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Research paper

Going through it together: Dyadic associations between parents' birth experience, relationship satisfaction, and mental health

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ABSTRACT

Background: Previous research suggests that a negative birth experience is associated with symptoms of postpartum depression and anxiety in mothers and partners. However, this has mostly been investigated within the first year postpartum and research on the long-term effects is lacking. Additionally, the role of relationship satisfaction and the interdependence between parents have not been considered so far.
Methods: Couples ($N = 1992$) completed questionnaires on their birth experience, relationship satisfaction, and symptoms of depression and anxiety at two months, 14 months, and two years after birth, respectively.
Results: Actor-Partner Interdependence Mediation Models indicated no partner effects, but several significant actor and indirect effects. A more positive birth experience was associated with higher relationship satisfaction and less depression and anxiety symptoms for both parents. Higher relationship satisfaction was in turn associated with less depression (mothers and partners) and anxiety symptoms (mothers). The association between birth experience and depression symptoms was partially mediated by relationship satisfaction for mothers and partners, while the association between birth experience and anxiety symptoms was partially mediated by relationship satisfaction only for mothers.
Limitations: Due to the highly educated, very healthy sample with low levels of depression and anxiety as well as high relationship satisfaction, results cannot be generalized to less privileged parents. Moreover, all effects were very small.
Conclusions: Results highlight the importance of a positive birth experience for parents' relationship satisfaction and mental health. Negative birth experiences need to be avoided to prevent a negative impact on the whole family.

1. Introduction

The birth of a child can be both a wonderful and challenging event in parents' lives. A positive birth experience is defined as an 'experience that fulfills or exceeds prior personal and sociocultural beliefs and expectations', which includes giving birth in 'a clinically and psychologically safe environment with continuity of practical and emotional support' (World Health Organization, 2018). On average, 7–34 % of

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mothers (Ghanbari-Homayi et al., 2019) and up to 26 % of partners (Hildingsson et al., 2011; Johansson et al., 2012; Premberg et al., 2011; Thies-Lagergren and Johansson, 2019) perceive childbirth as negative, which, in turn, increases the risk for mental health difficulties, like postpartum depression and anxiety in the first year postpartum (Bell et al., 2016; Bell and Andersson, 2016; Bradley et al., 2008; Bradley and Slade, 2011). However, the *long-term* impact of a negative subjective birth experience on parents' mental health in the following years has been largely neglected (Kingsbury et al., 2015). One study suggests that a substantial minority of mothers continues to show symptoms of depression up to 21 years after childbirth, with objective birth-related factors (e.g., birth mode, fetal distress, preterm birth) not being a significant predictor of these symptoms, but not investigating parents' *subjective* birth experience (Kingsbury et al., 2015). While the association between mothers' and especially partners' subjective birth experience and symptoms of depression and anxiety after the first year postpartum is therefore not clear yet, it is clear that parents' mental health is associated with each other: a recent meta-analysis found that maternal postpartum depression predicts later paternal postpartum depression and the other way around (Thiel et al., 2020), highlighting the need for studies investigating how family members influence each other. More knowledge is needed not only to ensure parents' mental health but also a healthy development of their children, which is reliant on parents' well-being (Bradley and Slade, 2011; Brennan et al., 2000; Field, 2017; Junge et al., 2017). Therefore, this study will analyze the dyadic, longitudinal associations between parents' birth experience and their symptoms of depression and anxiety after birth. As depression and anxiety present differently clinically, it is important to investigate them separately for potential differential effects. In addition, the literature on the association between birth experience and postpartum anxiety is especially scarce, making it an important topic to study.

One factor, which seems to play an important role in how couples manage the transition to parenthood and could therefore serve as one of the above-mentioned determinants for the association between a negative birth experience and symptoms of parental depression and anxiety, is relationship satisfaction. Previous literature suggests that the birth of a child leads to an accelerated decline in the satisfaction with the relationship compared to the naturally occurring decline over time in non-parents, even if the couple started as relatively satisfied (Lawrence et al., 2008). Some studies report mothers to be more affected by these declines than fathers (e.g., Twenge et al., 2003), but others report no differences between mothers and fathers (Doss et al., 2009). While initial difficulties after the transition to parenthood are common, the failure to adapt to the new situation over time, particularly after a negative birth experience, may lead to chronic problems within the relationship, which, in turn, may impact parenting and the relationship with the child (Cox et al., 1999; Nicolaus et al., 2021). To the best of our knowledge, previous studies have only examined the impact of the transition to parenthood in general but not the importance of parents' birth experience for their relationship satisfaction, making this an important aspect to focus on in new research.

When parents there are dissatisfied with their relationship, the risk for depression and anxiety symptoms increases (Pilkington et al., 2015). In support of this, Figueiredo et al. (2018) found that parents' negative interactions aggravate mothers' and fathers' depressive symptoms, while positive interactions protect fathers against an increase of postpartum anxiety symptoms. One study even suggested that the couple relationship, rather than birth-related factors, was the strongest independent predictor of mothers' long-term depressive symptoms (Kingsbury et al., 2015). Nevertheless, results by Anding et al. (2016) still highlighted the importance of the birth experience for parents' postpartum mental health, because mothers' postpartum depression symptoms were predicted by birth experience, relationship satisfaction, and fathers' depressive symptoms, while fathers' postpartum depression symptoms were predicted by birth-related distress, relationship satisfaction, and mothers' depressive symptoms.

As it becomes clear from this summary, further research is needed to clarify the association between parents' birth experience and long-term depression and anxiety symptoms, as well as the potential mediating role of relationship satisfaction in this association. Results may help to shed light on whether interventions to improve relationship satisfaction postpartum may be an effective way to prevent symptoms of postpartum mental health problems, especially for parents with a negative birth experience.

