



# Mother-Father Differences in Risk Factors for Postnatal Psychological Distress: Results from the German SKKIPPI Cohort Study

Ariana Neumann<sup>1</sup> · Marie Bolster<sup>1</sup> · Natalja Lisewski<sup>1</sup> · Katja Icke<sup>1</sup> · Thomas Reinhold<sup>1</sup> · Franziska Schlenzog-Schuster<sup>2</sup> · Christiane Ludwig-Körner<sup>3</sup> · Lars Kuchinke<sup>3</sup> · Thomas Keil<sup>1,4,5</sup> · Stephanie Roll<sup>1</sup> · Anne Berghöfer<sup>1</sup> · Julia Fricke<sup>1</sup>

Accepted: 28 November 2023 / Published online: 15 January 2024  
© The Author(s) 2024

## Abstract

The postnatal period is a potentially vulnerable time for families and can be associated with psychological distress in mothers and fathers. The aim of this analysis was to identify mother-father differences in symptoms of postnatal psychological distress and their risk factors. Cross-sectional screening data for postnatal psychological distress included postnatal depressive (PDS), anxiety (PAS), and obsessive-compulsive symptoms (POCS). Using baseline data of 4984 mothers and 962 fathers from the German SKKIPPI cohort study, we conducted an explorative multilevel logistic regression. Mothers were more likely than fathers to report PAS (OR 1.55, 95% CI: 1.00–2.41,  $p = 0.051$ ) and POCS (1.38, 1.03–1.83,  $p = 0.029$ ) but not PDS (1.15, 0.76–1.74,  $p = 0.509$ ). Risk factors associated with psychological symptoms in mothers and fathers were life stressors, history of mental illness, and unsuitable pregnancy timing. Most risk factors were similar in mothers and fathers. However, relationship problems, having a child with a serious illness or disability, and the receipt of state payments seemed to have greater impact on fathers for some outcomes. These associations require further attention by researchers and should be considered by practitioners in the management of postnatal mental health. The SKKIPPI study has been registered in the German Clinical Trial Registry on February 8th, 2019 (DRKS-ID: DRKS00016653).

**Keywords** Postnatal anxiety symptoms · Postnatal depressive symptoms · Postnatal obsessive-compulsive symptoms · Risk factors · Sex differences

## Highlights

- Comparing mothers and fathers in symptoms of postnatal psychological distress showed that mothers were more likely to report anxiety and obsessive-compulsive symptoms, while depressive symptoms showed little difference.
- Most risk factors for postnatal psychological symptoms were similar in mothers and fathers.
- However, some indications for father-specific risk factors were found (e.g., relationship problems or the receipt of state payments), which require further attention by researchers.

Becoming a parent is one of the major events that people experience during their lifetime. For some parents, this event

may not only bring joy, but also stress or feelings of being overwhelmed. In both mothers and fathers, postnatal

✉ Julia Fricke  
julia.fricke@charite.de

<sup>1</sup> Institute of Social Medicine, Epidemiology and Health Economics, Charité—Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Berlin, Germany

<sup>2</sup> Department of Child and Adolescent Psychiatry, Psychotherapy

and Psychosomatics, University of Leipzig, Leipzig, Germany

<sup>3</sup> International Psychoanalytic University, Berlin, Germany

<sup>4</sup> Institute of Clinical Epidemiology and Biometry, University of Würzburg, Würzburg, Germany

<sup>5</sup> State Institute of Health, Bavarian Health and Food Safety Authority, Erlangen, Germany

depression and anxiety disorders represent the most common psychological illnesses after birth (Bradley & Slade, 2011; Meltzer-Brody et al., 2018). Regarding postnatal depression in mothers, earlier studies found prevalence estimates that ranged from 13 to 19% (O'Hara & McCabe, 2013; Underwood et al., 2016). In studies from Germany, where our study took place, estimates were lower ranging from 3 to 6% (Kurstjens & Wolke, 2001; Reck et al., 2008; v. Ballestrem et al., 2005). For maternal postnatal anxiety, systematic reviews reported prevalence estimates of 8.5 and 15% (Dennis et al., 2017; Goodman et al., 2016). In Germany, Reck et al. (2008) found a prevalence of 11% for maternal postnatal anxiety. Also, there is a growing interest in research on obsessive-compulsive disorder (OCD) in the postnatal period. Past studies showed prevalences ranging from 2.4 to 11% in mothers (Miller et al., 2013; Uguz et al., 2007; Zambaldi et al., 2009).

However, the risk of developing postnatal mental illness is not restricted to mothers. Previous research identified prevalence rates from 1 up to 9.2% for postnatal depression in fathers (Bradley & Slade, 2011; Cameron et al., 2016; Rao et al., 2020). In Germany, symptoms of postnatal depression were found in 7.8% of fathers (Gawlik et al., 2014). For postnatal anxiety, the prevalence estimates ranged from 2.4 to 18% in fathers (Bradley & Slade, 2011; Leach et al., 2016). Nevertheless, other study results suggested that anxiety in fathers increases during pregnancy and birth, but decreases in the postnatal period (Philpott et al., 2019). Studies on postnatal OCD in fathers are still rare. One study reported a prevalence of 1.8% for postnatal OCD in fathers (Coelho et al., 2014). Whereas research about postnatal mental illness in mothers is established, more studies regarding fathers are required.

Postnatal psychological distress does not only negatively affect mothers and fathers, but also other family members. A systematic review and meta-analysis by Thiel et al. (2020) found low to moderate associations between paternal and maternal depressive symptoms during the perinatal period. Several studies have found that postnatal psychological distress in mothers (Field, 2010, 2018; Glasheen et al., 2010; Kingston et al., 2012) and fathers (Glasser & Lerner-Geva, 2019; Kerstis et al., 2016; Sweeney & MacBeth, 2016) had a negative impact on parenting behavior, the caregiver-infant relationship as well as the child's health and development. Moreover, it was found that children with two depressed parents were at even higher risk for negative outcomes than children with only one depressed parent (Burke, 2003). Therefore, it is of major interest to consider both parents when dealing with postnatal mental illness to ensure the best possible conditions for the child's health and development.

Finally, it is important to detect risk factors for postnatal psychological distress and to explore their generalizability for mothers and fathers. A history of mental illness, current or past sexual and physical abuse along with high life stress

such as lack of social support, relationship dissatisfaction and an unplanned/unwanted pregnancy have been identified as risk factors for mothers (Beck, 2001; Bell et al., 2016; Bener et al., 2012; Field, 2018; Hutchens & Kearney, 2020; Underwood et al., 2016; van der Zee-van den Berg et al., 2021). Whereas sociodemographic factors like young age (<30 years), a higher educational level and being employed were identified as risk factors for maternal postnatal anxiety symptoms (PAS) (Bener et al., 2012; Field, 2018); young age (<30 years), an age greater than 34 years, a high and low educational level as well as unemployment were found to act as risk factors for postnatal depressive symptoms (PDS) in mothers (Bell et al., 2016; Bener et al., 2012; Underwood et al., 2016). Additionally, the mother's health and personality as well as child and birth-related aspects seemed to be associated with postnatal psychological distress in mothers (Anding et al., 2016; Beck, 2001; Bell et al., 2016; Field, 2018; van der Zee-van den Berg et al., 2021). When looking at postnatal psychological distress in fathers, a history of mental illness, a low educational level, unemployment, high life stress such as relationship dissatisfaction, work-related or financial stress, low parental self-efficacy, having a partner in a more prestigious occupation, an unplanned/unwanted pregnancy and maternal mental health problems were identified as risk factors (Ansari et al., 2021; Bradley & Slade, 2011; Giallo et al., 2013; Philpott et al., 2019; Wang et al., 2021). However, it is still unclear whether these risk factors are equally associated with postnatal psychological distress in mothers and fathers and studies that simultaneously observe both parents are lacking (Anding et al., 2016). Especially studies with German samples are missing. Moreover, the postnatal period is an especially vulnerable time for parents, and it is important to detect high-risk individuals that need further support and to provide appropriate support. Further research about risk factor differences could potentially help to clarify whether individual support, screening tools or intervention programs are necessary for mothers and fathers in the postnatal period. Moreover, it could help to close research gaps and guide future research on risk factors. Therefore, the aim of the present study was to assess differences between mothers and fathers regarding different symptoms of postnatal psychological distress and their associations with sociodemographic, psychological, pregnancy and birth related factors as well as life stressors.

