, the Female Sexual Distress Scale-Revised (FSDS-R; Derogatis et al., 2008) was used to assess distress relative to one's sex life in the preceding 4 weeks (e.g., "How often did you feel distressed about your sex life?"). This 13-item self-report measure is validated for use in women and men with good psychometric properties (Derogatis et al., 2008; Santos-Iglesias et al., 2018) and has been used to measure sexual distress during pregnancy and postpartum (Dawson et al., 2020). Total scores range from 0 to 52, with higher scores being indicative of greater sexual distress. This measure showed excellent internal consistency at all time-points in this study ($\alpha_{mothers}$ = .95–.96; $\alpha_{fathers}$ = .94). Sexual distress trajectories were interpreted following established cutoffs denoting clinically significant sexual distress (i.e., > 11 for women, > 19.5 for men; Derogatis et al., 2008; Santos-Iglesias et al., 2018).

### Biomedical Factors

Six dichotomous (0 = no; 1 = yes) biomedical factors related to labor and delivery characteristics were examined: epidural, induction of labor, vaginal delivery, episiotomy, perineal tear, and breastfeeding at 3 months postpartum. Data were coded as missing for those who answered "unsure/do not know."

### Psychological Factors

At baseline and at 3 months postpartum, participants reported on their average daily energy level using a single item (1 = high energy to 7 = extreme fatigue) used in prior research (Dawson et al., 2020), as well as on anxiety, depression, and perceived stress. Anxiety was measured with the valid and reliable 7-item Anxiety Subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983), wherein higher scores denote a more severe presence of anxiety symptoms in the past 4 weeks (e.g., "I feel tense or 'wound up'"), range = 0–21. The HADS-A showed strong indices of internal consistency ($\alpha_{mothers}$ = .79–.84, $\alpha_{fathers}$ = .77–.83). Depressive symptoms were assessed with the well-validated Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). This 10-item scale is a widely used screening tool for depression designed to particularly target populations at pregnancy and postpartum (e.g., "In the past 7 days, I have felt sad or miserable"). Higher scores reflect greater depressive symptoms in the prior week (range = 0–30). Internal

consistency of the EPDS in the current study was excellent ($\alpha_{mothers}$ = .85–.86; $\alpha_{fathers}$ = .82–.85). Participants also reported on the degree to which they perceived situations in their lives as stressful in the prior 4 weeks using the well-validated 14-item Perceived Stress Scale (PSS; Cohen et al., 1983), wherein higher scores indicate higher perceived stress (e.g., "In the last month, how often have you felt that you were unable to control the important things in your life?"), range = 0–40. The PSS showed strong internal consistency in our sample ($\alpha_{mothers}$ = .90–.91; $\alpha_{fathers}$ = .87–.88). Attitudes toward sex during pregnancy were assessed using the Maternal and Partner Sex during Pregnancy Scales (MSP/PSP; Jawed-Wessel et al., 2016) at baseline, which comprise 6 and 8 items, respectively, in which participants report their rate of agreement with cognitive and affective aspects related to having sex during pregnancy (e.g., "Having sex can cause a miscarriage"). Higher scores indicate a more positive attitude toward having sex during pregnancy (range = 1–6). The scale was reliable for mothers ($\alpha$ = .74) and fathers ($\alpha$ = .83).

### Social Factors

Relational variables were collected at baseline and at 3 months postpartum. Relationship quality was assessed with the well-validated 14-item Dyadic Adjustment Scale–Revised (DAS-R; Busby et al., 1995), which includes a comprehensive evaluation of different dimensions of the quality of the relationship with a partner (e.g., "How often do you and your partner quarrel?"; from 0 = all the time to 5 = never). Higher scores reflect higher perceived relationship quality (range = 0–69). The scale was reliable for both mothers ($\alpha$ = .85) and fathers ($\alpha$ = .80). The perception of social support individuals receive from their partners was assessed with the 4-item Multidimensional Scale of Perceived Social Support–Significant Other subscale (MSPSS-SO; Zimet et al., 1988). Higher scores indicate higher perceived partner support (e.g., "There is a special person who is around when I am in need"), range = 1–7. In this sample, the MSPSS-SO showed excellent internal consistency ($\alpha_{mothers}$ = .93; $\alpha_{fathers}$ = .92).

## Data Analyses

De-identified data and syntax for the analyses are available on the Open Science Framework at https://osf.io/wabfk/. Analyses were conducted with MPlus v8.6 (Muthén & Muthén, 1998–2017) using the maximum likelihood estimator. Full information maximum likelihood estimation was employed to estimate missing data due to attrition over time (Enders & Bandalos, 2001).

Couples' trajectories of sexual function and sexual distress were examined using dyadic latent class growth analysis (DLCGA; Foran & Kliem, 2015; Jung & Wickrama, 2008), a type of mixture modeling that captures heterogeneity in couples' longitudinal patterns by identifying "hidden groups" of couples who share similar responses (i.e., latent classes). Each latent class represents a qualitatively unique dyadic trajectory of an outcome over time. We conducted one DLCGA for each sexual outcome and, for each model, a total of eight variables was assessed simultaneously (i.e., mothers' and fathers' reports in sexual function and sexual distress across the four time-points). Time frame was weighted by months (0, 3, 8, 11) with the intercept representing the first time-point. Variances of the intercepts and slopes were assumed to be invariant (i.e., constrained to zero) within classes but allowed to vary across classes (Grimm et al., 2016). The selection of the optimal number of classes was performed according to several criteria: (a) good model fit as evidenced by the lowest Akaike information criterion (AIC), Bayesian information criteria (BIC), and sample-size-adjusted BIC (SABIC), entropy values closer to one (indicating better precision in distinguishing between different classes), a significant Lo–Mendell–Rubin likelihood ratio test (LMR-LRT), and a significant bootstrap likelihood ratio test (BLRT; Nylund et al., 2007); (b) being the best-fitted model in a row of three subsequent models in which model fit worsened (van de Schoot et al., 2017); and (c) parsimony, interpretability, and size of classes (at least 5% of the sample in each class; Nylund et al., 2007). Models were run with 500 start values, using the best 50 for final optimization. When a final solution was selected, it was then replicated with 1500 random start values with the best 150 retained to ensure it replicated without issue. There is no established method for calculating the required sample size for the current analysis (Ferguson et al., 2019), but a sample size of at least 500 individuals is recommended to detect the correct number of latent classes using adjusted fit statistics (Nylund et al., 2007).

Second, to examine overlap in membership in the identified classes of sexual function and sexual distress, we conducted dual trajectory analyses (Jones & Nagin, 2007) by regressing the sexual function trajectories onto the sexual distress trajectories. This approach allows us to examine the posterior probabilities of group membership across classes (i.e., the likelihood of a couple being part of two given classes simultaneously), which indicates whether couples' membership in a particular sexual function class is significantly more or less likely to correspond to membership in a particular sexual distress class.

Finally, to examine whether biopsychosocial variables account for significant differences between sexual function and sexual distress classes, we used the BCH method, named after Bolck et al. (2004). The BCH method tests for significant differences between the established classes based on auxiliary variables (i.e., predictors) and, compared to alternative methods of estimating differences in latent classes according to auxiliary variables, the BCH is preferable

because it employs weighted multiple group analysis, therefore avoiding shifts in latent class membership of the identified trajectories because the groups of classes (i.e., latent classes) are known (Bakk et al., 2013; Vermunt, 2010).

