BMJ Open

# Swiss cohort on Traumatic Childbirth and Health (SwiTCH): protocol for a prospective, population-based cohort study on parents' mental health from pregnancy to one year postpartum

Hélène Chanvrier,[1] Valentine Rattaz,[1] Valentin Offredi,[1,2] Marc Dupuis,[3] Antje Horsch [1,4]

**To cite:** Chanvrier H, Rattaz V, Offredi V, *et al*. Swiss cohort on Traumatic Childbirth and Health (SwiTCH): protocol for a prospective, population-based cohort study on parents' mental health from pregnancy to one year postpartum. *BMJ Open* 2024;**14**:e080557. doi:10.1136/bmjopen-2023-080557

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2023-080557).

HC and VR are joint first authors.

Received 04 October 2023
Accepted 11 January 2024



For numbered affiliations see end of article.

**Correspondence to**
Dr Antje Horsch;
antje.horsch@chuv.ch

## ABSTRACT

**Introduction** Approximately 4%–5% of mothers develop childbirth-related post-traumatic stress disorder (CB-PTSD) and approximately 12.3% of mothers develop some CB-PTSD symptoms (CB-PTSS). To date, there is a dearth of studies on fathers and other coparents. Parental CB-PTSD and CB-PTSS may have a negative impact not only on the parents but also on the infant. Understanding risk and protective factors of CB-PTSD for both parents and its consequences on the family is key to detecting or anticipating it, to developing interventions aimed at reducing its detrimental effects and to supporting parents.

**Methods and analysis** This study protocol describes an observational, population-based study, consisting of a longitudinal prospective cohort with online surveys at four time points. The population of interest consist of women, in the third trimester of pregnancy or at 6–12 weeks postpartum, and their partner/coparent, who will give birth or gave birth in the French-speaking part of Switzerland. The target sample size is 300–500 women and a proportional number of partners. The primary outcome of this study is the prevalence of CB-PTSD and CB-PTSS. The secondary outcomes focus on: (1) the impact of CB-PTSD and CB-PTSS on the marital and coparental relationships, the bonding with the infant, parental burnout and healthcare seeking behaviours, (2) the role of the childbirth experience in the development of CB-PTSD and CB-PTSS and (3) the social and economic determinants of CB-PTSD and CB-PTSS.

**Ethics and dissemination** Ethical approval was granted by the human research ethics committee of the Canton de Vaud (study number 2022-00284). All study participants signed an informed consent form. Dissemination of results will occur via national and international conferences, in peer-reviewed journals, public conferences and social media.

**Trial registration number** NCT05865704.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study consists of a prospective population-based cohort study from the third trimester of pregnancy until 1 year after childbirth.
⇒ The population includes both women and their partner, with childbirth taking place in the French-speaking part of Switzerland.
⇒ Different outcomes focusing both on the individual parents, as well as the couple and their role as parents, are included.
⇒ Mental health status before childbirth is measured at baseline, but, somatic health, although very relevant, was not included to limit the number of questionnaires.

## INTRODUCTION

Approximately 20%–40% of women experience childbirth as traumatic, and about 4%–5% develop childbirth-related post-traumatic disorder (CB-PTSD).[1] Post-traumatic stress disorder consists of four symptom clusters, such as re-experiencing, avoidance, negative cognition and mood, and arousal.[2] CB-PTSD has been proposed as a new subtype of PTSD,[3] with birth-related symptoms (re-experiencing and avoidance) and general symptoms (negative mood and cognition, hyperarousal).[4] Not all women who had a traumatic childbirth experience go on to meet all CB-PTSD diagnostic criteria. Approximately 12.3% of women, and up to 21% in high-risk groups, such as following unplanned caesarean section, report some childbirth-related post-traumatic stress symptoms (CB-PTSS).[1] CB-PTSD can also develop some time after childbirth, in which case it is referred to as the CB-PTSD delayed type. Women's partners who were present during the birth can also develop CB-PTSD or CB-PTSS, with a reported prevalence rate of 1.3%.[1] More studies are needed on partners and coparents, since their role is key within the family; they are usually present

during birth and are highly involved in the children's lives.[5]

Although CB-PTSD shares aetiologic features with generic PTSD, it has its own specific risk factors (pregnancy, birth related or postnatal). Antenatal depression, unplanned pregnancy, fear of childbirth and complications during pregnancy, combined or not with birth complications, severe labour pain, operative birth or negative birth experience represent pregnancy-related and birth-related vulnerabilities, respectively.[1 6 7] Postnatal risk factors are mainly related to postnatal comorbidities and lack of support,[8] while general risk factors are mainly linked to history of PTSD, comorbid mental disorders and experiencing stressful events.[7]

The development of CB-PTSD can have a detrimental impact on the parents, as well as on the whole family system, fear of subsequent pregnancies and births,[9] impaired parent–infant bonding,[10] reduced breastfeeding rates,[11] lower parenting quality,[12] poorer marital adjustment,[13] child sleep[8] and child behaviour.[12 14] Moreover, a high comorbidity of CB-PTSD with postnatal depression and anxiety disorders has been shown.[15] Depression and anxiety disorders may also trigger parental burnout.[16] Healthcare seeking behaviours may also be impacted by anxiety and depression, with a possible increased risk of healthcare renunciation. Healthcare renunciation is related to forgoing available healthcare (physical and/or psychological), considered as suitable, for any reasons, including economic motives, depression and fatigue.[17] Healthcare renunciation related to the mother and coparent in the postpartum period may thus be another consequence of CB-PTSD and CB-PTSS; however, research on this is still lacking.