## Method

### Study Design

The German SKKIPPI project (evaluation of parent-infant psychotherapy using prevalence and intervention studies)

consists of three work packages: two randomized trials and an observational population-based cohort study (Eckert et al., 2020; Fricke et al., 2021; Mattheß et al., 2020; Sprengeler et al., 2021). The aim of the latter cohort study was to identify postnatal psychological distress and potential risk as well as protective factors for postnatal mental health. The cohort study had a two-step screening design (Fricke et al., 2021). The first screening step included an online questionnaire for mothers and fathers, which was aimed to be as brief as possible and with simple language to reduce selection bias and increase participation rates. Mothers who showed an elevated stress level within this first screening step were invited to take part in the second, more thorough screening step. This second step comprised a detailed structured psychiatric-diagnostic telephone interview and questionnaires to assess mental health problems, possible regulatory problems in the child, and the use of health care services. This paper focuses on data from the first screening step of the cohort study (i.e., on cross-sectional data).

## Sample

For the population-based cohort study, a random sample of mothers and fathers was drawn up to 12 months after birth by the registration offices in Berlin, Leipzig, and Flensburg (Germany) in January 2019. The sample size was chosen according to birth rates and the population size of the different cities at the time of sampling (Fricke et al., 2021). The mothers received an invitation letter with a link to take part in the study online. The letter was primarily addressing the mother but included two participation codes, encouraging the fathers to fill out the online questionnaire as well. The screening data was collected from March 2019 until July 2020. Parents were included if they met the following criteria: (a) being the biological or adoptive parent; (b) having a child aged 12 months or younger at the time of the sampling; (c) being at least 18 years old; (d) registered in Berlin, Leipzig, or Flensburg; (e) able to understand German, English, Turkish or Arabic language, and (f) providing written or online informed consent.

## Measures

### Outcomes of postnatal psychological distress

Representing the most common mental illnesses in the postnatal period, PDS and PAS were measured using the well-established Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009). This brief self-report consists of a 2-item depression scale (Patient Health Questionnaire-2; Kroenke et al., 2003) and a 2-item anxiety scale (Generalized Anxiety Disorder-2 scale; Kroenke et al., 2007), which represent the core symptoms of depression and anxiety. Both scales have been recommended for screening purposes

in postpartum women (e.g., Chae et al., 2012; National Institute for Health and Care Excellence, 2014). A score of 3 or higher in the individual categories was counted as a positive screening for either PDS or PAS.

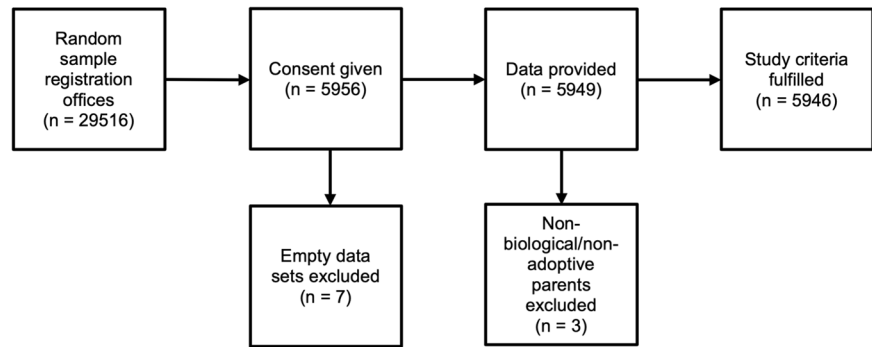
In addition, postnatal obsessive-compulsive symptoms (POCS) were assessed using two items from the Zohar-Fineberg Obsessive Compulsive Screen (ZF-OCS; Fineberg & Roberts, 2001). The items were phrased as: ‘Is there any thought that keeps bothering you that you would like to get rid of but can’t?’ and ‘Do you have to repeat actions over and over again that actually seem pointless to you (e.g., compulsive hand washing, checking the stove/coffee machine)?’. The screening was counted as positive, when at least one of the two questions was answered with ‘yes’.

When considering these three symptom groups it is worth noticing that they share common features and can be highly comorbid with each other. However, they all have unique features, and their distinction is of major importance for the right treatment of symptoms (e.g., Goodwin, 2015). Therefore, all three symptom groups were considered.

### Potential risk factors

Information about potential risk factors for postnatal psychological distress was collected in the screening questionnaire. The selection of risk factors was based on previously published studies and cut-offs were defined on a consensus basis, determined by a group of scientific experts from the fields of psychology, pediatrics, medicine, public health and data science (Fricke et al., 2021). Sociodemographic risk factors included parent’s age younger than 20 years, receipt of state payments, support through early intervention programs, being a single parent, poor German language skills (self-assessed), and a low educational level according to level 1 of the International Standard Classification of Education (ISCED; UNESCO Institute for Statistics, 2012). In addition, pregnancy and birth-related factors such as multiple pregnancy, emergency caesarean section, preterm delivery, and pregnancy described as happening at an unsuitable time were assessed. Having at least one child with a serious illness or disability, having three or more children under the age of six years living in the household and having a chronic illness were additionally considered. Referring to professional, family, relationship, or financial problems and the burden of lack of social support as ‘strong’ or ‘very strong’ was also rated as a potential risk factor. Furthermore, parental mental health aspects that were considered as risk factors are a history of mental illness (including depression, anxiety, obsessive-compulsive disorder, and other mental illnesses that were diagnosed in the past) and describing current impairment caused by alcohol or drug use as ‘some’ or ‘explicit’. Describing the relationship with the child as ‘rarely’ or ‘never’ feeling close to the child was also counted as a risk factor.