## Results

Descriptive statistics and correlations among study variables are presented in Supplemental Table 1. Below, we report results of the DLGCAs for sexual function and sexual distress by first describing the average trajectories for each outcome (i.e., the dyadic single class solution) followed by the number of classes and pattern of change within each class resulting from the final selected DLGCA. Model fit indices of the estimated DLCGAs are shown in Table 1, and the trajectories are depicted in Figs. 2 and 3.

### Dyadic Trajectories of Sexual Function

The average trajectory of sexual function showed that mothers (intercept = 61.44, SE = 0.63, $p < .001$; $EST_S = -.64$, SE = 0.11, $p < .001$) declined in sexual function from pregnancy to 6 months postpartum, whereas fathers' sexual function did not significantly change over time (intercept = 66.13, SE = 0.39, $p < .001$; $EST_S = -.06$, SE = 0.06, $p = .272$). The DLGCAs indicated significant heterogeneity in trajectories (see Table 1), with the best fitting model being the two-class solution (see Fig. 2). The two-class solution showed good fit indices alongside significant LMR-LRT and BLRT, the highest entropy value, and sufficient membership in each class. Class 1 (*Discrepant Sexual Function–Mothers Clinically Low*) included 15% of couples ($n = 38$) who were experiencing a sexual function discrepancy between partners throughout the transition, with mothers' functioning being lower than fathers' and at clinical levels from mid-pregnancy to 6 months postpartum. In this class, mothers' sexual function at baseline was in the clinically significant range (46.63, SE = 3.25, $p < .001$) and showed a significant decrease over time ($EST_S = -1.40$, SE = 0.38, $p < .001$), thus being at clinical levels at all time-points. Fathers' sexual function intercept was high and at non-clinical levels (62.41, SE = 1.63, $p < .001$) and remained stable over time ($EST_S = -.39$, SE = 0.30, $p = .183$). Class 2 (*High Sexual Function*) included 85% of couples ($n = 216$) who reported relatively high levels of sexual function throughout the transition. In this class, mothers' (63.79, SE = 0.59, $p < .001$) and fathers' (66.70, SE = 0.42, $p < .001$) sexual function intercept was not in the clinically significant range. Mothers' sexual function significantly decreased between mid-pregnancy and 6 months postpartum ($EST_S = -.46$, SE = 0.11, $p < .001$) but was still at non-clinical levels at all time-points, while fathers' sexual function was stable over time ($EST_S = -.002$, SE = 0.05, $p = .966$).

### Dyadic Trajectories of Sexual Distress

The average trajectory of sexual distress indicated that mothers (intercept = 8.13, SE = 0.55, $p < .001$; $EST_S = .19$, SE = 0.06, $p = .002$) increased in sexual distress over time, while fathers (intercept = 5.90, SE = 0.41, $p < .001$; $EST_S = .05$, SE = 0.148 $p = .08$) did not show significant changes in sexual distress from mid-pregnancy to 6 months postpartum. Similar to sexual function, we found heterogeneity in trajectories of sexual distress when estimating DLGCAs (see Table 1). All fit indices indicated that the

**Table 1** Fit indices and final class solutions for the dyadic latent class growth analyses ($n = 257$ couples)

| | Class proportions | LL | AIC | BIC | SABIC | LMR-LRT $p$ value | BLRT $p$ value | Entropy |
|---|---|---|---|---|---|---|---|---|
| *Sexual function* | | | | | | | | |
| 1 class | 1.00 | −5200.60 | 10,433.20 | 10,489.80 | 10,439.08 | NA | NA | NA |
| 2 class | **.15/.85** | **−5089.58** | **10,221.15** | **10,295.44** | **10,228.86** | ***p* < .05** | ***p* < .001** | **.885** |
| 3 class | .49/.10/.41 | −5047.20 | 10,146.41 | 10,238.38 | 10,155.95 | $p = .185$ | $p < .001$ | .743 |
| 4 class | .73/.11/.04/.12 | −5013.71 | 10,089.41 | 10,199.07 | 10,100.79 | $p = .490$ | $p < .001$ | .858 |
| 5 class | .46/.10/.07/.02/.35 | −4979.03 | 10,030.06 | 10,157.41 | 10,043.28 | $p = .365$ | $p < .001$ | .805 |
| *Sexual distress* | | | | | | | | |
| 1 class | 1.00 | −5941.07 | 11,914.14 | 11,970.93 | 11,920.20 | NA | NA | NA |
| 2 class | .83/.17 | −5726.58 | 11,495.16 | 11,569.69 | 11,503.11 | $p < .001$ | $p < .001$ | .954 |
| 3 class | **.77/.12/.11** | **−5612.18** | **11,276.37** | **11,368.64** | **11,286.22** | ***p* = .018** | ***p* < .001** | **.947** |
| 4 class | .64/.10/.22/.04 | −5567.54 | 11,197.08 | 11,307.10 | 11,208.82 | $p = .644$ | $p < .001$ | .899 |
| 5 class | .05/.26/.08/.54/.08 | −5522.33 | 11,116.65 | 11,244.42 | 11,130.29 | $p = .196$ | $p < .001$ | .905 |
| 6 class | .08/.25/.05/.50/.04/.08 | −5492.04 | 11,066.08 | 11,211.59 | 11,081.61 | $p = .549$ | $p < .001$ | .891 |

*LL* Model log likelihood, *AIC* Akaike information criterion, *BIC* Bayesian information criterion, *SABIC* Sample-adjusted BIC, *LMR-LRT* Lo–Mendell–Rubin likelihood ratio test, *BLRT* Bootstrap likelihood ratio test, *NA* Not applicable. The final class solution is depicted in bold