To develop targeted interventions adapted to the Swiss context for early detection of risk of CB-PTSD and prevention, there is a need to better understand the aetiology of CB-PTSD and CB-PTSS for mothers and their partners, that is, the risk and the protective factors, as well as the subsequent impact on the whole family system, including healthcare seeking behaviours.

### Study aims

The aims of the present study are to investigate the prevalence of CB-PTSD and CB-PTSS in the French-speaking part of Switzerland and to analyse the psychological, medical and social factors linked with CB-PTSD and CB-PTSS, whether they are antecedent factors or further consequences. The primary outcome is the prevalence of CB-PTSS and CB-PTSD in the French-speaking part of Switzerland, for both mothers and partners. The secondary outcomes focus on: (1) the risk and protective factors of CB-PTSD and CB-PTSS for both mothers and partners, (2) the impact of CB-PTSD and CB-PTSS on the marital and coparental adjustment, on the bonding with the infant, on the perceived parenting self-efficacy, on parental burn out and healthcare seeking behaviours, (3) the role of the childbirth experience in the development of CB-PTSD and CB-PTSS, including emotional aspects and (4) the social and economic determinants of CB-PTSD and CB-PTSS, including, for example, social support and religion.

A part of the data collected in the Swiss cohort on Traumatic Childbirth and Health (SwiTCH) study will also contribute to the primary and secondary outcomes of the International Survey of Childbirth-related Trauma (INTERSECT,researchregistry6439—11 January 2021), that is, (1) the determination of the prevalence of birth trauma and CB-PTSD across countries and cultures, (2) the determination of differences in symptom presentation across countries and cultures and (3) the determination of the aetiology of CB-PTSD symptoms across countries and cultures.

## METHOD AND ANALYSIS

The relevant parts of the Strengthening the Reporting of Observational studies in Epidemiology guidelines were followed for the preparation of this protocol. The study is registered on ClinicalTrials.gov, NCT05865704.

### Study design

The present study consists of a prospective population-based observational longitudinal cohort study with online surveys at four time points:

- T1, during the third trimester of pregnancy: assessment of risk and protective factors for CB-PTSD and CB-PTSS, such as antenatal stress, couple relationship quality/satisfaction, social support, current anxiety and depression symptoms, and history of mental health issues and treatments. Fear of childbirth and prenatal attachment are also assessed at this stage. Sociodemographic information is also collected.
- T2, at 6–12 weeks postpartum: focusing on medical and emotional aspects of childbirth and its consequences. The survey also investigates immediate CB-PTSD and CB-PTSS onsets and other short-term outcomes, such as early coparenting quality, parent–infant bonding, perceived parenting self-efficacy, depression and anxiety symptoms.
- T3, at 6 months postpartum: reassessment of CB-PTSD and CB-PTSS, as CB-PTSD occurring more than 6 months after the traumatic event represents the 'delayed PTSD' subtype.
- T4, at 12 months postpartum: identifying the prevalence of delayed CB-PTSD and CB-PTSS, or of persistent/recurrent perinatal depression symptoms, assessing healthcare renunciation, as well as couple relationship quality/satisfaction, coparenting quality and parental burnout.

Participants enter the SwiTCH study preferably at t1, but inclusion at t2 is also possible to maximise recruitment. The participants included at t2 will complete the sociodemographic and history of mental health surveys at t2 instead of t1.

### Study population

The primarily targeted population of the present study are mothers. The inclusion criteria are being pregnant

in the third trimester or being between 6 and 12 weeks postpartum, being 16 years old or older and having a sufficient understanding of French to be able to read and answer questionnaires in French. Of note, the term 'mother' is used to make the distinction between pregnant persons and their partners; however, any non-female pregnant person who fulfils the inclusion criteria would be eligible. Partners (if any and willing to participate) are recruited based on the inclusion criteria for mothers. There is no specific exclusion criterion for the present study. However, participation will be interrupted in case of perinatal loss.

### Recruitment procedure

The recruitment started in July 2022 and is planned until at least the end of 2024 to reach the targeted number of participants. Participants are recruited in the Cantons of Vaud, Neuchâtel, Fribourg, Valais and Geneva, through maternity units of hospitals or through online and paper advertising via independent health professionals providing maternity care, such as private midwives, gynaecologists, pregnancy yoga teachers, etc. Perinatal health professionals in the eligible areas are invited to inform their patients (mothers/couples) about the study and to advertise it via posters and flyers in their waiting rooms.