**Fig. 1** Participant flow of the population-based cohort study of the SKKIPPI project in Germany



**Table 1** Sociodemographic and psychological characteristics of mothers and fathers in the population-based cohort study of the SKKIPPI project in Germany

Characteristic	Mothers (n = 4984)		Fathers (n = 962)	
	n	%	n	%
Age group (in years)				
≤29	778	15.6	88	9.2
30–39	3708	74.4	649	67.5
40–49	497	10.0	203	21.1
≥50	1	0.02	22	2.3
Region of recruitment				
Berlin	3963	79.5	745	77.4
Flensburg	67	1.3	14	1.5
Leipzig	813	16.3	171	17.8
Other	141	2.8	32	3.3
Country of birth <sup>a</sup>				
Germany	4190	84.7	786	84.0
Other	756	15.3	150	16.0
Educational level <sup>b</sup>				
Low (ISCED 1)	24	0.5	7	0.8
Middle (ISCED 2)	695	14.1	127	13.6
High (ISCED 3)	4196	84.9	796	85.1
Unknown	29	0.6	5	0.5
History of mental illness				
Depression	738	14.9	69	7.4
Anxiety	282	5.7	31	3.3
Obsessive-compulsive disorder	35	0.7	7	0.7

ISCED International Standard Classification of Education

<sup>a</sup>mothers (n = 4946), fathers (n = 936)

<sup>b</sup>mothers (n = 4944), fathers (n = 935)

## Statistical Methods

Questionnaires were filled out either by one or both parents separately. When the mother and the father of the same child filled out their individual questionnaires, we accounted for the clustered structure of the data in the analyses. Parental pairs share various life circumstances; thus, their data is assumed to

be correlated (not independent). A random intercept multi-level logistic regression, which accounted for the nested structure of the data, was used for each of the three outcomes for postnatal psychological distress. Two different models were fitted. The first was an intercept-only model (model 1), which contained a fixed as well as a random intercept. This model was used to take the variability among parental pairs into account and to determine whether there was dependence within parental pairs on the outcome variables. Based on model 1 the intra class correlation coefficients (ICC) were calculated to assess the clustering effects. For the second model, all predictors and sex\*risk factor interactions were added to the intercept-only model to explore potential mother-father differences (model 2). Odds ratios with 95% confidence intervals and explorative *p*-values were reported. Interactions that resulted in odds ratios >1 indicated that the association of the risk factor with postnatal psychological distress was greater for mothers. Odds ratios <1 suggested that the association was stronger in the group of fathers compared to mothers. Since this is an exploratory analysis, no formal level of statistical significance was set, and there was no adjustment for multiple testing. Only complete cases were included in the respective analyses, which resulted in a varying number of participants for the different outcomes. Risk factors that had very few positive cases and were not reasonably estimable were excluded. Consequently, being under 20 years old, being a single parent, reporting current impairment caused by alcohol or drug use, and rarely or never feeling close to the child had to be removed as risk factors. Furthermore, only few cases had a low educational level (ISCED level 1). Hence, ISCED level 2 was also counted as a potential educational risk factor and was combined with the level 1 cases. IBM SPSS Statistics Version 26 was used for all data analyses.

## Results

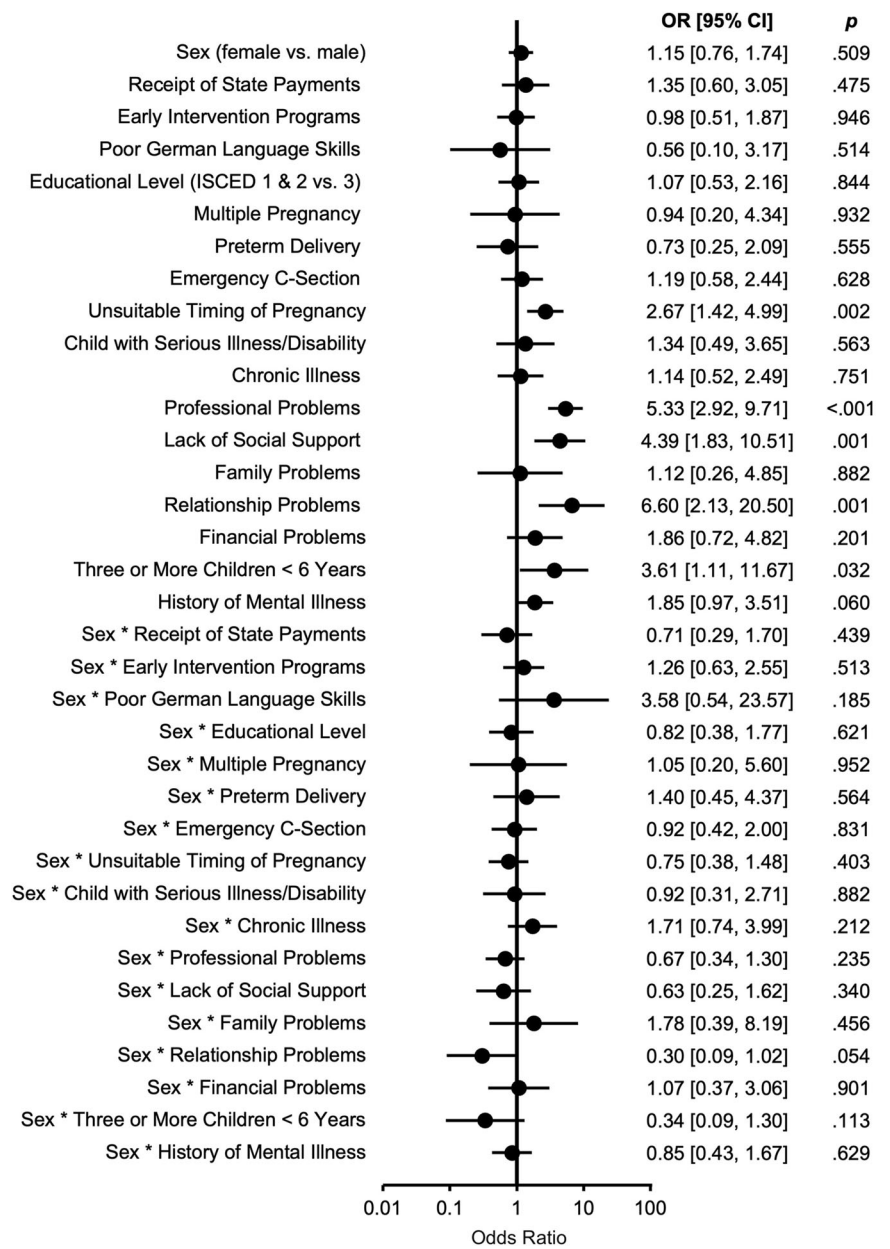
### Participants

Out of the 29516 parental pairs that were invited, 5956 gave consent to participate in the study and 5949 participants

**Table 2** Postnatal psychological distress in mothers and fathers participating in the population-based cohort study of the SKKIPPI project in Germany

Outcome	Mothers		Fathers	
	<i>n</i>	Positive Screening (%)	<i>n</i>	Positive Screening (%)
Postnatal Depressive Symptoms	4955	458 (9.2)	944	84 (8.9)
Postnatal Anxiety Symptoms	4953	537 (10.8)	944	70 (7.4)
Postnatal Obsessive-Compulsive Symptoms	4948	1207 (24.4)	938	185 (19.7)

**Fig. 2** Factors potentially associated with parental postnatal depressive symptoms in the population-based cohort study of the SKKIPPI project in Germany. Association of the predictors with a positive screening for postnatal depressive symptoms (*n* = 4684 mothers, 923 fathers). OR = Odds Ratio, CI = confidence interval, ISCED = International Standard Classification of Education