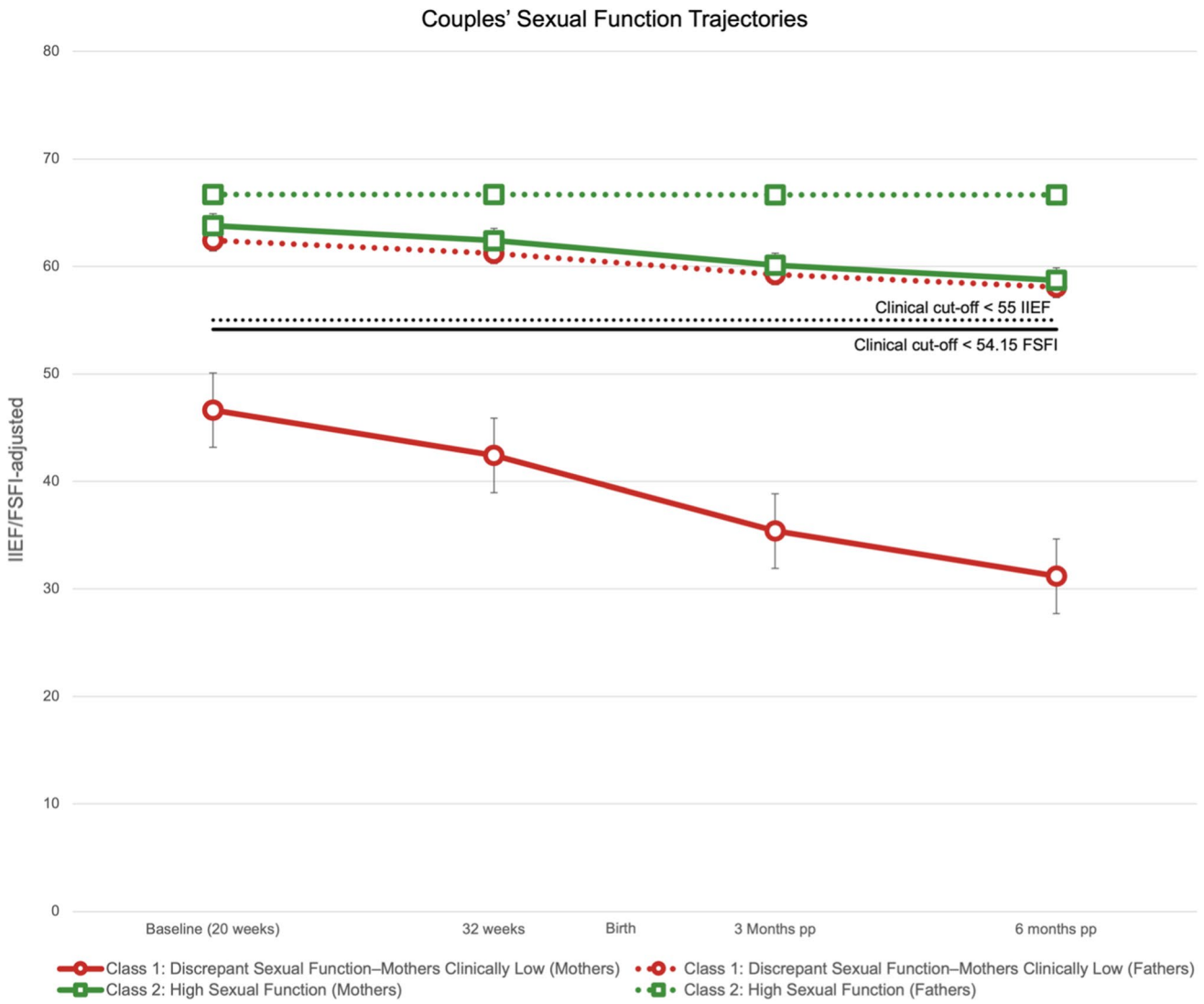


**Fig. 2** Dyadic trajectories of sexual function from mid-pregnancy to 6 months postpartum ($n = 254$ couples). Solid lines represent mothers' trajectories and dashed lines represent fathers' trajectories. Note. Error bars based on the 95% CI are not visible if smaller than the markers

best fitting model was the three-class solution (see Fig. 3), with the three subsequent models (i.e., four-classes, five-classes, six-classes) all showing worse fit indices and insufficient class membership (i.e., < 5% sample in at least one class). Class 1 (*Low Sexual Distress*) included 77% of couples ($n = 197$) who reported low levels of sexual distress across the transition. In this class, mothers' sexual distress intercept was 4.66 (SE = 0.37, $p < .001$) and increased over time ($EST_S = .25$, SE = 0.07, $p < .001$), but was still at non-clinical levels at 6 months postpartum. Fathers' sexual distress intercept was 3.73 (SE = 0.39, $p < .001$) and did not show significant change over time ($EST_S = .05$, SE = 0.05, $p = .25$). Class 2 (*Moderate Sexual Distress*) included 12% of couples ($n = 32$) in which both partners were experiencing moderate levels of sexual distress across the transition. In this class, mothers' sexual distress intercept was in the clinically significant range (12.27, SE = 1.99, $p < .001$) , while fathers' intercept was not (17.04, SE = 1.77, $p < .001$). Although both mothers' ($EST_S = -.13$, $SE = .19$, $p = .48$) and fathers' ($EST_S = .29$, SE = 0.24, $p = .21$) sexual distress did not show significant change over time, both partners' sexual distress levels approached clinical cutoff values at 6 months postpartum. Class 3 (*Discrepant Sexual Distress–Mothers Clinically Elevated*) included 11% of couples ($n = 28$) who were experiencing a sexual distress discrepancy between partners, with mothers' distress being higher than fathers' from mid-pregnancy to 6 months postpartum. Mothers' sexual distress at baseline was high and in the clinically significant range (25.48, SE = 1.14, $p < .001$) and continued to be so at all time-points, while fathers' sexual distress intercept was low and at non-clinical levels (7.56, SE = 92, $p < .001$). In this class, both mothers' ($EST_S = .08$, SE = 0.18, $p = .67$)

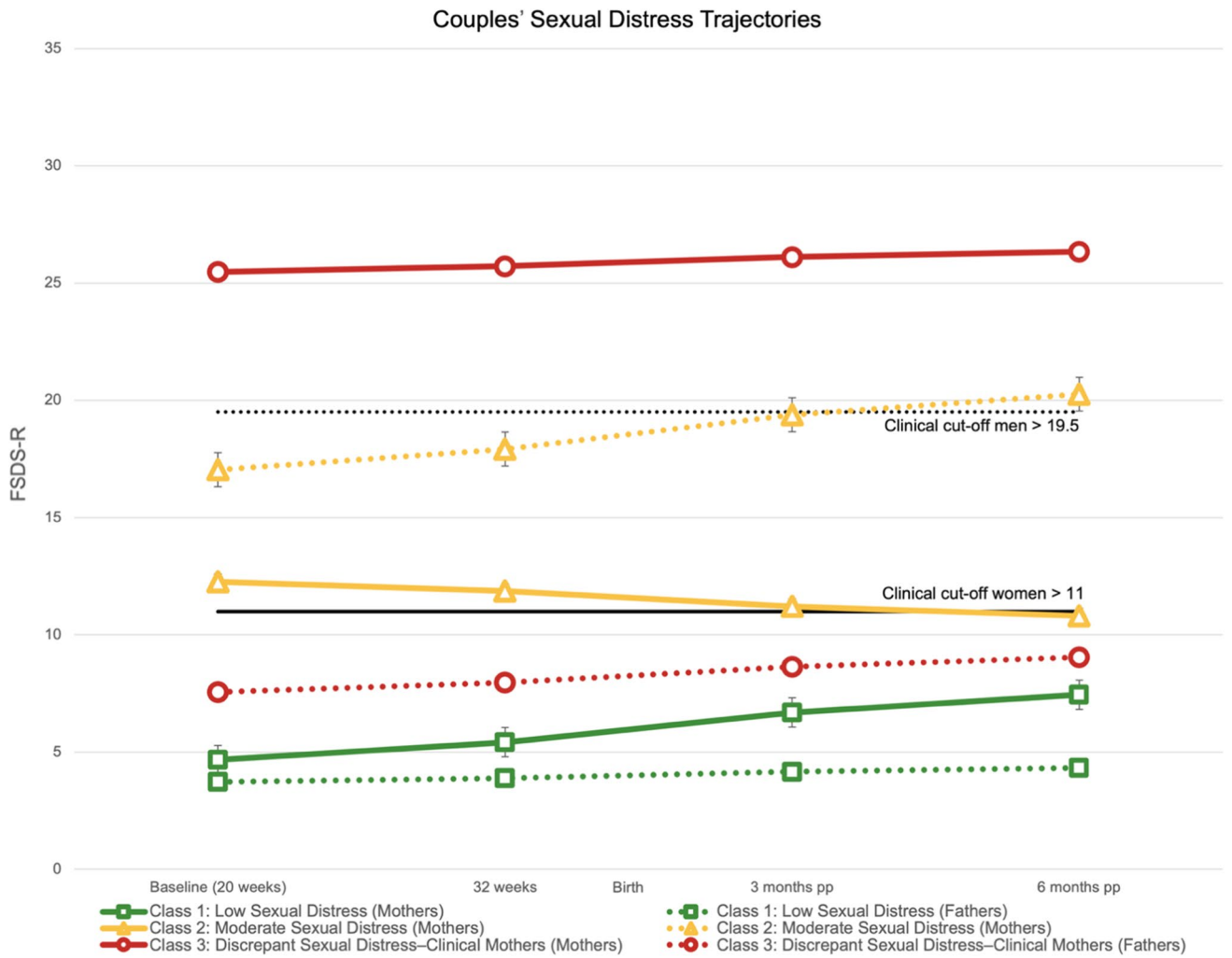


**Fig. 3** Dyadic trajectories of sexual distress from mid-pregnancy to 6 months postpartum ($n = 257$ couples). Solid lines represent mothers' trajectories and dashed lines represent fathers' trajectories. Error bars based on the 95% CI are not visible if smaller than the markers

and fathers' ($EST_S = .14$, $SE = 0.10$, $p = .16$) sexual distress remained stable over time.