As the transition to parenthood is a time of dyadic stress for parents (Keizer and Schenk, 2012; Seefeld et al., 2022), not only mothers' and partners' role for their own outcomes needs to be investigated (i.e., actor effects), but also how parents' experiences, emotions, and behaviors influence those of their partner (i.e., partner effects). According to the systemic-transactional model (Bodenmann et al., 2016), stress (e.g., due to a negative birth experience) of one partner in a relationship and his/her resulting behavior and wellbeing may impact the other partner's experiences in a similar way. Thus, partners' mental health and well-being are intertwined and dependent on one another. Therefore, this study aimed to analyze the dyadic associations between mothers' and partners' subjective birth experience, their relationship satisfaction 14 months postpartum, and their depressive and anxiety symptoms two years after childbirth using the Actor-Partner Interdependence Mediation Model (APIMeM; Ledermann et al., 2011).

We hypothesized a negative actor effect of birth experience on symptoms of depression at two years postpartum in both parents, meaning that a more positive birth experience would be associated with less depressive symptoms. Due to the lack of longitudinal studies, the actor effect of birth experience on anxiety symptoms at two years postpartum was investigated in exploratory analyses. In addition, partner effects (i.e., the association between mothers' birth experience and partners' symptoms of depression and anxiety as well as vice versa) were explored. Further, we hypothesized that the association between parents' birth experience and symptoms of depression and anxiety at two years postpartum would be mediated by the actor's relationship satisfaction at 14 months postpartum. Due to a lack of dyadic studies examining partner effects, we also explored other potential mediating roles of relationship satisfaction for the association between birth experience and depression and anxiety symptoms at two years postpartum (e.g., mothers' birth experience → partners' relationship satisfaction → mothers' symptoms of depression/anxiety). The theoretical model for this study is depicted in Fig. 1.

2. Methods

2.1. Design

The current study is based on data from the prospective cohort study DREAM. Recruitment started in 2017, was finished at the end of 2020, and data collection included six measurement points: T1 during pregnancy, T2 two months after the anticipated birth date, T3 14 months, T4 two years, T5 three years, and T6 4.5 years after birth. Data from T2–T4 were used in this study. A community sample of couples from Dresden, Germany, and surroundings who were expecting a child were mainly recruited at obstetric clinics. More information on the DREAM study can be found in the study protocol (Kress et al., 2019).

2.2. Sample

The study is based on version 9 of the quality-assured data files of the DREAM study. A total of 2227 mothers and 1634 partners were included in the cohort (Fig. 2). Data of couples who were expecting one child (singleton pregnancy) and where the partner attended the birth were included in this study. Parents were excluded if they had not been in a relationship with the same person from at least the index birth until two years after the birth or if they had not completed T2 to ensure that inclusion criteria were met. This resulted in an eligible sample of $n = 3212$

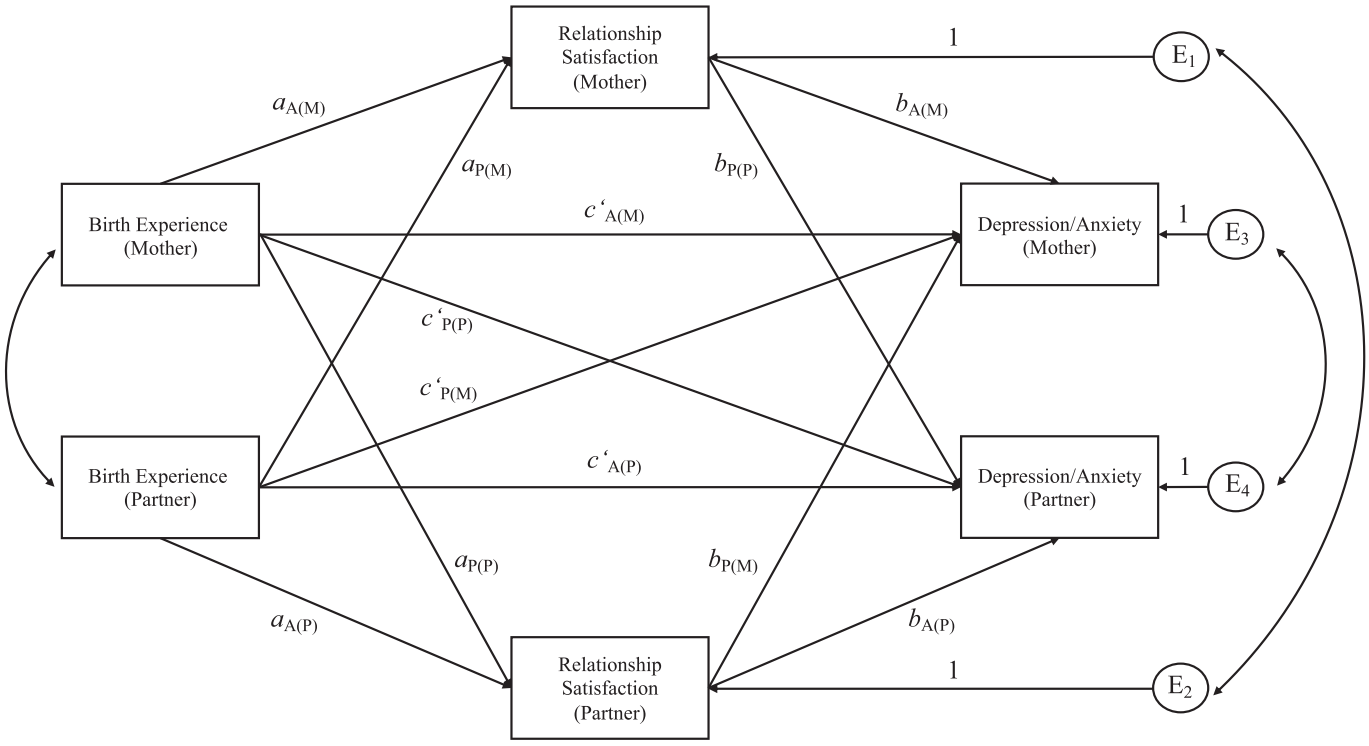

Fig. 1. Theoretical model for the association between birth experience, relationship satisfaction, and depression/anxiety symptoms.
Note. $E_{1\text{-}4}$ = error terms of the mediator and the outcome variables.