(Future) parents interested in participating fill out a short online questionnaire (within the Research Electronic Data Capture (REDCap) web application),[18 19] including questions on contact details, gender, age, predicted date of birth, relationship status and if applicable, contact details of the partner. The study coordinator contacts the participants by telephone to check their eligibility and the collected online information, gives them more detailed information about the study, and replies to their possible questions. This call also enables the study coordinator to establish a personal link with each participant and to inform them of their availability to answer any questions or needs participants may have during their participation in the study. The participants receive a family code in REDCap (which allows the pairing of data stemming from the same parenting couple) and the surveys are sent out according to the time points described above. Both mothers and partners are asked to sign an electronic informed consent at the first time point of the study to access the survey. Each participating family will receive a gift for the child (baby bottle, pacifier) after completing the first questionnaires (t1 or t2, according to the time of enrolment).

### Primary outcome

The primary outcome is the prevalence of CB-PTSD and CB-PTSS in the French-speaking part of Switzerland, for both mothers and partners.

### Secondary outcomes

The first secondary outcome includes the risk and protective factors of CB-PTSD and CB-PTSS through the baseline measurements before childbirth, including history of traumatic events and mental health problems, especially depression and anxiety symptoms, for both mothers and partners. The second secondary outcome includes the possible consequences of CB-PTSD and CB-PTSS for mothers, partners and their relationships, such as bonding with infant, coparenting and relationship quality, parental burnout and healthcare renunciation. The childbirth experience including emotional and affective aspects (eg, support from partner) and its role in the development of CB-PTSD and CB-PTSS will constitute the third secondary outcome. Finally, for the fourth secondary outcome, the social and economic determinants of CB-PTSD and CB-PTSS will allow defining risk and protective factors linked to social support in the community.

### Measures

The measurements and their timing (t1, t2, t3 and t4) are described in table 1. The table also indicates who the target is (mother and/or partner). Given that the local population speaks French, the surveys will be completed in French.

#### City Birth Trauma Scale (City BiTS)

The City BiTS[4] is a 29-item self-report questionnaire assessing CB-PTSD and CB-PTSS according to the PTSD criteria of DSM-5.[2] A French version of the City Bits (City BiTS-F) has been validated and good psychometric properties have been reported.[20] The City BiTS-F has also been validated to assess CB-PTSD and CB-PTSS in partners.[21]

#### Perceived birth trauma

Perceived birth trauma will be assessed using a single-item question on a 10-point scale for women to rate whether their birth was traumatic from not at all (0) to extremely (10). This question will be used to verify if a single-item question can be validated to assess birth trauma.

#### Hospital Anxiety and Depression Scale (HADS)

The HADS[22] is a 14-item scale assessing anxiety and depression symptoms. A French version of the HADS has been validated and good psychometric properties have been reported.[23]

#### Edinburgh Postpartum Depression Scale (EPDS)

The EPDS[24] is a 10-item scale assessing depression symptoms. A French version of the EPDS has been validated and has shown good psychometric properties.[25]

#### History of mental health disorders and treatment

Previous and current mental health disorders and treatments will be assessed. Participants will be asked whether they were already and/or are currently diagnosed with a mental health disorder. They will also be asked whether they have received and/or are receiving support or a treatment for a mental health disorder. Finally, they will be asked which type of support or treatment they received or are still receiving (drug treatment; professional support;