## Overlap in Classes of Sexual Function and Sexual Distress

To assess the overlap in couples' membership across classes, we conducted dual trajectory analyses by regressing the established sexual function trajectories onto the established sexual distress trajectories. Table 2 depicts the probabilities of couples in each sexual distress class being part of each of the sexual function classes. Figure 4 depicts the percentage of couples from the total sample that overlapped in each of the six class combinations.

The odds ratio results indicated that membership in the *Discrepant Sexual Function—Mothers Clinically Low* class was significantly associated with increased odds of membership in the *Moderate Sexual Distress* class compared to

**Table 2** Estimated posterior probabilities from the dual trajectory analysis ($n = 257$ couples)

| | Sexual distress classes | | |
|---|---|---|---|
| | Class 1 Low sexual distress | Class 2 Moderate sexual distress | Class 3 Discrepant sexual distress—mothers clinically elevated |
| *Sexual function classes* | | | |
| Class 1 Discrepant sexual function—mothers clinically low | .06 | .77 | .30 |
| Class 2 High sexual function | .95 | .23 | .70 |

Values indicate the posterior probability that each of the three sexual distress classes falls into one of the two sexual function classes (e.g., the .95 posterior probability means that for couples that were part of the low sexual distress class, there was a 95% likelihood they would also be part of the high sexual function class)

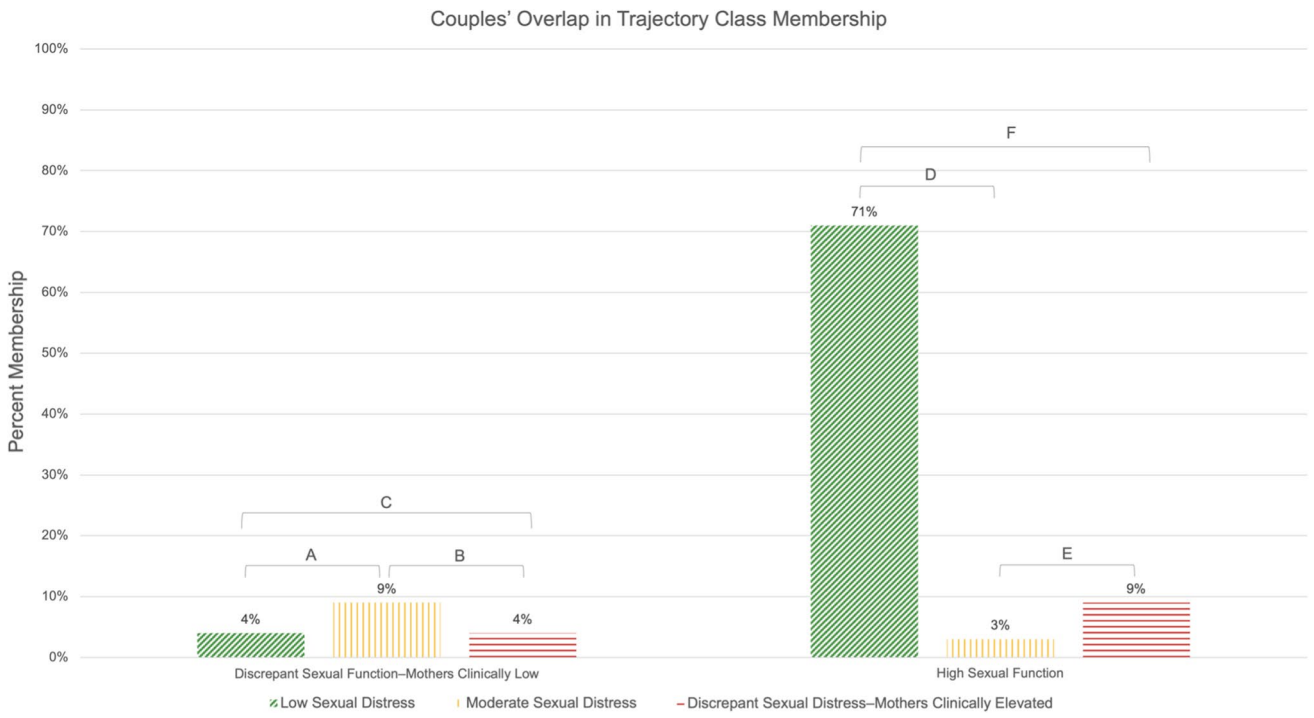


**Fig. 4** Couples' overlap into each of the nine sexual well-being class combinations ($n = 257$ couples)

membership in the *Low Sexual Distress* (OR = 7.55, 95% CI [1.78, 32.07], $p < .01$) and *Discrepant Sexual Distress—Mothers Clinically Elevated* (OR = 56.71, [14.84, 216.73], $p < .001$) classes. Membership in this sexual function class was also significantly associated with reduced odds of membership in both the *Low Sexual Distress* (OR = .02, [.01, .07], $p < .001$) and *Discrepant Sexual Distress—Mothers Clinically Elevated* (OR = .13, [.03, .56], $p < .01$) classes.

As for membership in the *High Sexual Function* class, this was significantly associated with increased odds of membership in the *Low Sexual Distress* class compared to membership in the *Moderate Sexual Distress* (OR = 7.50, [2.42, 23.24], $p < .001$) and in the *Discrepant Sexual Distress—Mothers Clinically Elevated* (OR = 56.68, [14.85, 216.40], $p < .001$) classes. Membership in this sexual function class was also significantly associated with decreased odds of membership in both the *Moderate Sexual Distress* (OR = .02, [.01, .07], $p < .001$) and *Discrepant Sexual Distress—Mothers Clinically Elevated* (OR = .13, [.04, .41], $p < .01$) classes.

## Biomedical and Psychosocial Differences Across Classes

We tested how biological, psychological, and social/relational variables differed between classes of sexual function and of sexual distress. Psychosocial predictors were significantly and positively correlated (i.e., interdependent) between partners ($rs = .15–.65$) and, within-person, they were only weakly correlated between baseline and 3 months postpartum ($rs = .16–.18$). Full results of the BCH analyses are depicted in Tables 3 and 4. To rule out the potential contribution of sociodemographic factors (e.g., age, sexual orientation, socioeconomic status), we also tested for their effect as auxiliary variables in the BCH model and present these results in Supplemental Tables 2 and 3. There were no significant differences in sexual functioning or sexual distress classes according to these individual-level characteristics.