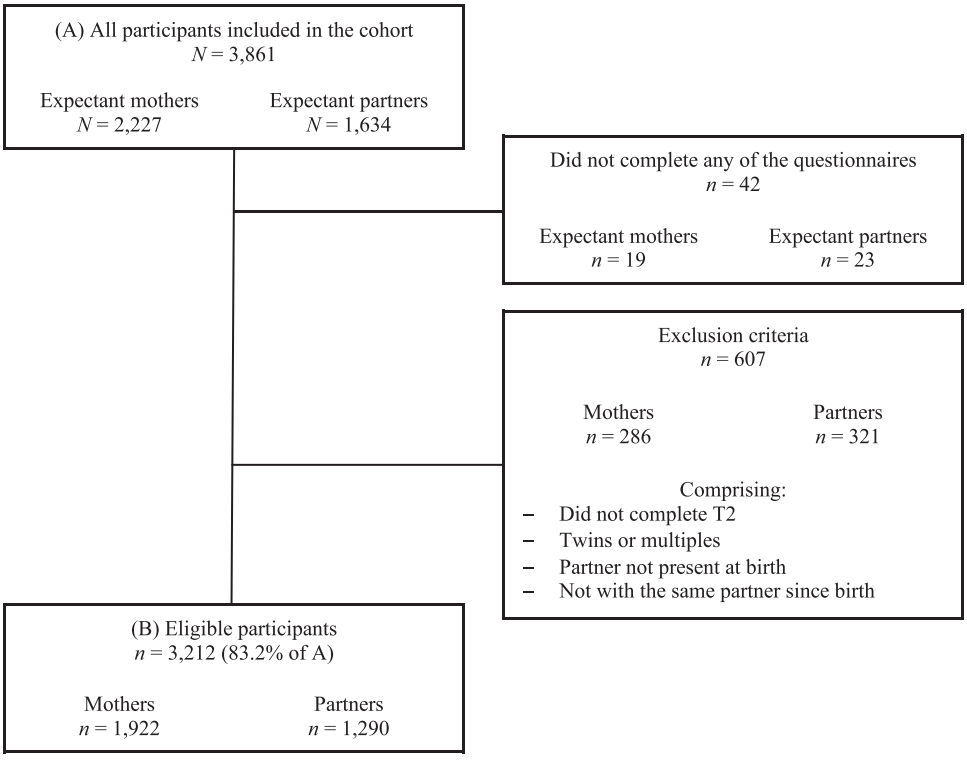

Fig. 2. Flowchart of the study's retention.

parents, comprising 1992 couples (1977 different- and 15 same-sex couples), of which 1220 were couples in which both partners participated in the study. Of these eligible participants, 96.1 % had completed T2, 84.8 % had completed T3, and 63.2 % had completed T4. To ensure comparability, sum scores of questionnaires which participants did not complete within the following timeframes were deleted: T2 6–16 weeks postpartum, T3 12–16 months postpartum, and T4 22–26 months postpartum. This affected 127 participants of the eligible sample at T2, 29 participants at T3, and 21 participants at T4. Attrition analyses were computed to compare the eligible sample to parents who did not

complete all necessary questionnaires and full-information Maximum Likelihood Estimation was employed to handle missing data.

2.3. Measures

Parents' subjective birth experience was measured two months postpartum using the German version of Salmon's Item List (SIL), which is a 20-item questionnaire validated for mothers (Stadlmayr et al., 2001) and fathers (Gawlik et al., 2015). It comprises four dimensions: fulfillment, physical discomfort, good emotional adaptation, and negative emotional experience. The items of the SIL are split into positive and negative valences as anchor words and are rated on a scale from 1 to 7 depending on which anchor word parents find more accurate to describe their experience. The total score is generated by the sum of all items and ranges between 0 and 120, with higher scores indicating a more positive birth experience. The total score was used in the current study. The reliability of the SIL was $\alpha = .912$ (McDonald's omega = .918) for mothers and $\alpha = .863$ (McDonald's omega = .864) for partners.

Parents' relationship satisfaction was measured 14 months after birth using the validated German short version of the Partnership Questionnaire (PFB-K; Kliem et al., 2012), which comprises three subscales with three items each and an additional item assessing the general happiness of the partnership. The four possible responses range from never/very rare (0) to very often (3). The total score is generated by summation of all items and ranges from 0 to 27, with higher scores indicating greater relationship satisfaction. Only the total score, not the happiness item will be used in the current analyses. The reliability of the PFB-K was $\alpha_{T2} = .809$ (McDonald's $omega_{T2} = .814$) and $\alpha_{T3} = .830$ (McDonald's $omega_{T3} = .833$) for mothers and $\alpha_{T2} = .792$ (McDonald's $omega_{T2} = .799$) and $\alpha_{T3} = .817$ (McDonald's $omega_{T3} = .823$) for partners.

Parents' symptoms of depression were measured two years after childbirth using the German version of the Edinburgh Postnatal Depression Scale (EPDS; Bergant et al., 1998; Cox et al., 1987) which assesses depressive symptoms during the past week. It has been validated for mothers as well as fathers (Matthey et al., 2001) and consists of 10 items with four possible responses, respectively, which are scored from 0 to 3. The total score is generated by summation of all items and ranges from 0 to 30, with higher scores indicating more severe depressive symptoms. The reliability of the EPDS was $\alpha_{T3} = .836$ (McDonald's $omega_{T3} = .840$) and $\alpha_{T4} = .852$ (McDonald's $omega_{T4} = .858$) for mothers and $\alpha_{T3} = .825$ (McDonald's $omega_{T3} = .836$) and $\alpha_{T4} = .839$ (McDonald's $omega_{T4} = .848$) for partners.

Parents' symptoms of anxiety were measured two years after childbirth using the German version of the 10-item subscale 'anxiety' of the Symptom Checklist SCL-90-R (Franke, 2002). Participants are asked to rate how much they have been burdened by anxiety symptoms during the last seven days. Answers range from 'not at all' (0) to 'extremely' (4). The total score of the subscale therefore ranges from 0 to 40, with higher scores indicating more anxiety. The reliability of the SCL-90-R was $\alpha_{T3} = .782$ (McDonald's $omega_{T3} = .799$) and $\alpha_{T4} = .817$ (McDonald's $omega_{T4} = .823$) for mothers and $\alpha_{T3} = .797$ (McDonald's $omega_{T3} = .800$) and $\alpha_{T4} = .768$ (McDonald's $omega_{T4} = .798$) for partners.