**Table 1** Questions or instruments used versus time points

| Investigated dimensions (with questionnaire's names) | Target | Variable's information and/or French instrument's validation | Time points | | | | |
|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T2 entry | T3 | T4 |
| ID+contact | M&P | Family ID, email, phone number | x | | x | | |
| Consent | M&P | Age confirmation, consent | x | | x | | |
| Sociodemographic information | M&P | Ethnicity, country of origin, place of living Education, income, relationship Parity, number of children | x | | x | | |
| Religion and religiosity | M&P | Gmel *et al*[51] | x | | x | | |
| Gynaecological and obstetrical history | M | Self-reported | | x | x | | |
| Overall mental health | | | | | | | |
| History of mental health issues/treatment | M&P | Past/current issues and treatment | x | | x | | x |
| Anxiety and depression (Hospital Anxiety and Depression Scale) | M&P | Untas *et al*[22] | x | x | x | x | x |
| Perinatal depression (Edinburgh Postpartum Depression Scale) | M&P | Guedeney and Fermanian[25] | x | x | x | x | x |
| Pregnancy and fear of childbirth | | | | | | | |
| Planned pregnancy | M&P | Was the pregnancy planned? Yes/no | x | | | | |
| Fear of childbirth or delivery | M&P | How much do you fear childbirth? Not at all/completely | x | | | | |
| Fear of Childbirth | M | To be validated in French in this study | x | | | | |
| Antenatal stress (Antenatal Perceived Stress Inventory) | M | Razurel *et al*[26] | x | | | | |
| Birth experience (common to International Survey of Childbirth-related Trauma study) | | | | | | | |
| Previous trauma | M&P | Non-birth-related trauma | x | | x | | |
| Previous birth trauma | M&P | Traumatic previous birth, pregnancy loss | x | | x | | |
| Delivery | M | Number of babies, date, pregnancy week, delivery methods, complications | | x | x | | |
| Consequences | M | Effects on mother and infant | | x | x | x | x |
| Birth trauma | M&P | Extent of trauma: not at all/highly traumatised | | x | x | | |
| Birth-related post-traumatic stress disorder (City Birth Trauma Scale) | M&P | Sandoz *et al*[20] | | x | x | x | x |
| Birth satisfaction (Birth Satisfaction Scale) | M | Avignon *et al*[31] (In preparation) | | x | x | | |
| Support from partner during childbirth | M | Extent of partner's support? Not at all[1]/ tremendously[5] | | x | x | | |
| Relational factors | | | | | | | |
| Prenatal Attachment Inventory | M | Jurgens *et al*[33] | x | | | | |
| Postpartum Bonding (Postpartum Bonding Questionnaire) | M | Demanche *et al*[35] | | x | x | x | |
| Parent–infant bonding (Mother-to-Infant Bonding Scale) | M&P | Bienfait *et al*[37] | | x | | | |
| Relationship Assessment Scale | M&P | Saramago *et al*[41] | x | x | x | | x |
| Coparenting Relationship Scale | M&P | Favez *et al*[43] | | x | x | | x |
| Distress and efficacy | | | | | | | |
| Perceived Maternal Parenting (Perceived Maternal Parenting Self-Efficacy) | M&P | Schneider *et al*[45] | | x | x | | |
| Parental burnout (Parental Burnout Assessment) | M&P | Roskam *et al*[46] | | | | | x |
| Social determinants of health | | | | | | | |

Continued

Table 1 Continued

| Investigated dimensions (with questionnaire's names) | Target | Variable's information and/or French instrument's validation | Time points | | | | |
|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T2 entry | T3 | T4 |
| Social support (Modified Medical Outcomes Study Social Support Survey) | M&P | Moser *et al*[47] | x | x | x | x | x |
| Neighbourhood social capital (Perceived Neighbourhood Social Cohesion Brief Form) | M&P | Dupuis *et al*[49] | | | | x | |
| Healthcare renunciation and reasons | M&P | Baggio *et al*[17] | | x | x | | x |
| Survey closure | | | | | | | |
| Participant comments | M&P | Free text space for additional remarks | x | x | x | x | x |

M, mother (or pregnant participant); P, partner.

both; other, with the possibility to indicate what other type of support it is).

### Previous trauma

Previous trauma will be assessed by asking the participants whether they have been exposed to or have witnessed a stressful or traumatic event during their life. They will be able to select from a list which events they went through (serious life-threatening health problem or disease; physical aggression; sexual aggression; military conflict or civil war; abuse during childhood; accident; natural disaster; others).

### Previous birth trauma

Previous birth trauma will be determined by asking whether previous births were traumatic and whether they experienced perinatal loss (miscarriage; stillbirth).

### Antenatal Perceived Stress Inventory (APSI)

The APSI[26] is a 12-item scale assessing antenatal stress. The original APSI was originally validated in French and has shown good psychometric properties.[26]

### Fear of Childbirth Questionnaire (FCQ)

The FCQ[27] is a 22-item scale assessing the fear of childbirth. A French translation and cultural adaptations using the forward–backward was performed.[28] Additionally, since the FCQ was developed for the UK context, one question was added at the end to assess other fears that could be dependent on the Swiss context. The French version of the FCQ will be validated during the study.

### Degree of fear of childbirth

The degree of fear of childbirth during pregnancy will be assessed with a single-item validated question from 0 (no fear at all) to 10 (high fear).[29]

### Birth Satisfaction Scale Revised (BSS-R)

The BSS-R[30] is a 10-item scale assessing birth satisfaction. A validation procedure of the French version of the BSS-R is currently ongoing.[31]

### Partner support

Mothers will rate the support of their partner (if any) from not at all (0) to extremely (5). This question, not validated, will be assessed to verify whether partner support can be evaluated via a single-item question.

### Prenatal Attachment Inventory

The PAI[32] is a 21-item scale assessing the relationships with the child about to be born during pregnancy. A French version of the PAI has been validated and good psychometric properties have been reported.[33]

### Postpartum Bonding Questionnaire (PPBQ)

The PPBQ[34] is a 25-item scale assessing the mother–infant bonding. A French version of the PPBQ has been validated and good psychometric properties have been found.[35]

### Mother-to-Infant Bonding Scale (MIBS)

The MIBS[36] is an 8-item scale assessing the feelings toward the infant. A French version of the MIBS has been validated and showed good psychometric properties.[37] Although the MIBS was developed to assess mother–infant bonding, it has been used in other languages to assess father–infant bonding.[38 39]