For sexual function, there were significant differences across classes for three biomedical factors: vaginal deliveries, perineal tearing, and breastfeeding were significantly higher in couples in the *Discrepant Sexual Function—Mothers Clinically Low* class compared to those in the *High Sexual Function* class. For psychological factors, couples in the *Discrepant Sexual Function—Mothers Clinically Low* class reported higher scores for mothers' and fathers' fatigue, as well as higher scores for mothers' stress, anxiety, and depression at baseline (20 weeks pregnancy) and at 3 months postpartum relative to couples in the *High Sexual Function* class. Furthermore, mothers in the *Discrepant Sexual Function—Mothers Clinically Low* class reported significantly less positive attitudes to sex during pregnancy relative to women in the *High Sexual Function* class. For relational factors, couples in the *Discrepant Sexual Function—Mothers Clinically Low* class had mothers and fathers reporting lower relationship quality and lower perceived partner support both at pregnancy and 3 months postpartum relative to couples in the

**Table 3** Biomedical and psychosocial differences across couples' sexual function class membership ($n = 254$ couples)

| | (a) Discrepant Sexual Function—Mothers Clinically Low (15%, $n = 38$) | (b) High Sexual Function (85%, $n = 216$) | Range | $\chi^2$ | $p$ value |
|---|---|---|---|---|---|
| Biological | | | | | |
| Epidural | 0.94 (0.04) | 0.94 (0.02) | 0–1 | < 0.01 | .994 |
| Induction | 0.38 (0.09) | 0.53 (0.04) | 0–1 | 2.05 | .152 |
| **Vaginal delivery** | **0.84 (0.07)[b]** | **0.67 (0.04)[a]** | **0–1** | **4.10** | **.043** |
| Episiotomy | 0.52 (0.10) | 0.50 (0.04) | 0–1 | 0.04 | .849 |
| **Perineal tear** | **0.58 (0.10)[b]** | **0.29 (0.04)[a]** | **0–1** | **6.47** | **.011** |
| **Breastfeeding (3 months postpartum)** | **0.92 (0.05)[b]** | **0.79 (0.03)[a]** | **0–1** | **4.31** | **.038** |
| Psychological | | | | | |
| **Fatigue M (20 weeks)** | **4.20 (0.17)[b]** | **3.47 (0.07)[a]** | **1–7** | **15.35** | **< .001** |
| **Fatigue F (20 weeks)** | **3.40 (0.18)[b]** | **2.76 (0.07)[a]** | **1–7** | **10.87** | **.001** |
| **Fatigue M (3 months postpartum)** | **4.61 (0.22)[b]** | **3.53 (0.08)[a]** | **1–7** | **20.31** | **< .001** |
| **Fatigue F (3 months postpartum)** | **3.65 (0.22)[b]** | **3.11 (0.09)[a]** | **1–7** | **4.62** | **.032** |
| **Stress M (20 weeks)** | **19.56 (1.14)[b]** | **13.93 (0.43)[a]** | **0–40** | **20.10** | **< .001** |
| Stress F (20 weeks) | 15.32 (0.92) | 13.56 (0.46) | 0–40 | 2.72 | .099 |
| **Stress M (3 months postpartum)** | **21.26 (1.50)[b]** | **15.11 (0.52)[a]** | **0–40** | **14.06** | **< .001** |
| Stress F (3 months postpartum) | 14.36 (1.25) | 14.45 (0.60) | 0–40 | < 0.01 | .951 |
| **Anxiety M (20 weeks)** | **6.43 (0.63)[b]** | **4.51 (0.23)[a]** | **0–21** | **7.72** | **.005** |
| Anxiety F (20 weeks) | 4.76 (0.47) | 3.92 (0.21) | 0–21 | 2.48 | .115 |
| **Anxiety M (3 months postpartum)** | **6.86 (0.86)[b]** | **4.47 (0.22)[a]** | **0–21** | **6.87** | **.009** |
| Anxiety F (3 months postpartum) | 4.87 (0.58) | 4.39 (0.31) | 0–21 | 0.50 | .481 |
| **Depression M (20 weeks)** | **8.25 (0.72)[b]** | **6.02 (0.30)[a]** | **0–30** | **7.61** | **.006** |
| Depression F (20 weeks) | 5.22 (0.53) | 4.56 (0.25) | 0–30 | 1.21 | .272 |
| **Depression M (3 months postpartum)** | **9.26 (0.92)[b]** | **5.49 (0.29)[a]** | **0–30** | **14.29** | **< .001** |
| Depression F (3 months postpartum) | 5.18 (0.68) | 4.88 (0.35) | 0–30 | 0.14 | .704 |
| **Positive attitudes to sex M (20 weeks)** | **3.83 (0.15)[b]** | **4.33 (0.06)[a]** | **1–6** | **8.70** | **.003** |
| Positive attitudes to sex F (20 weeks) | 4.48 (0.15) | 4.65 (0.06) | 1–6 | 1.20 | .274 |
| Social | | | | | |
| **Relationship quality M (20 weeks)** | **47.62 (1.99)[b]** | **56.48 (0.45)[a]** | **0–69** | **18.00** | **< .001** |
| **Relationship quality F (20 weeks)** | **50.64 (1.59)[b]** | **54.78 (0.47)[a]** | **0–69** | **5.89** | **.015** |
| **Relationship quality M (3 months)** | **45.18 (2.19)[b]** | **54.97 (0.54)[a]** | **0–69** | **17.82** | **< .001** |
| **Relationship quality F (3 months)** | **48.29 (2.35)[b]** | **53.97 (0.60)[a]** | **0–69** | **5.19** | **.023** |
| **Perceived partner support M (20 weeks)** | **5.37 (0.13)[b]** | **5.81 (0.04)[a]** | **1–7** | **9.21** | **.002** |
| **Perceived partner support F (20 weeks)** | **5.20 (0.20)[b]** | **5.65 (0.05)[a]** | **1–7** | **4.52** | **.034** |
| **Perceived partner support M (3 months)** | **5.22 (0.18)[b]** | **5.76 (0.05)[a]** | **1–7** | **7.72** | **.005** |
| Perceived partner support F (3 months) | 5.10 (0.26) | 5.40 (0.09) | 1–7 | 1.16 | .282 |

*M* Mother, *F* Father. Standard errors are in parenthesis. Bolded information indicates significate effects. *p* values indicate the overall significant difference between the classes. Superscripts denote those classes which are significantly different from the reference class ($p < .05$). For dichotomous predictors, the reference group were women who endorsed or experienced the predictor (i.e., yes = 1). More intense colors denote classes with the highest score, less intense colors denote classes with the lowest score

*High Sexual Function* class, except for fathers' reports of perceived partner support at 3-months postpartum which did not differ between sexual function classes (see full results in Table 3).

For sexual distress, only one biological factor, i.e., breastfeeding at 3 months postpartum, showed significant differences between classes, such that more women in the *Discrepant Sexual Distress—Mothers Clinically Elevated* class were breastfeeding at 3 months postpartum than in the *Low Sexual Distress* class. The most consistent differences between sexual distress classes were found for psychological and relational factors, with almost all mothers' and fathers' variables revealing significant differences. Overall, couples in the *Low Sexual Distress* class were those in which mothers and fathers reported lower baseline and 3 months postpartum levels of fatigue, stress, anxiety, and depression, more positive attitudes toward sex during pregnancy (assessed at baseline), as well as higher levels of relationship quality and perceived partner responsiveness (both at baseline and at 3 months postpartum) relative to couples in the other classes. Couples in the *Moderate Sexual Distress* class had fathers reporting higher stress, anxiety, and depression scores both at baseline and at 3 months postpartum, relative to both other sexual distress classes (see full results in Table 4).