Based on previous literature, the following variables were considered as potential confounding variables: parents' academic degree (Matsumura et al., 2019; van der Zee-van den Berg et al., 2021), number of children at T4 (Canário and Figueiredo, 2016; Mortensen et al., 2012), and duration of the couple relationship (Belsky and Rovine, 1990; Doss et al., 2009). Parents' academic degree was assessed at T1 and parents were divided into a group with and without a university degree (bachelor's degree or higher).

2.4. Data analysis

Descriptive and attrition analyses as well as intercorrelations were computed using IBM SPSS Statistics (Version 28.0). Unpaired *t*-tests were used to analyze attrition by comparing the eligible sample to parents who only completed T1 and therefore had to be excluded from the study. Correlational analyses computed Pearson correlation coefficients for all variables of interest and identified relevant confounding variables as variables, which significantly correlated with the dependent variables. The APIMeM (Ledermann et al., 2011) for distinguishable dyad members (i.e., mothers and partners) was used in all other analyses. The APIMeM comprises actor and partner effects and estimates four mediational pathways simultaneously, resulting in eight indirect effects. Structural equation modeling (SEM) was used to test all effects simultaneously in Mplus version 8 (Muthén and Muthén, 2017) and as recommended by Cook and Kenny (2005), unstandardized effects (*b*) are reported. In addition, the *b* coefficients were standardized on mothers' and partners' SDs (coefficient Δ: if the independent variable increases by 1 SD, the dependent variable increases by ΔSD) for ease of interpretation of the results. Direct effects were considered statistically significant, if 95 % confidence intervals (CI) using the bootstrap method with $k = 5000$ samples did not include 0 and if $p < .05$. For indirect effects, only 95 % bootstrapped CI were examined.

Following the recommendations by Kenny and Ledermann (2010), potential differences between mothers and partners were tested by comparing a saturated model (all effect parameters are estimated freely) and a constrained model (actor and partner effects of mothers and partners restrained to equality). The two models were compared using χ^2 difference tests and if $p \geq .05$, the parsimonious model was accepted. Multivariate outliers were identified as cases ±3SDs from the mean of the dependent variable and analyses were computed once with and once without these cases to compare results. Additionally, analyses were computed once with and once without incomplete couples, meaning parents who participated in the study without their partner. In additional analyses, effects were adjusted for the impact of the respective outcome variable at the previous timepoint (i.e., relationship satisfaction at T2, symptoms of depression/anxiety at T3). The hypotheses and analysis plan of this study were preregistered: https://osf.io/2ze9b.

Post-hoc power analyses were conducted using Monte Carlo simulations. Following suggestions by Ledermann et al. (2022), the semsim package in R with 10,000 random samples was used. With small correlations of $r = .10$ in the population among predictors, mediators, and outcomes, an APIMeM with the current sample size of 1992 couples had a power of .93 or higher to identify significant associations between all estimated regression coefficients in the model, and a power of .83 or higher to identify significant mediation effects. The APIMeM was therefore highly powered to detect even small sized actor, partner, and mediation effects.

2.5. Ethical statement

All parts of the study were approved by the Ethics Committee of the Technische Universität Dresden (No: EK 278062015). The parents were informed about the aims and procedures of the DREAM study, the pseudonymization of their data (using a personalized code generated by the participants), and their right to withdraw from the study at any time. All participants provided written informed consent.

3. Results

3.1. Attrition analyses

Parents included in the eligible sample were compared to $n = 327$ parents who only completed T1 and were therefore excluded from the current study. There were no differences between the two groups regarding parity or anxiety levels at T1, but they differed in their level of education, $\chi^2(1) = 21.35$, $p < .001$, their relationship satisfaction at T1, $t(3473) = -2{,}59$, $p = .008$, and their level of depression at T1, $t(3509) = 3.49$, $p = .004$. Non-completers more often had 10 years of education or less compared to completers (35.8 % vs. 24.1 %). Additionally, non-completers had a −0.62 (95 % CI -1.09;-0.15) lower score of

relationship satisfaction and a 0.81 (95 % CI 0.33;1.33) higher score of depression during pregnancy than completers.

3.2. Descriptive and correlational analyses

The characteristics of the study's sample can be found in Table 1. Bivariate correlation analyses between parents' academic degree, number of children at T4, and duration of the couple relationship and depression or anxiety scores at T4 revealed a significant correlation only between partners' number of children and depression ($r = .116$) and anxiety ($r = .086$) symptoms. Therefore, partners' number of children was included in the analyses as a confounding variable. Correlation coefficients between all study variables can be found in Table 2. The within partner correlations showed that for both mothers and partners, a more negative birth experience was associated with lower relationship satisfaction at T3 and more symptoms of depression and anxiety at T4. Additionally, lower relationship satisfaction at T3 was associated with more symptoms of depression and anxiety at T4 for mothers and more symptoms of depression at T4 for partners. Between-partner correlations showed that mothers' and partners' birth experience, relationship satisfaction, and depression and anxiety symptoms were positively correlated. However, regarding the paths of the partner effects, only mothers' relationship satisfaction and partners' depression symptoms as well as partners' relationship satisfaction and mothers' depression symptoms were significantly correlated.

3.3. Associations between birth experience, relationship satisfaction, and depression symptoms

The result of the χ^2 difference test comparing the saturated model with the restricted model indicated no differences between mothers and partners, χ^2 (6, $N = 1975$) = 10.004, $p = .12$. Also, no differences in terms of significant effects were found in the models with and without outliers or in the models with and without incomplete couples. Therefore, the results of the restricted model including outliers and incomplete couples were interpreted.

The APIMeM analyses showed that all direct actor effects but no partner effects were significant (see Table 3A and Fig. 3, Panel A): a more positive birth experience was associated with higher relationship satisfaction at T3, which in turn was associated with fewer depression symptoms at T4. A more positive birth experience was directly associated with fewer depression symptoms at T4, but this association was also partly mediated by the actor's relationship satisfaction at T3. However, all effects were very small. When relationship satisfaction at T2 and depression symptoms at T3 were added to the model as control variables to the a path, and the b and c' path, respectively, all effects apart from the indirect effect remained significant (see Table A1 in the Supplements). This indicates that a positive birth experience is associated with an increase in relationship satisfaction from T2 to T3, as well as a decrease of depressive symptoms from T3 to T4, while higher relationship satisfaction at T3 is associated with a decrease of depressive symptoms from T3 to T4.