### Relationship Assessment Scale (RAS)

The RAS[40] is a 7-item scale assessing the quality of the couple relationship. A French version of the RAS has been validated, with satisfactory psychometric properties.[41]

### Coparenting Relationship Scale (CRS)

The CRS[42] is a 35-item scale assessing the quality of the coparental relationship. A French version of the CRS has been validated and good psychometric properties have been reported.[43]

### Perceived Maternal Parenting Self-Efficacy (PMP-SE)

The PMP-SE[44] is a 20-item scale assessing the mother's perception of her ability to parent. The French version of the PMP-SE has been validated and has shown good psychometric properties.[45]

### Parental Burnout Assessment (PBA)

The PBA[46] is a 27-item scale assessing parental burnout. The PBA was originally validated in French and good psychometric properties have been reported.[46]

### Modified Medical Outcomes Study Social Support Survey (mMOS-SS)

The mMOS-SS[47] is an 8-item scale assessing social support. In the absence of a validated French version of the mMOS-SS, a French version that has already been used in Switzerland[48] has been used in the present study.

### Perceived Neighbourhood Social Cohesion (PNSC)

The PNSC Brief Form (PNSC-BF)[49] is a 9-item scale assessing the sense of cohesion within the neighbourhood. The PNSC-BF has been originally validated in French, with good psychometric properties.[49]

### Healthcare renunciation

The healthcare renunciation and its reasons are also assessed via three questions used in different languages in several European countries and Switzerland.[17 50] The first item assesses whether participants have renounced to healthcare in the last twelve months, the second item assesses the type of renounced healthcare (surgery, healthcare by a general practitioner, healthcare by a specialist, medication, teeth care, rehabilitation in hospital, outpatient rehabilitation, devices, healthcare in a specialised centre, at-home healthcare, housekeeping support, emergency, others). The third item assesses the reasons for the renunciation (financial, lack of time, fear to see healthcare providers or fear of examination or treatment, automedication, waiting for self-recovery, lack of good general practitioner or specialist, lack of energy, other reasons). The information obtained from these questions are dichotomous (presence or absence of renunciation to the listed healthcare and services).

### Sociodemographic information

Sociodemographic information includes the age, ethnicity, country of origin, type of accommodation, education, income, relationship, parity and number of other children, if any. Religion and religiosity (the extent of the commitment to religious beliefs and principles) is also included.[51]

### Pregnancy information

Some other pregnancy information includes the assessment of the nature of the pregnancy; planned or not, natural or not, and if not, how it was induced. Other items deal with previous births, if any, such as, previous caesarean section, type of caesarean section (elective, unplanned, or other), and if previous births happened before 37th week of pregnancy.

### Childbirth-related medical information

For mothers, self-reported medical information includes the birthplace, date of delivery, number of weeks of pregnancy, type of preparation for childbirth, problems during pregnancy, number of children born, gender of children, mode of childbirth, type of anaesthesia during childbirth, if any, induction and childbirth complications, current impact of potential childbirth complications on mother and on child, and type of infant feeding.

## Risk of bias

### Participation and attrition bias

Most longitudinal surveys have a significant number of non-responders and attrition. Affective disorders, especially depressive symptoms, can have an impact on the participation, but more particularly on attrition.[52 53] During data analysis, the role of history of mental health disorders on attrition will be investigated.

The perinatal period is a particularly challenging and stressful time that requires many adjustments and where resilience can be hindered,[54] which may increase the attrition rate. Indeed, the length of questionnaires, the lack of time and energy may reduce the motivation to fill the survey. The attrition may be differential; it may be different between mothers and partners, and higher for parents with burnout than for healthy parents, especially for those renouncing to healthcare. To overcome this limitation, to facilitate the participation, and to maximise responses, questionnaires are available online and are directly sent to the email address of the participants. Moreover, before participants sign the consent form, they are informed about the length of the survey. During the study, reminders are sent to non-responders and most of the questions of the survey are mandatory to avoid missing data. The personal phone call with the participant at the enrolment, the availability of the study coordinator throughout the study, and the gift sent to the families were also designed to create a bond with participants that could reduce attrition.

### Other possible bias

Since the participants will complete the surveys alone on their smartphone or computer, the risks of reporting bias and social desirability bias are very limited. However, the risk of bias may still exist for sensitive topics related to mental health. The medical data are self-reported, thus inducing a risk of reporting or recall bias for this information. However, during the pilot phase, participants told us that the obstetrical and gynaecological questions were easy to understand and that the answers should normally be known by mothers.

## Sample size

All the inferential analyses are planned with a 5% threshold for type I error and a minimal statistical power of 80% is required. Under these conditions, the study aims to recruit 300–500 mothers and a proportional number of partners. Detecting significant associations between dichotomous variables with a minimal probability of 80% will be possible for medium to large associations, especially with a sample of 500 mothers or partners. Concerning factor analysis, samples are usually expected

to be 5–10 times larger than the number of variables used in the analyses,[55] which will be warranted by a number of participants between 300 and 500 in the present study. Regarding latent class analysis, the number of required participants is hardly predictable without having a clear idea of the underlying groups. However, the planned sample is likely to allow a distinction between pathological and non-pathological groups.