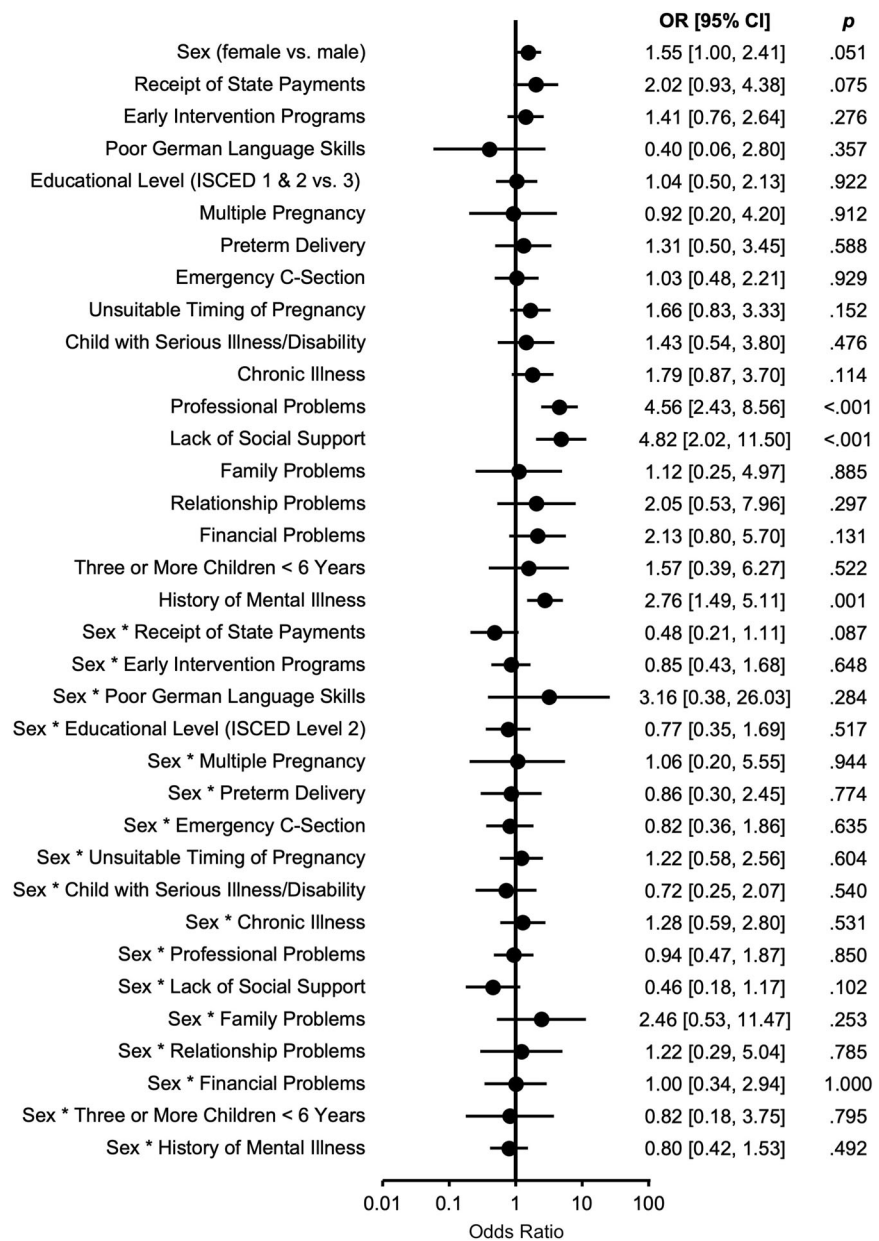
provided data (Fig. 1). Overall, 4984 mothers (4981 biological and 3 adoptive mothers) and 962 biological fathers fulfilled the study criteria (*N* = 5946). Parents of 5151 children participated in the online screening questionnaire, 4356 were filled out by only one parent and 795 by both parents. The response rate for the first screening step of the SKKIPPI cohort study was 17%.

**Sample Characteristics**

Table 1 shows an overview of the main sociodemographic and psychological characteristics of the sample. Detailed results of all screening variables from the SKKIPPI cohort study were summarized by Fricke et al. (2022).



**Fig. 3** Factors potentially associated with parental postnatal anxiety symptoms in the population-based cohort study of the SKKIPPI project in Germany. Association of the predictors with a positive screening for postnatal anxiety symptoms ( $n = 4683$  mothers, 923 fathers). OR = Odds Ratio, CI = confidence interval, ISCED = International Standard Classification of Education



### Postnatal Psychological Distress in Mothers and Fathers

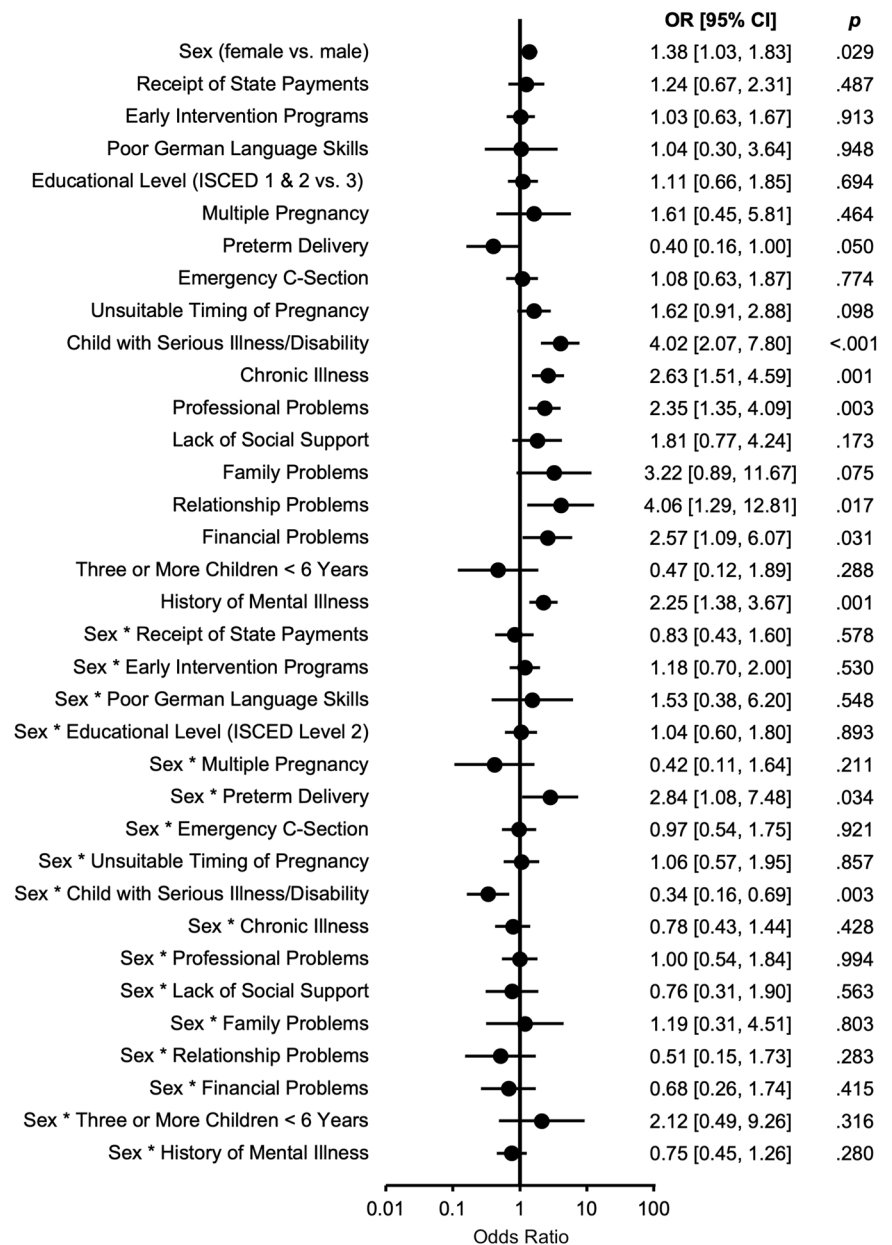
The descriptive analysis revealed that PAS and POCS were more prevalent in mothers than in fathers, while PDS was similar (Table 2). This was also seen in the multilevel models (Figs. 2–4), which accounted for correlation among parental pairs and tested significance of the findings. Being a mother compared to father was associated with PAS (OR 1.55, 95% CI: 1.00–2.41,  $p = 0.051$ ) and POCS (1.38, 1.03–1.83,  $p = 0.029$ ) but not with PDS (1.15, 0.76–1.74,  $p = 0.509$ ).