3.4. Associations between birth experience, relationship satisfaction, and anxiety symptoms

The result of the χ^2 difference test comparing the saturated with the restricted model indicated a significant difference between mothers and partners, χ^2 (6, $N = 1975$) = 15.120, $p = .02$. However, when the saturated model was compared to a restricted model constraining all effects to equality apart from the actor's effect of relationship satisfaction on anxiety symptoms, no differences between mothers and partners could be found, χ^2 (5, $N = 1975$) = 6.369, $p = .27$. Also, no differences were found between the models with and without outliers or in the models with and without incomplete couples. Therefore, the results of the second restricted model including outliers and incomplete couples were interpreted.

The APIMeM analyses showed that for mothers, all direct actor effects, but no partner effects were significant (see Table 3B and Fig. 3, Panel B): a more positive birth experience was associated with higher relationship satisfaction at T3, which in turn was associated with fewer anxiety symptoms at T4. A more positive birth experience was directly associated with fewer anxiety symptoms at T4, but this association was also partly mediated by mothers' relationship satisfaction at T3. For the partners, all effects were identical, apart from the effect of relationship satisfaction at T3 on anxiety symptoms at T4, which was not significant, which also led to a non-significant indirect effect of birth experience on anxiety symptoms at T4. All effects were very small. When relationship satisfaction at T2 and anxiety symptoms at T3 were added to the model as control variables, effects remained significant (see Table A2 in the Supplements). This indicates that a positive birth experience and, for mothers, higher relationship satisfaction was associated with a decrease of anxiety symptoms from T3 to T4.

Table 1
Sample characteristics.

	Mothers ($n = 1922$)[a]		Partners ($n = 1290$)[a]
		n (%)	
Country of birth			
Germany	1829 (95.5)		1247 (97.3)
Other	86 (4.5)		35 (2.7)
Education			
≤ 10 years	415 (21.6)		356 (27.9)
> 10 years	1503 (78.4)		921 (72.1)
Number of children at T4			
1	854 (72.4)		533 (73.3)
2	284 (24.0)		157 (21.6)
3	35 (3.0)		32 (4.4)
4 or more	7 (0.6)		5 (0.7)
		M ± SD (Range)	
Age at T1 (in years)	30.2 ± 3.9 (18–43)		32.5 ± 4.9 (20–56)
Duration of relationship at T4 (in years)	9.0 ± 4.0 (2.0–28.2)		8.8 ± 3.8 (2.5–23.3)
Birth experience (SIL score; T2)	78.5 ± 20.7 (6–120)		93.0 ± 15.1 (23.3–120)
Relationship satisfaction (PFB-K score; T3)	18.8 ± 4.8 (1–27)		18.3 ± 4.5 (3–27)
Depression (EPDS score; T4)	6.3 ± 4.6 (0–25)		4.4 ± 4.0 (0−22)
Anxiety (SCL-90-R, subscale anxiety score; T4)	2.2 ± 3.3 (0–29)		1.5 ± 2.5 (0−20)

Note. SIL = Salmon's Item List; PFB-K = Partnership Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; SCL-90-R = Symptom Checklist 90 Revised; T1 = during pregnancy; T2 = 2 months after the anticipated birth date; T3 = 14 months after childbirth; T4 = 2 years after childbirth.
[a] *n* varies slightly due to missing data. Valid percentages are displayed.

Table 2
Bivariate correlations between all study variables for mothers and partners.

Within partner	1	2	3	4	5	6	7	8
1: Birth experience		.075**	.067**	−.119***	−.094**	−.101***	−.095**	.156***
2: T2 Relationship satisfaction	.09**		.731***	−.127***	−.140***	−.05	−.096**	−.192***
3: T3 Relationship satisfaction	.093**	.678***		−.237***	−.231***	−.091***	−.154***	−.078**
4: T3 Depression	−.124***	−.166***	−.272***		.579***	.572***	.398***	.013
5: T4 Depression	−.132***	−.167***	−.195***	.622***		.399***	.598***	.018
6: T3 Anxiety	−.105**	−.114***	−.119***	.598***	.410***		.555***	.041
7: T4 Anxiety	−.134***	−.052	−.054	.467***	.580***	.588***		.042
8: Number of children at T4	.134***	−.163***	−.102**	.126***	.116**	.148***	.086*	
Between partner								
1: Birth experience	.478***	.014	.015	.014	−.008	.010	−.040	.122**
2: T2 Relationship satisfaction	.039	.521***	.474***	−.068*	−.086*	−.002	−.041	−.219***
3: T3 Relationship satisfaction	.041	.426***	.498***	−.135***	−.117**	−.002	−.066	−.103**
4: T3 Depression	−.041	−.065*	−.146***	.222***	.189***	.110***	.106**	.017
5: T4 Depression	−.023	−.061	−.099*	.146***	.255***	.049	.111**	−.010
6: T3 Anxiety	.022	−.062	−.105**	.120***	.103**	.153***	.086*	.050
7: T4 Anxiety	−.055	.043	−.012	.101**	.184***	.086*	.170***	.023
8: Number of children at T4	.176***	−.112**	−.040	.020	.007	−.011	.050	.712***

Note. T2 = 2 months after the anticipated birth date; T3 = 14 months after childbirth; T4 = 2 years after childbirth. For within partner correlations, mothers' coefficients are given above and partners' coefficients below the diagonal. For between partner correlations, mothers' coefficients are given in the columns and partners' coefficients are given in the rows.