## Data collection

Study data will be collected and managed using REDCap electronic data capture tools hosted at Lausanne University Hospital,[18] a secure, web-based software platform designed to support data capture for research studies. The survey on REDCap will be developed in a way that all questions are mandatory to prevent missing answers. Therefore, possible missing data will stem from attrition only. In such case, statistical analyses will be conducted by using robust estimation, that is, full information maximal likelihood, when applicable.

## Confidentiality

Personal contact details (email addresses for survey invitation) will be entered into REDCap as identifiers and will only be available to the study coordinator and the principal investigator, who will enter the information and eventually check survey completion. The only database in which identifiers will be available is the participant list that will not include survey data and will be stored separately on a secure server with limited access. A unique number will be attributed to the mothers and the same number will be attributed to the partner (if any) to allow for the pairing of the dyadic data, the distinction between mother and partner will be made with a second number (eg, 426_1 for the mother and 426_2 for the partner). Additionally, information making participants potentially identifiable (participation dates, infant birth date) will be coded before sharing data with researcher partners.

## Data sharing

The fully anonymised database from the present study will be uploaded on the open repository Zenodo (https://zenodo.org/) at the end of the data collection and publication process.

The anonymised data related to the common measurements with the INTERSECT Consortium (highlighted in table 1) will be shared using a secure server provided by City University of London. A signed data transfer and use agreement is in place and rules the conditions of data sharing with the INTERSECT Consortium.

## Statistical analysis

Bivariate analysis will be used to compare two groups (eg, those with CB-PTSD compared with those without CB-PTSD), with a $\chi^2$ test of independence between two variables and using t-test of differences between two groups. Comparison between partners of couples will also be performed. Repeated-measure analysis of variance (ANOVA) will be used to compare different groups over time. Causal path analysis or confirmatory factor analysis will be used to understand the causal relationships between CB-PTSD and CB-PTSS and their consequences (eg, coparenting, relationship quality in couples) and CB-PTSD and CB-PTSS and their risk and protective factors (eg, mode of birth, birth experience, relationship quality in couple, social support). Latent class analysis will be conducted to identify groups of participants based on their CB-PTSD and CB-PTSS patterns. In case of multiple statistical tests, the Bonferroni correction method will be used where appropriate.

## Patient and public involvement

Patients were not involved in the design or recruitment of the study. Results will be disseminated in written form to the participants and to the public via social media, websites and public events.

## Ethics and dissemination

The study protocol has been approved by the human research ethics committee of the Canton de Vaud (study number 2022-00284). All study participants signed an informed consent form. Participation in the study does not entail any particular risk. However, due to the content of the questionnaires, some participants may feel momentarily distressed. Participants will be informed that the research team will be available to provide information on where to seek support if needed.

The results of the SwiTCH study will be disseminated in peer-reviewed publications, at national and international conferences and on social media. The results will also be communicated as part of institutional communications within the Lausanne University Hospital to raise awareness among healthcare professionals.

**Author affiliations**
[1]Institute of Higher Education and Research in Healthcare, University of Lausanne, Lausanne, Switzerland
[2]University Department of Child and Adolescent Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[3]Institute of Primary Health Care (BIHAM), University of Bern, Bern, Switzerland
[4]Department of Woman Mother and Child, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland

**Acknowledgements** The authors thank Giuseppina Tenore and Mélanie Vanetti for the preparation of the communication material of the study, as well as the listing of healthcare professionals and organisations for recruitment, and Sabrina Villa and Marianne Gabastou for their contribution to the recruitment of participants and follow-up. Vincent Faivre and Fanny Muet are also acknowledged for their support in the setting up of the RedCap survey. Valérie Avignon is acknowledged for her help with the distribution of the recruitment material in the maternity ward. Vania Sandoz is acknowledged for her help in training part of the team on the RedCap platform and for providing some of the questionnaires.

**Contributors** HC and VR contributed equally to this manuscript, HC and VR should be mentioned as joint first authors. MD, VO and AH designed the study in collaboration with the INTERSECT consortium. MD and AH drafted the first version of the ethics protocol. HC, VR and VO contributed to the later versions of the protocol. MD designed the REDCap system for the project. HC, VO, MD, VR and AH significantly contributed to the establishments and refinements of the study procedures. HC, VR and AH drafted the manuscript. All the listed authors critically revised and approved the final version of the manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; externally peer reviewed.