### Risk Factors for Postnatal Psychological Distress in Mothers and Fathers

#### Postnatal depressive symptoms

Concerning PDS, an association with various risk factors was found (Fig. 2). Especially life stressors such as having professional or relationship problems, lack of social support and having three or more children under the age of six years living in the household were associated with PDS. The only pregnancy and birth-related risk factor that was associated with PDS was an unsuitable pregnancy timing. No association with the sociodemographic risk factors was found. Additionally, a

**Fig. 4** Factors potentially associated with parental postnatal obsessive-compulsive symptoms in the population-based cohort study of the SKKIPPI project in Germany. Association of the predictors with a positive screening for postnatal obsessive-compulsive symptoms (*n* = 4681 mothers, 923 fathers). OR = odds ratio, CI = confidence interval, ISCED = International Standard Classification of Education



history of mental illness showed some association with PDS. Most of the sex\*risk factor interactions were not associated with PDS. Nevertheless, the interactions of sex with relationship problems and having three or more children under the age of six years living in the household showed some negative association with PDS, suggesting that the association of these risk factors with PDS was stronger in fathers compared to mothers.

**Postnatal anxiety symptoms**

Figure 3 shows all of the results for PAS. Life stressors such as having professional problems and lack of social support along with a history of mental illness were associated with

PAS. Furthermore, no pregnancy and birth-related risk factors or sociodemographic risk factors were associated with PAS. Merely the receipt of state payments showed some association with PAS. Also, for PAS no association with most of the sex\*risk factor interactions was found. However, the interactions of sex with the receipt of state payments and lack of social support showed some negative association with PAS, meaning that the association of these risk factors with PAS was stronger in fathers compared to mothers.

**Postnatal obsessive-compulsive symptoms**

Multiple life stressors and a history of mental illness were associated with POCS (Fig. 4). None of the

sociodemographic risk factors were associated with POCS. Preterm delivery and an unsuitable timing of pregnancy were the only pregnancy and birth-related risk factors that showed some association with POCS. The only sex\*risk factor interactions that seemed to be associated with POCS were the interactions of sex with preterm delivery and having a child with a serious illness or disability. These interactions suggest that having a child with a serious illness or disability had a stronger association with POCS in fathers compared to mothers and preterm delivery had a stronger connection with POCS in mothers compared to fathers.

### Random Effect Estimates and Model Fit Statistics

The ICCs for the parental pairs in model 1 were .030 for POCS and <0.001 for both PDS and PAS, which suggests that the correlation in the answers of parental pairs was rather small. The overall percentage of accuracy in classification of model 2 ranged from 79.3 to 91.5%, with a sensitivity of 12.2 to 16.9% and a specificity of 97.6 to 99.1% for the different outcome variables. Considering the fact that the models were used to detect potential relationships with the outcomes and not for prediction, these values are acceptable.

## Discussion

### Main Results

We found that mothers compared to fathers were more vulnerable to PAS and POCS, but not to PDS. There were various factors that seemed to be associated with postnatal psychological distress in this sample, in particular professional problems. Life stressors in general seemed to have a negative impact on postnatal symptoms. A history of mental illness and an unsuitable timing of pregnancy were additional risk factors that were connected to postnatal psychological distress in this sample. Sociodemographic risk factors showed only little or no associations with the three outcomes. Furthermore, the results suggest that there are only few mother-father differences in the observed risk factors for postnatal psychological distress, which highlights the importance of supporting both parents in the postnatal period.

### Comparison with Other Studies

Whereas mothers did not seem to be at higher risk for PDS in this sample, other studies that investigated postnatal depression in mothers (prevalence ranging from 9 to 27.5%) and fathers (prevalence ranging from 5.4 to 9%) found higher prevalence rates in mothers (Anding et al., 2015; Anding et al., 2016; Ballard et al., 1994). Prevalence

estimates from studies in Germany revealed similar proportions for mothers (ranging from 3.3 to 11.1%) and fathers (ranging from 7.8 to 9.8%) regarding postnatal depression and anxiety (Gawlik et al., 2014; Kurstjens & Wolke, 2001; Reck et al., 2008; v. Ballestrem et al., 2005). In Iran, Mahmoodi et al (2017) found postnatal somatic disorder (21 vs. 7.3%), anxiety (21 vs. 6.5%) and social dysfunction (25.8 vs. 6.5%) to be more prevalent in fathers. Differences in fathers and mothers regarding depressive symptoms (11.3 vs. 12.9%) and postnatal psychological distress (21 vs. 12.9%) were not significant. Even though there is a tendency for mothers to be at higher risk for postnatal psychological distress, findings are mixed, and more research, especially in regard to fathers and POCS, is needed.

Multiple factors seemed to have an impact on postnatal psychological distress. This included different life stressors. The role of elevated life stress was explored in earlier studies, which also underlined its adverse impact on postnatal mental health (e.g., Anding et al., 2015; Ansari et al., 2021; Beck, 2001; Field, 2010; Hutchens & Kearney, 2020). A history of mental illness was also found to contribute to postnatal psychological distress in this sample. This finding is consistent with other studies that looked at risk factors for postnatal depression and anxiety in mothers and fathers (e.g., Ansari et al., 2021; Beck, 2001; Field, 2018; Wang et al., 2021). Further risk factors that have been suggested in earlier studies were sociodemographic characteristics (e.g., Ansari et al., 2021; Field, 2010; Underwood et al., 2016). Nevertheless, the sociodemographic factors assessed in our analysis did not seem to have a great impact on symptoms of postnatal psychological distress. Most of the characteristic pregnancy and birth-related risk factors, which showed associations with postnatal psychological distress in earlier studies (e.g., Anding et al., 2016; Field, 2018), failed to predict postnatal psychological symptoms in our study. A pregnancy-related predictor that was associated with symptoms of postnatal psychological distress was an unsuitable timing of the pregnancy. This is in line with results from previous studies (e.g., Beck, 2001; Bener et al., 2012). Preterm delivery acted as a potential protective factor for POCS in our study, which was unexpected as it was previously found to have an adverse effect on postnatal psychological distress (Carson et al., 2015; Field, 2018; Ionio et al., 2016). Being a parent with a chronic illness and having a seriously ill or disabled child were associated with POCS in our sample. So far, research regarding POCS is scarce. A possible hypothesis to explain this finding could be that chronically ill parents or having a child with a serious illness or disability causes additional worries and challenges that potentially contribute to the development of these symptoms.