4. Discussion

This prospective cohort study investigated dyadic associations between parents' birth experience, relationship satisfaction, and postpartum depression and anxiety symptoms. Results indicated no partner effects, but several actor and indirect effects. A more positive birth experience of mothers and partners was associated with higher relationship satisfaction and less depression and anxiety symptoms. Higher relationship satisfaction was, in turn, associated with less depression symptoms in mothers and partners and less anxiety symptoms in mothers. In addition, the association between birth experience and depression symptoms was partially mediated by relationship satisfaction for mothers and partners, while the association between birth experience and anxiety symptoms was partially mediated by relationship satisfaction only for mothers.

Results showed that parents' positive birth experience was associated with less depression and anxiety symptoms two years after birth, which replicates earlier studies on the link between the subjective birth experience and depression (Bell and Andersson, 2016; Bradley and Slade, 2011; Gürber et al., 2017; Zhao and Zhang, 2020) as well as anxiety symptoms (Bell et al., 2016; Giakoumaki et al., 2009; Polachek et al., 2014; van der Zee-van den Berg et al., 2021; Weisman et al., 2010). However, none of these earlier studies extended to after the first year postpartum, making this, to the best of our knowledge, the first study focusing on the long-term impact of a negative birth experience. Additionally, our study sheds light on partners' experience, for whom evidence is still scarce. Of note, a previous study analyzing the same cohort (Seefeld et al., 2023) found an association between birth experience and anxiety symptoms 8 weeks postpartum for partners but not for mothers, prompting the need for more studies investigating the role of a negative birth experience for the trajectory of postpartum anxiety.

Our findings also indicated that a positive birth experience is

Table 3A
Unstandardized and standardized effects of the APIMeM testing the association between birth experience, relationship satisfaction, and depression symptoms, while controlling for partners' number of children at T4.

	Effect label (M)	$b_{M/P}$	$\lvert\Delta_{M/P}\rvert$	95 %-CI	SE	*p*
Direct						
X ➔ M						
Actor	$a_{A(M)}$	0.022	0.005	0.011;0.033	0.005	.000
Partner	$a_{P(P)}$	0.000	0.0	−0.012;0.012	0.006	.974
M ➔ Y						
Actor	$b_{A(M)}$	−0.184	0.040/0.046	−0.232;-0.136	0.025	.000
Partner	$b_{P(P)}$	−0.009	0.002	−0.064;0.047	0.028	.742
X ➔ Y						
Actor	$c'_{A(M)}$	−0.028	0.006/0.007	−0.039;-0.015	0.006	.000
Partner	$c'_{P(P)}$	0.008	0.002	−0.005;0.021	0.007	.243
Indirect						
Actor						
Total	$a_{A(M)}b_{A(M)} + a_{P(P)}b_{P(M)} + c'_{A(M)}$	−0.032	0.007/0.008	−0.044;-0.020	0.006	.000
Total Indirect	$a_{A(M)}b_{A(M)} + a_{P(P)}b_{P(M)}$	−0.004	0.001	−0.006;-0.002	0.001	.001
Actor-Actor	$a_{A(M)}b_{A(M)}$	−0.004	0.001	−0.006;-0.002	0.001	.000
Partner-Partner	$a_{P(P)}b_{P(M)}$	0.000	0.0	0.000;0.000	0.000	.992
Partner						
Total	$a_{A(P)}b_{P(M)} + a_{P(M)}b_{A(M)} + c'_{P(M)}$	0.008	0.002	−0.006;0.021	0.007	.244
Total Indirect	$a_{A(P)}b_{P(M)} + a_{P(M)}b_{A(M)}$	0.000	0.0	−0.003;0.002	0.001	.896
Actor-Partner	$a_{A(P)}b_{P(M)}$	0.000	0.0	−0.001;0.001	0.001	.753
Partner-Actor	$a_{P(M)}b_{A(M)}$	0.000	0.0	−0.002;0.002	0.001	.974

Note. X = birth experience; M = relationship satisfaction; Y = depression symptoms at T4. Effect labels are given exemplary for mothers due to better readability. If paths were not restrained to equality, effects are given for mothers (M) and partners (P) separately.