## Discussion

The current study followed a large cohort of first-time parent couples prospectively from mid-pregnancy to 6 months postpartum and revealed that a majority of couples followed trajectories of maintaining high sexual function and low distress, whereas a minority of couples followed trajectories characterized by sexual function and distress difficulties. We observed two unique trajectories for sexual function: 85% of couples retained high sexual function over time, whereas 15% of couples demonstrated discrepant sexual function between partners, with mothers showing declining and clinically low levels of sexual function across the whole period, while fathers did not. For sexual distress, we observed three distinct trajectories: 77% of couples retained low sexual distress over time, 12% of couples demonstrated moderate and stable

**Table 4** Biomedical and psychosocial differences across couples' sexual distress class membership ($n = 257$ couples)

| | (a) Low Sexual Distress (77%, $n = 197$) | (b) Moderate Sexual Distress (12%, $n = 32$) | (c) Discrepant Sexual Distress—Mothers Clinically Elevated (11%, $n = 28$) | Range | $\chi^2$ | $p$ value |
|---|---|---|---|---|---|---|
| Biological | | | | | | |
| Epidural | 0.94 (0.02) | 0.96 (0.04) | 0.92 (0.06) | 0–1 | 0.46 | .795 |
| Induction | 0.51 (0.04) | 0.46 (0.11) | 0.52 (0.10) | 0–1 | 0.23 | .890 |
| Vaginal delivery | 0.70 (0.04) | 0.77 (0.09) | 0.67 (0.10) | 0–1 | 0.82 | .664 |
| Episiotomy | 0.50 (0.04) | 0.48 (0.10) | 0.54 (0.10) | 0–1 | 0.20 | .904 |
| Perineal tear | 0.29 (0.04)$^{b}$ | 0.55 (0.11)$^{a}$ | 0.40 (0.11) | 0–1 | 5.21 | .074 |
| **Breastfeeding (3 months postpartum)** | **0.78 (0.03)$^{c}$** | **0.89 (0.07)** | **0.96 (0.04)$^{a}$** | **0–1** | **11.64** | **.003** |
| Psychological | | | | | | |
| **Fatigue M (20 weeks)** | **3.46 (0.07)$^{bc}$** | **3.95 (0.22)$^{a}$** | **4.00 (0.18)$^{a}$** | **1–7** | **10.62** | **.005** |
| **Fatigue F (20 weeks)** | **2.75 (0.07)$^{c}$** | **3.07 (0.18)** | **3.25 (0.17)$^{a}$** | **1–7** | **8.44** | **.015** |
| **Fatigue M (3 months postpartum)** | **3.56 (0.09)$^{bc}$** | **4.21 (0.21)$^{a}$** | **4.17 (0.26)$^{a}$** | **1–7** | **11.38** | **.003** |
| **Fatigue F (3 months postpartum)** | **3.07 (0.09)$^{b}$** | **3.93 (0.25)$^{a}$** | **3.45 (0.21)** | **1–7** | **11.53** | **.003** |
| **Stress M (20 weeks)** | **13.78 (0.45)$^{bc}$** | **17.06 (1.21)$^{a}$** | **19.04 (1.10)$^{a}$** | **0–40** | **22.93** | **< .001** |
| **Stress F (20 weeks)** | **12.85 (0.44)$^{b}$** | **19.77 (1.16)$^{ac}$** | **13.74 (0.96)$^{b}$** | **0–40** | **30.16** | **< .001** |
| **Stress M (3 months postpartum)** | **14.72 (0.52)$^{bc}$** | **19.56 (1.69)$^{a}$** | **21.59 (1.37)$^{a}$** | **0–40** | **26.13** | **< .001** |
| **Stress F (3 months postpartum)** | **13.90 (0.60)$^{b}$** | **20.16 (1.27)$^{ac}$** | **12.38 (1.16)$^{b}$** | **0–40** | **23.84** | **< .001** |
| **Anxiety M (20 weeks)** | **4.26 (0.23)$^{bc}$** | **6.83 (0.68)$^{a}$** | **6.18 (0.65)$^{a}$** | **0–21** | **17.69** | **< .001** |
| **Anxiety F (20 weeks)** | **3.60 (0.21)$^{b}$** | **6.69 (0.50)$^{ac}$** | **3.92 (0.44)$^{b}$** | **0–21** | **31.63** | **< .001** |
| **Anxiety M (3 months postpartum)** | **4.40 (0.24)$^{c}$** | **5.69 (0.70)** | **6.92 (0.84)$^{a}$** | **0–21** | **10.20** | **< .001** |
| **Anxiety F (3 months postpartum)** | **4.03 (0.29)$^{b}$** | **8.45 (0.75)$^{ac}$** | **3.39 (0.58)$^{b}$** | **0–21** | **33.14** | **< .001** |
| **Depression M (20 weeks)** | **5.77 (0.31)$^{bc}$** | **7.97 (0.75)$^{a}$** | **8.50 (0.79)$^{a}$** | **0–30** | **15.14** | **.001** |
| **Depression F (20 weeks)** | **4.05 (0.24)$^{bc}$** | **7.19 (0.66)$^{ac}$** | **5.43 (0.58)$^{ab}$** | **0–30** | **21.94** | **< .001** |
| **Depression M (3 months postpartum)** | **5.36 (0.30)$^{bc}$** | **8.43 (0.99)$^{a}$** | **8.63 (0.85)$^{a}$** | **0–30** | **19.40** | **< .001** |
| **Depression F (3 months postpartum)** | **4.52 (0.34)$^{b}$** | **8.13 (0.87)$^{ac}$** | **4.44 (0.85)$^{b}$** | **0–30** | **15.03** | **< .001** |
| **Positive attitudes to sex M (20 weeks)** | **4.36 (0.06)$^{bc}$** | **3.89 (0.15)$^{a}$** | **3.92 (0.18)$^{a}$** | **1–6** | **11.44** | **.003** |
| **Positive attitudes to sex F (20 weeks)** | **4.73 (0.06)$^{b}$** | **3.96 (0.14)$^{ac}$** | **4.56 (0.13)$^{b}$** | **1–6** | **25.37** | **< .001** |
| Social | | | | | | |
| **Relationship quality M (20 weeks)** | **56.59 (0.51)$^{bc}$** | **51.54 (1.72)$^{a}$** | **49.35 (1.30)$^{a}$** | **0–69** | **31.07** | **< .001** |
| **Relationship quality F (20 weeks)** | **55.34 (0.49)$^{bc}$** | **48.13 (1.51)$^{ac}$** | **52.58 (1.24)$^{ab}$** | **0–69** | **22.13** | **< .001** |
| **Relationship quality M (3 months)** | **55.19 (0.55)$^{bc}$** | **48.74 (2.53)$^{a}$** | **46.91 (1.77)$^{a}$** | **0–69** | **23.98** | **< .001** |
| **Relationship quality F (3 months)** | **54.35 (0.61)$^{b}$** | **45.72 (2.76)$^{a}$** | **50.81 (1.75)** | **0–69** | **11.73** | **.003** |
| **Perceived partner support M (20 weeks)** | **5.85 (0.04)$^{bc}$** | **5.39 (0.17)$^{a}$** | **5.44 (0.13)$^{a}$** | **1–7** | **15.12** | **.001** |
| **Perceived partner support F (20 weeks)** | **5.66 (0.05)$^{b}$** | **5.23 (0.18)$^{a}$** | **5.40 (0.20)** | **1–7** | **6.47** | **.039** |
| **Perceived partner support M (3 months)** | **5.79 (0.05)$^{c}$** | **5.34 (0.22)** | **5.24 (0.18)$^{a}$** | **1–7** | **11.46** | **.003** |
| Perceived partner support F (3 months) | 5.39 (0.10) | 5.09 (0.22) | 5.36 (0.26) | 1–7 | 1.50 | .472 |