Interactions of the predictor sex with potential risk factors were inspected to identify a mother-father-specific



relevance of the risk factors. Past studies found that mothers were affected by their own personality, critical life events, a history of childhood violence, perinatal, birth and infant-related factors more than fathers (Anding et al., 2016; Dudley et al., 2001). Fathers seemed to be more affected by their perception of the mother's personality style and mental health as well as relationship aspects (Anding et al., 2016; Dudley et al., 2001). In their Iranian study, Mahmoodi et al. (2017) additionally stated that socioeconomic characteristics and being consent with the pregnancy played a bigger role for postnatal psychological distress in fathers, whereas mothers were affected by the mode of delivery more often. In our analysis, most of the included risk factors for postnatal psychological distress were equally relevant to both parents. However, some mother-father differences were observed. The protective effect of preterm delivery on POCS seemed to apply to the fathers but not mothers of this sample. This result is in contrast to studies that found preterm delivery to have a negative effect on postnatal mental health in both parents (Carson et al., 2015; Ionio et al., 2016). Additionally, for POCS, having a child with a serious illness or disability tended to be a greater risk factor for fathers in comparison to mothers. Further research is needed to explore these associations. Furthermore, there were some indications that fathers were more affected by relationship problems and receipt of state payments. This supports findings from studies which emphasized the role of socioeconomic and relationship aspects concerning postnatal psychological distress in fathers (Anding et al., 2016; Ansari et al., 2021; Dudley et al., 2001; Mahmoodi et al., 2017). Even though the gender gap in domestic labor is slowly decreasing in Germany, mothers still perform the majority of childcare, and the 'male breadwinner family model' is still common (Jurczyk et al., 2019; Steinbach & Schulz, 2022). This could explain why fathers are specifically affected by financial struggles (resulting in the receipt of state payments), because they feel responsible for the financial situation of their family.

### Strengths and Limitations

A major strength of this study was the large population-based sample, which was based on a stringent recruitment strategy via local registries. Thus, it was possible to get a broader insight into postnatal mental health problems of parents from different regions of Germany, which was not limited to parents who happen to be treated in a clinical setting after birth. Another strength was the exploration of PDS, PAS and POCS simultaneously in a sample of mothers and fathers.

However, some limitations should be noted. First, some risk factors that were found to be relevant in other studies could not be included in the analyses due to small case

numbers. Only very few participants of the SKKIPPI cohort study sample were younger than 20 years. According to the inclusion criteria, only people aged 18 years or older were allowed to take part in the study. Consequently, only a limited number of teenager parents were recruited. The small case numbers for other risk factors such as (self-reported) current drug or alcohol abuse could have been caused by social desirability. Additionally, we excluded being a single parent as a potential risk factor from our analyses. Since only the mother received the study invitation letter, there was a higher likelihood that parents who live together would take part in the study. Especially single fathers potentially had a lower chance to receive the study invitation and therefore were less likely to be included. Accordingly, there were less fathers ( $N = 962$ ) than mothers ( $N = 4984$ ) in this sample. It is possible that only less distressed, non-single fathers took part in our study, which potentially caused selection bias. This could have led to the underestimation of prevalence rates for postnatal psychological symptoms in fathers and an underrepresentation of risk factors in this group in our study. Secondly, the results are based on cross-sectional data and temporal or even causal relationships can therefore not be established. Thirdly, outcomes of postnatal psychological distress were assessed using screening instruments only to keep the screening questionnaire as brief as possible and achieve a higher participation quota. Therefore, the detection of postnatal psychological symptoms was based on exploratory short self-report measures and not on clinical diagnoses. Finally, the generalizability of our results is limited, and we cannot rule out some selection bias. The response rate was only 17% and people with higher educational levels were overrepresented in the sample (Fricke et al., 2022). Even though the sample was population-based, it was certainly not representative for the general population of Germany, but perhaps to some extent for the areas where the recruitment took place. In addition, a small amount (<5%) of the screening data was assessed during the COVID-19 pandemic, which could have potentially impacted parental symptoms.

### Conclusion and Implications

We found that mothers were at higher risk of developing PAS and POCS than fathers. Most sociodemographic, psychological, pregnancy and birth related factors as well as life stressors did not show mother-father differences, which highlights their relevance to both parents in the postnatal period. However, risk factors such as having relationship problems, having a child with a serious illness or disability and the receipt of state payments seemed to have a greater impact on fathers for some outcomes. These associations

should be explored in future research and considered when dealing with paternal postnatal mental health in practice.

Longitudinal studies are needed to examine temporal relationships and to further validate the results from this study. They should ideally start during pregnancy and follow up participants after birth to allow for more reliable conclusions about potential causes and relationships. Furthermore, future research should include more fathers to prevent small case numbers. Additionally, future studies should aim to reduce self-selection bias and particularly should try to include more parents with a low socioeconomic status.

Based on our findings we suggest for clinical practice to pay attention to potential life stressors like lack of social support, professional or relationship problems, a history of mental illness and timing of pregnancy in mothers and fathers. Especially professional problems seemed to be a relevant risk factor for symptoms of postnatal psychological distress in this sample. Therefore, solutions for work-related problems such as paid parental leave or flexible working hours need to be considered by policy makers and employers. Since most risk factors did not show mother-father differences, healthcare professionals should focus on both parents after the birth of a child, because they both are susceptible to being affected by characteristic risk factors of the postnatal period.

**Acknowledgements** We would like to thank Melanie Liedtke and Burgi Riens for the data management and data cleaning, respectively. Moreover, we thank the student research assistants (Ina Temeschinko, Isabelle-Valentine Springer, Maike Stolz, Maximilian Leschinski, Melisa Celik, Paula Kuper, Sali Al-Rubaiey and Stella Hoffmann) for managing appointments with participants and conducting standardized telephone interviews.

**Funding** SKKIPPI is funded by a grant from the Innovationsfonds/ Gemeinsamer Bundesausschuss Germany (No 01 VSF17027). Open Access funding enabled and organized by Projekt DEAL.

## Compliance with Ethical Standards

**Conflict of interest** The authors declare no competing interests.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Anding, J., Röhrle, B., Grieshop, M., Schücking, B., & Christiansen, H. (2015). Early detection of postpartum depressive symptoms in mothers and fathers and its relation to midwives' evaluation and service provision: A community-based study. *Frontiers in Pediatrics*, 3, 62. <https://doi.org/10.3389/fped.2015.00062>.
- Anding, J., Röhrle, B., Grieshop, M., Schücking, B., & Christiansen, H. (2016). Couple comorbidity and correlates of postnatal depressive symptoms in mothers and fathers in the first two weeks following delivery. *Journal of Affective Disorders*, 190, 300–309. <https://doi.org/10.1016/j.jad.2015.10.033>.
- Ansari, N. S., Shah, J., Dennis, C., & Shah, P. S. (2021). Risk factors for postpartum depressive symptoms among fathers: A systematic review and meta-analysis. *Acta Obstetrica et Gynecologica Scandinavica*, 100(7), 1186–1199. <https://doi.org/10.1111/aogs.14109>.
- Ballard, C. G., Davis, R., Cullen, P. C., Mohan, R. N., & Dean, C. (1994). Prevalence of postnatal psychiatric morbidity in mothers and fathers. *British Journal of Psychiatry*, 164(6), 782–788. <https://doi.org/10.1192/bjp.164.6.782>.
- Beck, C. T. (2001). Predictors of postpartum depression: An update. *Nursing Research*, 50(5), 275–285. <https://doi.org/10.1097/00006199-200109000-00004>.
- Bell, A. F., Carter, C. S., Davis, J. M., Golding, J., Adejumo, O., Pyra, M., Connelly, J. J., & Rubin, L. H. (2016). Childbirth and symptoms of postpartum depression and anxiety: A prospective birth cohort study. *Archives of Women's Mental Health*, 19(2), 219–227. <https://doi.org/10.1007/s00737-015-0555-7>.
- Bener, A., Gerber, L. M., & Sheikh, J. (2012). Prevalence of psychiatric disorders and associated risk factors in women during their postpartum period: A major public health problem and global comparison. *International Journal of Women's Health*, 4, 191–200. <https://doi.org/10.2147/IJWH.S29380>.
- Bradley, R., & Slade, P. (2011). A review of mental health problems in fathers following the birth of a child. *Journal of Reproductive and Infant Psychology*, 29(1), 19–42. <https://doi.org/10.1080/02646838.2010.513047>.
- Burke, L. (2003). The impact of maternal depression on familial relationships. *International Review of Psychiatry*, 15(3), 243–255. <https://doi.org/10.1080/0954026031000136866>.
- Cameron, E. E., Sedov, I. D., & Tomfohr-Madsen, L. M. (2016). Prevalence of paternal depression in pregnancy and the postpartum: An updated meta-analysis. *Journal of Affective Disorders*, 206, 189–203. <https://doi.org/10.1016/j.jad.2016.07.044>.
- Carson, C., Redshaw, M., Gray, R., & Quigley, M. A. (2015). Risk of psychological distress in parents of preterm children in the first year: Evidence from the UK Millennium cohort study. *BMJ Open*, 5(12), e007942. <https://doi.org/10.1136/bmjopen-2015-007942>.
- Chae, S. Y., Chae, M. H., Tyndall, A., Ramirez, M. R., & Winter, R. O. (2012). Can we effectively use the two-item PHQ-2 to screen for postpartum depression? *Family Medicine*, 44(10), 698–703.
- Coelho, F. M., da Silva, R. A., de Á Quevedo, L., Souza, L. D., Pinheiro, K. A., & Pinheiro, R. T. (2014). Obsessive-compulsive disorder in fathers during pregnancy and postpartum. *Revista Brasileira de Psiquiatria*, 36(3), 272–272. <https://doi.org/10.1590/1516-4446-2013-1312>.
- Dennis, C.-L., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: Systematic review and meta-analysis. *British Journal of Psychiatry*, 210(5), 315–323. <https://doi.org/10.1192/bjp.bp.116.187179>.
- Dudley, M., Roy, K., Kelk, N., & Bernard, D. (2001). Psychological correlates of depression in fathers and mothers in the first postnatal year. *Journal of Reproductive and Infant Psychology*, 19(3), 187–202. <https://doi.org/10.1080/02646830124397>.