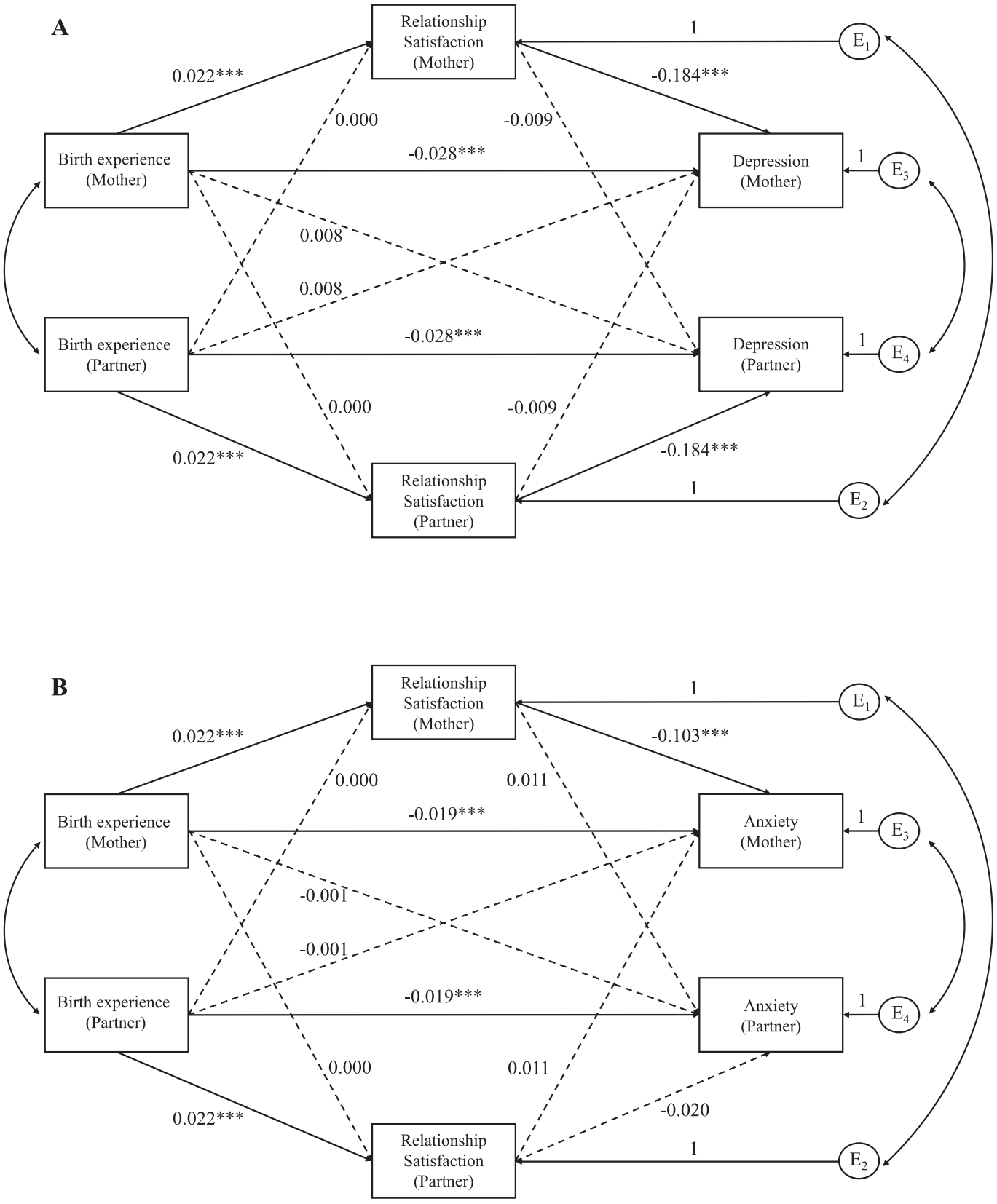

Fig. 3. Unstandardized effects of the APIMeM testing the association between birth experience, relationship satisfaction, and depression and anxiety symptoms.
Note. Panel A = Association between birth experience, relationship satisfaction, and depression symptoms. Panel B = Association between birth experience, relationship satisfaction, and anxiety symptoms. $E_{1–4}$ = error terms of the mediator and the outcome variables. Dotted lines represent non-significant paths.
*** $p < .001$.

Table 3B
Unstandardized and standardized effects of the APIMeM testing the association between birth experience, relationship satisfaction, and anxiety symptoms, while controlling for partners' number of children at T4.

	Effect label (M)	$b_{M/P}$	$\lvert\Delta_{M/P}\rvert$	95 %-CI	SE	*p*
Direct						
X → M						
Actor	$a_{A(M)}$	0.022	0.005	0.011;0.033	0.006	.000
Partner	$a_{P(P)}$	0.000	0.0	−0.012;0.012	0.006	.986
M → Y						
Actor	$b_{A(M)}$	−0.103/−0.020	0.031/0.008	−0.148;-0.059/−0.063;0.021	0.023/0.021	.000/.350
Partner	$b_{P(P)}$	0.011	0.003/0.004	−0.024;0.047	0.018	.549
X → Y						
Actor	$c'_{A(M)}$	−0.019	0.006/0.008	−0.029;-0.010	0.005	.000
Partner	$c'_{P(P)}$	−0.001	0.0	−0.010;0.008	0.005	.837
Indirect						
Actor						
Total	$a_{A(M)}b_{A(M)} + a_{P(P)}b_{P(M)} + c'_{A(M)}$	−0.022/−0.020	0.007/0.008	−0.031;-0.012/−0.029;-0.011	0.005/0.005	.000
Total Indirect	$a_{A(M)}b_{A(M)} + a_{P(P)}b_{P(M)}$	−0.002/0.000	0.001/0.0	−0.004;-0.001/−0.002;0.000	0.001/0.001	.004/.390
Actor-Actor	$a_{A(M)}b_{A(M)}$	−0.002/0.000	0.001/0.0	−0.004;−0.001/−0.002;0.000	0.001/0.000	.003/.375
Partner-Partner	$a_{P(P)}b_{P(M)}$	0.000	0.0	0.000;0.000	0.000	.993
Partner						
Total	$a_{A(P)}b_{P(M)} + a_{P(M)}b_{A(M)} + c'_{P(M)}$	-0.001	0.0	−0.010;0.008	0.005	.879/.876
Total Indirect	$a_{A(P)}b_{P(M)} + a_{P(M)}b_{A(M)}$	0.000	0.0	−0.001;0.002/−0.001;0.001	0.001/0.000	.738/.593
Actor-Partner	$a_{A(P)}b_{P(M)}$	0.000	0.0	−0.001;0.001	0.000	.567
Partner-Actor	$a_{P(M)}b_{A(M)}$	0.000	0.0	−0.001;0.001/0.000;0.000	0.001/0.000	.987/.991

Note. X = birth experience; M = relationship satisfaction; Y = anxiety symptoms at T4. Effect labels are given exemplary for mothers due to better readability. If paths were not restrained to equality, effects are given for mothers (M) and partners (P) separately.

associated with higher relationship satisfaction, which might suggest that a positive birth experience could act as a buffer against an accelerated decline of relationship satisfaction experienced by many parents during the transition to parenthood (Doss et al., 2009; Lawrence et al., 2008). In comparison to previous studies (Belsky and Hsieh, 1998; Twenge et al., 2003), we found no significant difference in the association between birth experience and relationship satisfaction for mothers and partners. Our study seems to be the first one to specifically examine the impact of parents' subjective birth experience on relationship satisfaction, not only the trajectory of relationship satisfaction after becoming a parent, and supports the suggestions of the vulnerability-stress-adaption model (Karney and Bradbury, 1995): coping with a negative birth experience demands additional resources from parents and can be understood as a vulnerability, if the transition to parenthood is already experienced as overwhelming. New parents' focus is usually on the infant, especially when they may have feared for its life during a difficult birth, and less time and resources go towards the couple relationship (Shapiro and Gottman, 2005), so that parents must find a way to adapt to this new situation.

Moreover, our results indicated that higher relationship satisfaction at 14 months after birth is associated with less symptoms of depression two years after birth for both parents, which replicates earlier studies, systematic reviews, and meta-analyses (Figueiredo et al., 2018; Kingsbury et al., 2015; Pilkington et al., 2015; Wee et al., 2011). As parents' rates of distress are often highest one year after the birth of their child (Matthey et al., 2000), the couple relationship may be especially prone to conflicts during this time, which may consequently be associated with parents' long-term depressive symptoms.