*M* Mother, *F* Father. Standard errors are in parenthesis. Bolded information indicates significate effects. $p$ values indicate the overall significant difference between the classes. Superscripts denote those classes which are significantly different from the reference class ($p < .05$). For dichotomous predictors, the reference group were women who endorsed or experienced the predictor (i.e., yes = 1). More intense colors denote classes with the highest score; less intense colors denote classes with the lowest score

sexual distress, and 11% of couples showed discrepant sexual distress between partners, with mothers showing clinically elevated and stable levels of sexual distress while fathers had low and stable levels of sexual distress. Belonging to these distinct trajectories was predicted by biomedical (vaginal delivery with perineal tearing, breastfeeding), psychological (fatigue, stress, mood, attitudes to sex during pregnancy), and relational factors (relationship quality, perceived partner support) assessed at relevant time-points for screening and intervention (i.e., around 20-weeks pregnancy and 3 months postpartum). The observed heterogeneity in trajectories of sexual function and sexual distress—the central markers of sexual dysfunction—is pertinent for conceptualizing first-time couples' postpartum sexual well-being and adds to a growing body of research demonstrating that negative sexual changes are not common across the transition (Fitzpatrick et al., 2021), but there are particular groups of couples who are at heightened risk for sustained sexual difficulties across this period. This information is particularly valuable to psychoeducational programs focused on providing evidence-based information on trajectories and prevalence of new parents' sexual changes across this period.

In line with prior evidence that the birthing parent shows heightened risk of sexual difficulties across this period (Fitzpatrick et al., 2021), our results indicated that only the expectant/birthing parent (mothers), and not their partners (fathers), showed average declines in sexual function and increases in sexual distress from mid-pregnancy to 6 months postpartum. The transition may be more difficult for women because of the distinct changes related to birth and their bodies (e.g., body image, childbirth, breastfeeding) that may impact their sexuality differently from their partners' (McBride & Kwee, 2017), but also because of a series of gendered roles and expectations. Outside of the perinatal period, it is women that are usually expected to, and that do perform, most of the household labor, relational labor (e.g., relationship maintenance, family management), and childcare (Erickson, 2005; Robertson et al., 2019). This inequitable division of chores is linked to women's heightened psychological distress (Barnett & Shen, 1997) and may become more salient during the transition to parenthood. Moreover, due to a pervasive and heteronormative focus on women's appearance (van Anders et al., 2021), women might feel pressured to maintain their physical appearance during pregnancy and to quickly bounce back to their prior physical form after childbirth. As women, and their male partners, adhere to and internalize these unrealistic beauty norms, women can feel more dissatisfied with their body appearance and present lower sexual self-esteem (van Anders et al., 2021), which can in part explain the average decline in women's sexual function (e.g., women's sexual desire may decrease if contingent upon whether they think they are desirable) and average increase in women's sexual distress (e.g., both women and their partners may have unattainable expectations about women's physical changes across the transition).

Our results are consistent with the only study examining subgroups of perinatal sexual function over time (which only included mothers, and not partners; Dawson et al., 2020), as we found that women who demonstrate clinically low sexual function at postpartum are likely to already report clinically low levels of sexual function in pregnancy. This is particularly relevant for intervention efforts, as an early screening of sexual function during pregnancy can help to identify those women who are more likely to subsequently suffer from more severe declines to their sexual function across the postpartum. As described above, women's poorer sexual function, even during pregnancy, might be associated with gendered factors such as self- and/or partner-imposed body-objectification and an unequal division of labor within the couple (van Anders et al., 2021), factors which might be exacerbated in the transition and that are worth screening for early on. These factors are worthy of examination in future research. By complying with scoring recommendations for our measure of sexual function, we were unable to include couples who did not engage in sexual activity in our analyses of sexual function classes, and it was thus not possible to examine whether these couples would fall into one of the identified sexual function classes or whether they would constitute a separate, additional sexual function class (and whether this class would be associated with classes of higher sexual distress and predicted by specific biopsychosocial factors). It is possible that these couples do not engage in sexual activity due to higher sexual concerns or the experience of sexual function difficulties and thus constitute a high-risk group; examining this question should be a goal of future research.

Current findings for sexual distress are also in line with the only study that has examined its course in new parent couples (Rosen et al., 2021b). We replicated the previously identified dyadic classes of sexual distress (i.e., low sexual distress, discrepant sexual distress) and with similar distributions (76% vs 77%, 24% vs 11%), but we identified an additional class of couples (i.e., moderate sexual distress, 12%). This additional class may result from differences in sample size between the two studies (203 vs 257 couples), as our larger sample size may have allowed for a better identification of classes that include a smaller portion of couples.

Contrary to the prevailing narrative about negative sexual experiences during the transition to parenthood, we found that only a minority of couples, and mostly mothers, experienced marked declines to sexual function and increases to sexual distress across the transition, and not necessarily together. In fact, when looking at the probability of couples belonging to a combination of each sexual function and distress classes simultaneously, most new parents (71%) showed trajectories characterized by low sexual distress together with high sexual function, with only a subsection of couples (4%) demonstrating clinically relevant trajectories of low sexual function paired with high sexual distress in mothers (i.e., high-risk couples). Although one could anticipate a strong overlap between couples' discrepant sexual function and discrepant sexual distress, this was not the case. Instead, we found that those couples who belonged to the most concerning class of sexual distress (i.e., *Discrepant Sexual Distress—Mothers Clinically Elevated* class, where mothers showed heightened and stable levels of sexual distress across the whole period, while partners did not) were more likely to present high sexual function, with a probability of 70%, than to report sexual function difficulties (i.e., belong to the *Discrepant Sexual Function—Mothers Clinically Low* class, where mothers' sexual function, but not fathers', was clinically low), with a probability of 30%. Yet, couples who belonged to the *Moderate Sexual Distress* class (in which both partners experienced moderate and stable sexual distress across the transition) were more likely to belong to the *Discrepant Sexual Function—Clinically Low Mothers* class, with a 77% probability, than to the *High Sexual Function*

class (where neither mothers nor fathers reported relevant sexual function difficulties), with a 23% probability.

Although these overlaps were observed in a small percentage of cases—as the greatest proportion of couples presented non-clinical levels of sexual function and distress—this indicates that specific subclinical groups of couples might deserve particular attention (viz., couples where mothers present high sexual distress despite none of the partners has clinically significant sexual function difficulties, or couples where mothers', but not fathers' sexual function is impaired and, yet, both partners feel moderately distressed). Altogether, these results suggest that mothers' and fathers' sexual distress across the transition to parenthood may stem from various dimensions of change (e.g., body image, anxiety about having sex while pregnant, postpartum change in roles in the couple) rather than only from changes to their sexual function. This also highlights the critical role of both partners' experiences to new parents' sexual well-being. As such, rather than focusing on strictly assessing sexual function or on establishing a diagnosis of sexual dysfunction, which will be obtained only in a minority of cases, professionals working with new parents may alternatively focus on targeting both partners' sources of sexual distress across this period. This is highly relevant considering that, compared to the 4% of couples in which women would be considered as having sexual dysfunction, about one in four mothers in our sample (i.e., 23%) experienced either subclinical (i.e., moderate) or clinical and stable levels of sexual distress and one in ten fathers (i.e., 12%) experienced subclinical and stable levels of sexual distress across the whole transition period.