- Eckert, M., Richter, K. M., Mattheß, J., Koch, G., Reinhold, T., Vienhues, P., Berghöfer, A., Roll, S., Keil, T., Schlenso-Schuster, F., von Klitzing, K., Ludwig-Körner, C., & Kuchinke, L. (2020). Postpartale psychische Erkrankungen: Versorgungslage und Wirksamkeit der Eltern-Säugling-Kleinkind-Psychotherapie. Vorstellung des Innovationsfondprojektes SKKIPPI. *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz*, 63(12), 1538–1547. <https://doi.org/10.1007/s00103-020-03242-4>.
- Field, T. (2010). Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behavior and Development*, 33(1), 1–6. <https://doi.org/10.1016/j.infbeh.2009.10.005>.
- Field, T. (2018). Postnatal anxiety prevalence, predictors and effects on development: A narrative review. *Infant Behavior and Development*, 51, 24–32. <https://doi.org/10.1016/j.infbeh.2018.02.005>.
- Fineberg, N., & Roberts, A. (2001). Obsessive compulsive disorder: A twentyfirst century perspective. In N. Fineberg, D. Marazziti, & D. J. Stein (Eds.), *Obsessive compulsive disorder: A practical guide*. (pp. 1–13). Martin Dunitz.
- Fricke, J., Bolster, M., Icke, K., Liedtke, M., Lisewski, N., Kuchinke, L., Ludwig-Körner, C., Schlenso-Schuster, F., Reinhold, T., Berghöfer, A., Roll, S., & Keil, T. (2022). *The SKKIPPI cohort study on psychosocial stress and mental health disorders in parents and their children in early childhood: Results from the baseline survey*. [Manuscript submitted for publication].
- Fricke, J., Bolster, M., Ludwig-Körner, C., Kuchinke, L., Schlenso-Schuster, F., Vienhues, P., Reinhold, T., Berghöfer, A., Roll, S., & Keil, T. (2021). Occurrence and determinants of parental psychosocial stress and mental health disorders in parents and their children in early childhood: Rationale, objectives, and design of the population-based SKKIPPI cohort study. *Social Psychiatry and Psychiatric Epidemiology*, 56(6), 1103–1112. <https://doi.org/10.1007/s00127-020-02004-6>.
- Gawlik, S., Müller, M., Hoffmann, L., Dienes, A., Wallwiener, M., Sohn, C., Schlehe, B., & Reck, C. (2014). Prevalence of paternal perinatal depressiveness and its link to partnership satisfaction and birth concerns. *Archives of Women's Mental Health*, 17(1), 49–56. <https://doi.org/10.1007/s00737-013-0377-4>.
- Giallo, R., D'Esposito, F., Cooklin, A., Mensah, F., Lucas, N., Wade, C., & Nicholson, J. M. (2013). Psychosocial risk factors associated with fathers' mental health in the postnatal period: Results from a population-based study. *Social Psychiatry and Psychiatric Epidemiology*, 48(4), 563–573. <https://doi.org/10.1007/s00127-012-0568-8>.
- Glasheen, C., Richardson, G. A., & Fabio, A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, 13(1), 61–74. <https://doi.org/10.1007/s00737-009-0109-y>.
- Glasser, S., & Lerner-Geva, L. (2019). Focus on fathers: Paternal depression in the perinatal period. *Perspectives in Public Health*, 139(4), 195–198. <https://doi.org/10.1177/1757913918790597>.
- Goodman, J. H., Watson, G. R., & Stubbs, B. (2016). Anxiety disorders in postpartum women: A systematic review and meta-analysis. *Journal of Affective Disorders*, 203, 292–331. <https://doi.org/10.1016/j.jad.2016.05.033>.
- Goodwin, G. M. (2015). The overlap between anxiety, depression, and obsessive-compulsive disorder. *Dialogues in Clinical Neuroscience*, 17(3), 249–260. <https://doi.org/10.31887/DCNS.2015.17.3/ggoodwin>.
- Hutchens, B. F., & Kearney, J. (2020). Risk factors for postpartum depression: An umbrella review. *Journal of Midwifery & Women's Health*, 65(1), 96–108. <https://doi.org/10.1111/jmwh.13067>.
- Ionio, C., Colombo, C., Brazzoduro, V., Mascheroni, E., Confalonieri, E., Castoldi, F., & Lista, G. (2016). Mothers and fathers in NICU: The impact of preterm birth on parental distress. *Europe's Journal of Psychology*, 12(4), 604–621. <https://doi.org/10.5964/ejop.v12i4.1093>.
- Jurczyk, K., Jentsch, B., Sailer, J., & Schier, M. (2019). Female-Breadwinner Families in Germany: New gender roles? *Journal of Family Issues*, 40(13), 1731–1754. <https://doi.org/10.1177/0192513X19843149>.
- Kerstis, B., Aarts, C., Tillman, C., Persson, H., Engström, G., Edlund, B., Öhrvik, J., Sylvé, S., & Skalkidou, A. (2016). Association between parental depressive symptoms and impaired bonding with the infant. *Archives of Women's Mental Health*, 19(1), 87–94. <https://doi.org/10.1007/s00737-015-0522-3>.
- Kingston, D., Tough, S., & Whitfield, H. (2012). Prenatal and postpartum maternal psychological distress and infant development: A systematic review. *Child Psychiatry & Human Development*, 43(5), 683–714. <https://doi.org/10.1007/s10578-012-0291-4>.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2003). The Patient Health Questionnaire-2: Validity of a two-item depression screener. *Medical Care*, 41(11), 1284–1292. <https://doi.org/10.1097/01.MLR.0000093487.78664.3C>.
- Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ-4. *Psychosomatics*, 50(6), 613–621. [https://doi.org/10.1016/S0033-3182\(09\)70864-3](https://doi.org/10.1016/S0033-3182(09)70864-3).
- Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: Prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, 146(5), 317–325. <https://doi.org/10.7326/0003-4819-146-5-200703060-00004>.
- Kurstjens, S., & Wolke, D. (2001). Postnatale und später auftretende Depressionen bei Müttern: Prävalenz und Zusammenhänge mit obstetrischen, soziodemographischen sowie psychosozialen Faktoren. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 30(1), 33–41. <https://doi.org/10.1026/0084-5345.30.1.33>.
- Leach, L. S., Poyser, C., Cooklin, A. R., & Giallo, R. (2016). Prevalence and course of anxiety disorders (and symptom levels) in men across the perinatal period: A systematic review. *Journal of Affective Disorders*, 190, 675–686. <https://doi.org/10.1016/j.jad.2015.09.063>.
- Mahmoodi, H., Golboni, F., Nadrian, H., Zareipour, M., Shirzadi, S., & Gheshlagh, R. G. (2017). Mother-father differences in postnatal psychological distress and its determinants in Iran. *Open Access Macedonian Journal of Medical Sciences*, 5(1), 91–96. <https://doi.org/10.3889/oamjms.2017.009>.
- Mattheß, J., Eckert, M., Richter, K., Koch, G., Reinhold, T., Vienhues, P., Berghöfer, A., Roll, S., Keil, T., Schlenso-Schuster, F., von Klitzing, K., Ludwig-Körner, C., & Kuchinke, L. (2020). Efficacy of parent-infant-psychotherapy with mothers with postpartum mental disorder: Study protocol of the randomized controlled trial as part of the SKKIPPI project. *Trials*, 21(1), 490. <https://doi.org/10.1186/s13063-020-04443-7>.
- Meltzer-Brody, S., Howard, L. M., Bergink, V., Vigod, S., Jones, I., Munk-Olsen, T., Honikman, S., & Milgrom, J. (2018). Postpartum psychiatric disorders. *Nature Reviews Disease Primers*, 4(1), 18022. <https://doi.org/10.1038/nrdp.2018.22>.
- Miller, E. S., Chu, C., Gollan, J., & Gossett, D. R. (2013). Obsessive-compulsive symptoms during the postpartum period. A prospective cohort. *The Journal of Reproductive Medicine*, 58(3–4), 115–122.
- National Institute for Health and Care Excellence (NICE). (2014). *Antenatal and postnatal mental health: Clinical management and service guidance*. <https://www.nice.org.uk/guidance/cg192>.
- O'Hara, M. W., & McCabe, J. E. (2013). Postpartum depression: Current status and future directions. *Annual Review of Clinical Psychology*, 9(1), 379–407. <https://doi.org/10.1146/annurev-clinpsy-050212-185612>.