For mothers, higher relationship satisfaction was also associated with less symptoms of anxiety at two years postpartum. This is supported by a meta-analysis by Pilkington et al. (2015), which found a small, significant effect for the association between relationship satisfaction following the birth of a child and lower levels of postpartum anxiety. One possible explanation could be linked to the amount of support mothers experience from their partner, because feeling supported may increase mothers' relationship satisfaction and decrease their anxiety levels (van der Zee-van den Berg et al., 2021). For partners, relationship satisfaction was not associated with anxiety levels, which – according to a dyadic growth curve study by Figueiredo et al. (2018) – could be due to partners' low variance and overall high relationship satisfaction in our study. Figueiredo and colleagues found that while fathers who experienced fewer positive interactions with their wife showed an increase of anxiety levels from three to 30 months postpartum, fathers who experienced many positive interactions with their wife did not show any changes in anxiety levels. Of note, this study did not find an association between mothers' positive or negative interactions with their partner and maternal anxiety symptoms, which is not in accordance with our results, but is supported by a study investigating the dyadic association between marital discord and generalized anxiety disorder outside the perinatal period. Its results indicate a positive actor effect for husbands but not for wives (Whisman et al., 2018). Additionally, a study by Koh et al. (2015) showed that marital distress increased the risk for paternal anxiety six weeks postpartum more than four-fold. To summarize, literature on the association between both parents' relationship satisfaction and postpartum anxiety is scarce, inconclusive, and heterogeneous in terms of the study timepoints and type of anxiety disorder, highlighting the need for more, especially dyadic and longitudinal research on this topic.

As hypothesized, the association between birth experience and depressive symptoms and (for mothers) anxiety symptoms was partially mediated by the actors' relationship satisfaction, although the indirect effect was very small and disappeared when controlling for relationship satisfaction and mental health at the previous time point. Nevertheless, this result replicates findings by Anding et al. (2016), showing that relationship satisfaction together with birth-related factors impacts parents' long-term mental health.

However, in contrast to our hypotheses, we did not find any partner effects. This seems to suggest that even over time, it is parents' own emotional experience during birth, not their partners', which determines their mental health and how satisfied they are with their relationship. One potential explanation might be that the birth and the first year postpartum often look very different for mothers and their partners. While the mother goes through labor and the usually painful birth herself, the partner often feels like a helpless bystander (Genesoni and Tallandini, 2009; Nichols, 1993; Vehviläinen-Julkunen and Liukkonen, 1998). In addition, most mothers in Germany stay home for the first year after the birth of their child, while most partners take only a few weeks of parental leave and then return to work (Statistisches Bundesamt, 2023). All of this might result in negative, but nevertheless very different feelings for both parents, so that their partner's experience

does not resonate with them and therefore does not affect them in the same way.

4.1. Implications for research and practice

These findings have clear implications for practice. Considering the potential long-term consequences of negative birth experiences, positive experiences during childbirth need to be facilitated, for instance by providing a home-like birth environment and continuity of care from midwives, who make the parents feel supported and give them a sense of control, safety, and respect (Dahlberg et al., 2016; Leinweber et al., 2023; Mondy et al., 2016). If parents did experience the birth of their child as negative, additional support should be offered to them, such as tailored conversations about the birth with staff or expressive writing interventions (de Graaff et al., 2018; Sigurðardóttir et al., 2019). Although our results suggest that parents' birth experience and relationship satisfaction do not affect their partner, these interventions should treat parents as a dyad, since research shows that women and men within couples react similarly to becoming a parent (Keizer and Schenk, 2012).

Regarding implications for research, birth experience should be included as a potential influencing factor in more studies on the transition to parenthood. In addition, the association between a negative birth experience and postpartum anxiety symptoms should be further examined, especially for partners. Finally, future studies including more severely affected parents need to investigate the impact of parents' relationship satisfaction on postpartum anxiety. These studies are encouraged to employ a longitudinal design including a range of different timepoints during the postpartum period, and should preferably use dyadic models, like the APIM or dyadic growth curve models.

4.2. Strengths and limitations

This study uses a very large sample of couples for dyadic analyses, which is still rare in the field of perinatal psychology (Garthus-Niegel et al., 2022). Additionally, we used a longitudinal design extending to two years postpartum and adjusted each effect for the outcome's impact at the previous timepoint. Finally, parents' birth experience is often overlooked in research on long-term parental mental health or the transition to parenthood, but is at the center of the current analyses, highlighting its importance for the whole family.

Nevertheless, some limitations of this study should be kept in mind. Firstly, our sample completed self-report questionnaires, which are prone to reporting and memory biases. Secondly, the sample mostly consisted of highly educated, healthy parents with low levels of depression and anxiety symptoms, who were on average very satisfied within their relationships and had been with their partner for a long period of time before having a child. Attrition analyses showed that parents with lower education, lower relationship satisfaction, and higher depression scores during pregnancy were more likely to drop out of the study after the birth of their child. Therefore, results are not generalizable to less privileged samples. For these parents, the effects may be much larger than the ones found in our study, which prompts the third limitation of this study, namely the small size of effects, although other dyadic studies investigating the transition to parenthood have also reported small effect sizes (Keizer and Schenk, 2012).

5. Conclusions

This prospective cohort study found actor effects between parents' birth experience, relationship satisfaction, and postpartum symptoms of depression and anxiety, but no partner effects. The results point to the importance of a positive birth experience for both parents' long-term relationship satisfaction and mental health up to two years after birth. The time shortly after birth is likely a critical period, in which mothers and partners with a negative birth experience might need additional support to prevent long-term consequences. However, more dyadic research on parents with higher levels of depression and anxiety and less stable relationships is needed.

CRediT authorship contribution statement

All authors designed the study together. Susan Garthus-Niegel acquired funding for the DREAM study, on which this study is based. Lara Seefeld preregistered the study, performed the statistical analyses, and wrote the initial draft. Jonathan E. Handelzalts wrote parts of the final manuscript. All authors contributed to and have approved the final manuscript.

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2023.12.044.

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