One of the central goals of this study was to test whether the identified subgroups of couples differed in terms of their biopsychosocial characteristics. In contrast to other recent prior research (Dawson et al., 2020; Rosen et al., 2021a), this study provides some evidence of the contribution of biomedical factors to couples' sexual trajectories, namely having experienced a vaginal birth with perineal tearing and breastfeeding at 3 months postpartum. Women with clinical levels of sexual function across the transition (i.e., those in the *Discrepant Sexual Function—Mothers Clinically Low* class) reported greater rates of vaginal delivery and perineal tear, findings which are consistent with prior cross-sectional research showing that these birth characteristics may increase the risk of the birthing parent experiencing lower genital arousal and poorer sexual function at 6 months postpartum and beyond (Cappell et al., 2020; Fitzpatrick et al., 2021). These differences may be partly explained by the physiological changes that happen after a vaginal birth, which may have a detrimental impact on sexual function by posing some damage to the physiological structures involved in the regulation of vaginal vasocongestion (e.g., the autonomic pelvic nerves in the inferior hypogastric plexus; Giuliano et al., 2002). Still, these same women were already showing clinical levels of poorer sexual function at mid-pregnancy, which only worsened across the postpartum. As such, it might not be the type and characteristics of labor that, in isolation, favor a steeper decline in women's sexual outcomes, but rather that those women who already demonstrate clinical levels of sexual problems at pregnancy are at heightened risk for the potential negative consequences of this mode of delivery, a factor that should be considered in pre-birth assessments. As such, screening for sexual difficulties in pregnancy might be a potential avenue to prevent heightened postpartum difficulties.

Furthermore, women in classes characterized by clinical levels of sexual function and sexual distress (i.e., *Discrepant Sexual Function—Mothers Clinically Low* and *Discrepant Sexual Distress—Mothers Clinically Elevated*) also reported greater rates of breastfeeding at 3 months postpartum. This result gives support to breastfeeding as a risk factor for sexual distress and low sexual function, which may be partly due to the specific hormonal (e.g., high prolactin and oxytocin levels) and physical characteristics of lactation occurring for the birthing parent. Indeed, bottle-feeding women tend to present lower levels of sexual problems and are likely to resume intercourse sooner after childbirth (Rowland et al., 2005), whereas those who breastfeed tend to experience more sexual concerns such as vaginal dryness, dyspareunia, increased nipple sensitivity, and decreased arousal (LaMarre et al., 2003).

Concerning psychological factors, we found that *High Sexual Function* and *Low Sexual Distress* couples had, overall, mothers and fathers who reported more positive attitudes toward having sex during pregnancy (i.e., less fears and negative beliefs about the potential negative impacts of sex on the baby's and on the pregnant partners' health) and who experienced the lowest levels of fatigue, stress, anxiety, and depression both at baseline and at 3 months postpartum. A few exceptions were found for sexual function classes which, apart from fatigue, differed only based on mothers', but not fathers', reports. The contribution of these psychological factors to the longitudinal regulation of new parents' sexual well-being aligns with our predictions and is in accordance with cognitive-motivational and information-processing models of sexual response (Barlow, 1986; Basson, 2000; Cranston-Cuebas & Barlow, 1990). In other words, this study provides evidence of the role of factors such as mood (e.g., depression, anxiety) and cognitions related to sex (attitudes to sex during pregnancy) in shaping couples' sexual function and distress over time. As such, preventative efforts should be able to identify expectant couples with a greater presence of these negative psychological factors, as early as in mid-pregnancy (e.g., including a brief screening of mood, or of negative attitudes to sex while pregnant; Dawson et al., 2020a; Tavares et al., 2021).

As for relational factors, mothers and fathers from the *Low Sexual Distress* and *High Sexual Function* classes showed

higher levels of relationship quality and perceived partner support (at baseline and at 3 months postpartum) relative to couples in all other classes, in line with our predictions. The only exception was observed for the level of support fathers reported receiving from mothers at 3 months postpartum, which did not significantly differ across sexual function or sexual distress classes. A reason as to why this was observed might be because this is a timing where fathers might be highly engaged in providing, rather than receiving support to their female partners who may be struggling with aspects such as physical recovery or breastfeeding and that this may occur irrespectively of the couples' prior and current sexual experiences. In sum, the current results indicate that couples with a strong prenatal bond show trajectories characterized by greater sexual functioning and lower sexual distress across the transition and support the buffering effect of higher-quality interpersonal dynamics to help couples navigate the demands that the transition imposes to their lives, including sexually (Dawson et al., 2020; Fitzpatrick et al., 2021; Shapiro et al., 2000). This is in contrast to some findings of sexual frequency that show the opposite effect (Lorenz et al., 2020), denoting that aspects of the relationship with one's partner might not show similar links to all aspects of sexual well-being.

This is the first study, to our knowledge, that identified specific groups of new parent couples based on their trajectories of the critical markers of sexual dysfunction (i.e., sexual function and sexual distress). Strengths of our study include the recruitment of a large cohort of first-time parents in mid-pregnancy across four time-points with high retention of participants to 6 months postpartum. The study was designed to assess predictors at time-points which reflect periods of routine appointments and opportunities for screening, thus providing useful information for professionals working with expectant and new parents. Although we did not follow couples beyond the 6-month postpartum period, the current results align with prior studies that assessed couples until 12 months after postpartum (Rosen et al., 2020). The current findings can only speak to those effects that were present after a couple was already pregnant and until 6 months postpartum. Future work might assess couples prior to the transition to parenthood to see prepregnancy indicators of these trajectories. Including longer follow-up periods might also be valuable for future studies to assess whether some dimensions (e.g., sexual dissatisfaction) can emerge later on. A limitation of this study is that sexual function and distress were self-assessed by participants, and we did not perform a clinical assessment. Also, the scoring of the FSFI/IIEF removes people who were not sexually active in the prior month, which limits the interpretability of the current findings only to those couples who are sexually active across the transition. To promote retention of couples during such a busy life period, participants were given up to 4 weeks to complete each survey; this allowance may have impacted between-person reports. Although our hypotheses were formulated prior to analyzing the data, they were not pre-registered and, as such, we recommend that future studies that aim to extend these results pre-register their predictions. The current sample was representative of the demography of the Portuguese population having a first child, namely regarding age range, marital status, and socioeconomical status (INE, 2011), but it included a large proportion of couples with relatively higher education and predominantly white/Caucasian. Despite the diversity of recruitment methods, which were inclusive in terms of diversity in gender/sex, all couples were in mixed-sex/gender relationships. The current findings replicated prior evidence from samples that included both same- and mixed-sex/gender couples (Dawson et al., 2020; Rosen et al., 2021b), yet future studies should strive to include more diverse sample in terms of sexual, racial/ethnic, socioeconomic, and obstetric (e.g., infant health complications, multiparity) characteristics.

## Conclusion

This study provides evidence that couples' sexual adjustment (i.e., sexual function, sexual distress) during the transition to parenthood follows different courses for specific subsamples of the population. The majority of couples followed trajectories of high sexual function and low sexual distress (85% and 77%), whereas 15% and 11% of couples followed trajectories in which mothers, but not fathers, experienced clinically significant levels of low sexual function and high sexual distress from mid-pregnancy to 6 months postpartum, respectively. We also identified critical time-points (i.e., around 20-week pregnancy and 3 months postpartum) to assess risk and protective biomedical and psychosocial factors to screen those individuals and couples at heightened risk for sexual dysfunction across this transition. Results from this study enhance knowledge of the heterogeneity of couples' sexual function and sexual distress across pregnancy and postpartum, which may contribute to better evaluation and treatment during such a critical, although normative, life transition.

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**Data Availability** De-identified data and syntax for the analyses are available on the Open Science Framework at https://osf.io/wabfk/?view_only=b80534a86fa043f9b7c45695db316d6c

## Declarations

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

**Conflict of interest** The authors report no conflicts of interest.

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