- Philpott, L. F., Savage, E., FitzGerald, S., & Leahy-Warren, P. (2019). Anxiety in fathers in the perinatal period: A systematic review. *Midwifery*, *76*, 54–101. <https://doi.org/10.1016/j.midw.2019.05.013>.
- Rao, W.-W., Zhu, X.-M., Zong, Q.-Q., Zhang, Q., Hall, B. J., Ungvari, G. S., & Xiang, Y.-T. (2020). Prevalence of prenatal and postpartum depression in fathers: A comprehensive meta-analysis of observational surveys. *Journal of Affective Disorders*, *263*, 491–499. <https://doi.org/10.1016/j.jad.2019.10.030>.
- Reck, C., Struben, K., Backenstrass, M., Stefenelli, U., Reinig, K., Fuchs, T., Sohn, C., & Mundt, C. (2008). Prevalence, onset and comorbidity of postpartum anxiety and depressive disorders. *Acta Psychiatrica Scandinavica*, *118*(6), 459–468. <https://doi.org/10.1111/j.1600-0447.2008.01264.x>.
- Sprengeler, M. K., Mattheß, J., Eckert, M., Richter, K., Koch, G., Reinhold, T., Vienhues, P., Berghöfer, A., Fricke, J., Roll, S., Keil, T., Ludwig-Körner, C., Kuchinke, L., von Klitzing, K., & Schlenzsch, F. (2021). Efficacy of parent-infant psychotherapy compared to care as usual in children with regulatory disorders in clinical and outpatient settings: Study protocol of a randomised controlled trial as part of the SKKIPPI project. *BMC Psychiatry*, *21*(1), 118. <https://doi.org/10.1186/s12888-021-03112-6>.
- Steinbach, A., & Schulz, F. (2022). Stability and change in German parents' childcare patterns across two decades. *Social Politics: International Studies in Gender, State & Society*, *29*(2), 428–445. <https://doi.org/10.1093/sp/jxab017>.
- Sweeney, S., & MacBeth, A. (2016). The effects of paternal depression on child and adolescent outcomes: A systematic review. *Journal of Affective Disorders*, *205*, 44–59. <https://doi.org/10.1016/j.jad.2016.05.073>.
- Thiel, F., Pittelkow, M.-M., Wittchen, H.-U., & Garthus-Niegel, S. (2020). The relationship between paternal and maternal depression during the perinatal period: A systematic review and meta-analysis. *Frontiers in Psychiatry*, *11*, 563287. <https://doi.org/10.3389/fpsy.2020.563287>.
- Uguz, F., Akman, C., Kaya, N., & Cilli, A. S. (2007). Postpartum-onset obsessive-compulsive disorder: Incidence, clinical features, and related factors. *The Journal of Clinical Psychiatry*, *68*(1), 132–138. <https://doi.org/10.4088/JCP.v68n0118>.
- Underwood, L., Waldie, K., D'Souza, S., Peterson, E. R., & Morton, S. (2016). A review of longitudinal studies on antenatal and postnatal depression. *Archives of Women's Mental Health*, *19*(5), 711–720. <https://doi.org/10.1007/s00737-016-0629-1>.
- UNESCO Institute for Statistics. (2012). *International Standard Classification of Education (ISCED) 2011*. <https://doi.org/10.15220/978-92-9189-123-8-en>.
- v. Ballestrem, C.-L., Strauß, M., & Kächele, H. (2005). Contribution to the epidemiology of postnatal depression in Germany – implications for the utilization of treatment. *Archives of Women's Mental Health*, *8*(1), 29–35. <https://doi.org/10.1007/s00737-005-0068-x>.
- van der Zee-van den Berg, A. I., Boere-Boonekamp, M. M., Groothuis-Oudshoorn, C. G. M., & Reijneveld, S. A. (2021). Postpartum depression and anxiety: A community-based study on risk factors before, during and after pregnancy. *Journal of Affective Disorders*, *286*, 158–165. <https://doi.org/10.1016/j.jad.2021.02.062>.
- Wang, D., Li, Y.-L., Qiu, D., & Xiao, S.-Y. (2021). Factors influencing paternal postpartum depression: A systematic review and meta-analysis. *Journal of Affective Disorders*, *293*, 51–63. <https://doi.org/10.1016/j.jad.2021.05.088>.
- Zambaldi, C. F., Cantilino, A., Montenegro, A. C., Paes, J. A., de Albuquerque, T. L. C., & Sougey, E. B. (2009). Postpartum obsessive-compulsive disorder: Prevalence and clinical characteristics. *Comprehensive Psychiatry*, *50*(6), 503–509. <https://doi.org/10.1016/j.comppsy.2008.11.014>.