**ORCID iD**

Antje Horsch http://orcid.org/0000-0002-9950-9661

## REFERENCES

1 Heyne C-S, Kazmierczak M, Souday R, *et al*. Prevalence and risk factors of birth-related posttraumatic stress among parents: a comparative systematic review and meta-analysis. *Clin Psychol Rev* 2022;94:102157.
2 American Psychiatric Association. *Diagnostic and statistical Manual of mental disorders.* 5th ed. Washington D.C: American Psychiatric Association, 2013.
3 Horesh D, Garthus-Niegel S, Horsch A. Childbirth-related PTSD: is it a unique post-traumatic disorder? *J Reprod Infant Psychol* 2021;39:221–4.
4 Ayers S, Wright DB, Thornton A. Development of a measure of postpartum PTSD: the city birth trauma scale. *Front Psychiatry* 2018;9:409.
5 Horsch A, Stuijfzand S. Intergenerational transfer of perinatal trauma-related consequences. *J Reprod Infant Psychol* 2019;37:221–3.
6 Chabbert M, Panagiotou D, Wendland J. Predictive factors of women's subjective perception of childbirth experience: a systematic review of the literature. *J Reprod Infant Psychol* 2021;39:43–66.
7 Ayers S, Bond R, Bertullies S, *et al*. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. *Psychol Med* 2016;46:1121–34.
8 Garthus-Niegel S, Ayers S, Martini J, *et al*. The impact of postpartum post-traumatic stress disorder symptoms on child development: a population-based, 2-year follow-up study. *Psychol Med* 2017;47:161–70.
9 Beck CT. Post-traumatic stress disorder due to childbirth: the aftermath. *Nurs Res* 2004;53:216–24.
10 Stuijfzand S, Garthus-Niegel S, Horsch A. Parental birth-related PTSD symptoms and bonding in the early postpartum period: a prospective population-based cohort study. *Front Psychiatry* 2020;11:570727.
11 Garthus-Niegel S, Horsch A, Ayers S, *et al*. The influence of postpartum PTSD on breastfeeding: a longitudinal population-based study. *Birth* 2018;45:193–201.
12 Van Sieleghem S, Danckaerts M, Rieken R, *et al*. Childbirth related PTSD and its association with infant outcome: a systematic review. *Early Hum Dev* 2022;174:105667.
13 Velotti P, Castellano R, Zavattini GC. Adjustment of couples following childbirth. *Eur Psychol* 2011;16:1–10.
14 Ben-Hassine S, Chabbert M, Rozenberg P, *et al*. Prevalence, evolution, and predictive factors of symptoms of postpartum posttraumatic stress disorder in a French-speaking cohort. *J Midwifery Womens Health* 2022;67:496–503.
15 Dikmen-Yildiz P, Ayers S, Phillips L. Longitudinal trajectories of post-traumatic stress disorder (PTSD) after birth and associated risk factors. *J Affect Disord* 2018;229:377–85.
16 Séjourné N, Sanchez-Rodriguez R, Leboullenger A, *et al*. Maternal burn-out: an exploratory study. *J Reprod Infant Psychol* 2018;36:276–88.
17 Baggio S, Iglesias K, Fernex A. Healthcare renunciation among young adults in French higher education: a population-based study. *Prev Med* 2017;99:37–42.
18 Harris PA, Taylor R, Thielke R, *et al*. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–81.
19 Harris PA, Taylor R, Minor BL, *et al*. The REDCap consortium: building an international community of software platform partners. *J Biomed Inform* 2019;95:103208.
20 Sandoz V, Hingray C, Stuijfzand S, *et al*. Measurement and conceptualization of maternal PTSD following childbirth: psychometric properties of the city birth trauma scale-French version (city BiTS-F). *Psychol Trauma* 2022;14:696–704.
21 Sandoz V, Lacroix A, Jubin M, *et al*. The latent factor structure and assessment of childbirth-related PTSD in fathers: psychometric characteristics of the city birth trauma scale—French version (partner version). *Psychol Trauma* 2023;15:1145–52.
22 Untas A, Aguirrezabal M, Chauveau P, *et al*. Anxiety and depression in hemodialysis: validation of the Hospital Anxiety and Depression Scale (HADS). *Nephrol Ther* 2009;5:193–200.
23 Bocéréan C, Dupret E. A validation study of the Hospital Anxiety and Depression Scale (HADS) in a large sample of French employees. *BMC Psychiatry* 2014;14:354.
24 Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. *Br J Psychiatry* 1987;150:782–6.
25 Guedeney N, Fermanian J. Validation study of the French version of the Edinburgh Postnatal Depression Scale (EPDS): new results about use and psychometric properties. *Eur Psychiatry* 1998;13:83–9.
26 Razurel C, Kaiser B, Dupuis M, *et al*. Validation of the antenatal perceived stress inventory. *J Health Psychol* 2014;19:471–81.
27 Slade P, Balling K, Houghton G, *et al*. A new scale for fear of childbirth: the Fear of Childbirth Questionnaire (FCQ). *J Reprod Infant Psychol* 2022;40:602–12.
28 Wild D, Grove A, Martin M, *et al*. Principles of good practice for the translation and cultural adaptation process for Patient-Reported Outcomes (PRO) measures: report of the ISPOR task force for translation and cultural adaptation. *Value Health* 2005;8:94–104.
29 Veringa-Skiba IK, de Bruin EI, Mooren B, *et al*. Can a simple assessment of fear of childbirth in pregnant women predict requests and use of non-urgent obstetric interventions during labour? *Midwifery* 2021;97.
30 Martin CH, Fleming V. The birth satisfaction scale. *Int J Health Care Qual Assur* 2011;24:124–35.
31 Avignon V, Deforges C, Sandoz V, *et al*. Validation of the French version of the birth satisfaction scale – revised. (in prep);
32 Muller ME. Development of the prenatal attachment inventory. *West J Nurs Res* 1993;15:199–211.
33 Jurgens MA, Levy-Rueff M, Goffinet F, *et al*. Psychometric properties of the French version of the prenatal attachment inventory in 112 pregnant women. *Encephale* 2010;36:219–25.
34 Brockington IF, Fraser C, Wilson D. The postpartum bonding questionnaire: a validation. *Arch Womens Ment Health* 2006;9:233–42.
35 Demanche A, Michel L, Chabbert M, *et al*. Version française du postpartum bonding questionnaire. *Devenir* 2022;33:287–310.
36 Taylor A, Atkins R, Kumar R, *et al*. A new mother-to-infant bonding scale: links with early maternal mood. *Arch Womens Ment Health* 2005;8:45–51.
37 Bienfait M, Haquet A, Maury M, *et al*. Traduction française de l'autoquestionnaire MIBS (Mother to Infant Bonding Scale) et validation comme évaluation du lien mère-nouveau-né en maternité. *Devenir* 2017;29:233–53.
38 Brandão S, Figueiredo B. Fathers' emotional involvement with the neonate: impact of the umbilical cord cutting experience. *J Adv Nurs* 2012;68:2730–9.
39 Yoshida K, Yamashita H, Conroy S, *et al*. A Japanese version of mother-to-infant bonding scale: factor structure, longitudinal changes and links with maternal mood during the early postnatal period in Japanese mothers. *Arch Womens Ment Health* 2012;15:343–52.
40 Hendrick SS. A generic measure of relationship satisfaction. *J Marriage Fam* 1988;50:93.
41 Saramago M, Lemetayer F, Gana K. Adaptation and validation of the French version of relationship assessment scale. *Psychologie Française* 2021;66:333–43.
42 Feinberg ME, Brown LD, Kan ML. A multi-domain self-report measure of coparenting. *Parent Sci Pract* 2012;12:1–21.
43 Favez N, Tissot H, Golay P, *et al*. French adaptation of the coparenting relationship scale: a scale for the assessment of the interparental relationship. *Eur J Psychol Assess* 2021;37:1–7.
44 Barnes CR, Adamson-Macedo EN. Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool: development and validation with mothers of hospitalized preterm neonates. *J Adv Nurs* 2007;60:550–60.
45 Schneider J, Borghini A, Morisod Harari M, *et al*. Joint observation in NICU (JOIN): study protocol of a clinical randomised controlled trial examining an early intervention during preterm care. *BMJ Open* 2019;9:e026484.

46 Roskam I, Brianda M-E, Mikolajczak M. A step forward in the conceptualization and measurement of parental burnout: the Parental Burnout Assessment (PBA). *Front Psychol* 2018;9:758.
47 Moser A, Stuck AE, Silliman RA, *et al*. The eight-item modified medical outcomes study social support survey: psychometric evaluation showed excellent performance. *J Clin Epidemiol* 2012;65:1107–16.
48 Gilbert L, Sandoz V, Quansah DY, *et al*. Prospective associations between maternal depression and infant sleep in women with gestational diabetes mellitus. *Front Psychol* 2022;13:926315.
49 Dupuis M, Baggio S, Gmel G. Validation of a brief form of the perceived neighborhood social cohesion questionnaire. *J Health Psychol* 2017;22:218–27.
50 Baggio S, Dupuis M, Wolff H, *et al*. Associations of lack of voluntary private insurance and out-of-pocket expenditures with health inequalities. Evidence from an international longitudinal survey in countries with universal health coverage. *PLoS One* 2018;13:e0204666.
51 Gmel G, Mohler-Kuo M, Dermota P, *et al*. Religion is good, belief is better: religion, religiosity, and substance use among young Swiss men. *Subst Use Misuse* 2013;48:1085–98.
52 Dupuis M, Strippoli M-PF, Gholam-Rezaee M, *et al*. Mental disorders, attrition at follow-up, and questionnaire non-completion in epidemiologic research. Illustrations from the CoLaus| PsyCoLaus study. *Int J Methods Psychiatr Res* 2019;28:e1805.
53 Lamers F, Hoogendoorn AW, Smit JH, *et al*. Sociodemographic and psychiatric determinants of attrition in the Netherlands Study of Depression and Anxiety (NESDA). *Compr Psychiatry* 2012;53:63–70.
54 Young C, Roberts R, Ward L. Hindering resilience in the transition to parenthood: a thematic analysis of parents' perspectives. *J Reprod Infant Psychol* 2022;40:62–75.
55 Nunnally JC. *Psychometric theory*. New York: McGraw-Hill, 1967.