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# Fathers' anxiety levels during early postpartum: A comparison study between first-time and multi-child fathers

C. Daire<sup>a</sup>, B. Martinez de Tejada<sup>b,c</sup>, M.J. Guittier<sup>b,d,\*</sup>

<sup>a</sup> University of Applied Sciences and Arts Western Switzerland (HES-SO) and University of Lausanne (UNIL), Switzerland

<sup>b</sup> Department of Pediatrics, Gynecology and Obstetrics, University Hospitals of Geneva, Geneva, Switzerland

<sup>c</sup> Faculty of Medicine, University of Geneva, Geneva, Switzerland

<sup>d</sup> School of Health Sciences Geneva HES-SO, University of Applied Sciences and Arts Western, Switzerland

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## ABSTRACT

**Background:** The postnatal period is considered the most challenging period in the adjustment to fatherhood. This study aimed to assess anxiety levels among fathers during this period.

**Methods:** A comparative study assessing the anxiety levels of first-time and multi-child fathers before the mother and child returned home (0–7 days after birth) was conducted. We used the French validation of the State–Trait Anxiety Inventory (STAI).

**Results:** Among 235 fathers who were met at the maternity ward, 182 (77 %) responded to the questionnaire. For most fathers in both groups, anxiety levels were low or very low for trait anxiety (166/182, 91.21 %) and state anxiety (177/182, 97.25 %). Levels of state anxiety were statistically higher for first-time fathers compared to multi-child fathers but were mainly at a low or very low level (70/83 [84 %] versus 71/99 [71 %], respectively,  $p = 0.029$ ). The multiple linear regression showed that “feeling prepared at birth time” was the only significantly ( $p < 0.001$ ) associated factor with state anxiety among first-time fathers only.

**Limitations:** The validity and reliability of the STAI have been widely proven for the general population but not specifically for men during the postpartum period.

**Conclusions:** Most fathers had low to very low anxiety levels during the early postpartum period, suggesting that developing new specific support interventions is not needed during early postnatal care. Further research focusing on when the family is back home is warranted.

## 1. Introduction

Since the International Conference on Population and Development in 1994, the importance of involving men in areas related to sexual reproduction has been established (World Health Organization [WHO], 2007). With the feminist movements of the 1960s and 1970s advocating for gender equality, men have been increasingly called upon to participate in family life in the same ways as women (WHO, 2007). The father's role has shifted from a traditional and authoritarian attitude to a warmer, more affectionate and interactive attitude (Genesoni and Talandini, 2009). Therefore, the transition to parenthood affects both women and men. After detailing many processes related to mothers' futures, it was only recently that researchers became interested in paternity (WHO, 2007; Åsenhed et al., 2014).

The changes in identity and social constructs that occur while

transitioning from being a man to being a father come with many challenges, and the emotional journey of this transformation can be compared to a “roller coaster” (Åsenhed et al., 2014). In its 2015 report, the WHO recognized the importance of health services to support fathers-in-the-making and to involve them as much as possible in their spouse's reproductive health. Indeed, starting on the right foot in paternity contributes to better health outcomes, and adopting parental responsibilities as early as possible positively influences the health of women, children and men themselves (WHO, 2015). However, many men feel insufficiently prepared to become fathers (Deave and Johnson, 2008) and left out when it comes to maternity care (Darwin et al., 2017). Considering that the medical profession puts the mothers' and children's health at the centre of care, it is easily understandable that fathers may feel neglected in their identity transition (Deave and Johnson, 2008). Darwin et al. (2017) described “feelings of conflict about [men] wanting

\* Corresponding author at: hes-so délémont, Haute Ecole de Santé de Genève (HESd), Avenue de Champel, 47, 1206 Genève, Geneva, Switzerland.

E-mail address: [marie-julia.guittier@hesge.ch](mailto:marie-julia.guittier@hesge.ch) (M.J. Guittier).

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to be more involved, and a questioning as to whether this may detract from the support provided to women". Moreover, Franzen et al. (2021) suggested that more support from the healthcare professionals would positively benefit fathers' experience of childbirth. According to Genesoni and Tallandini (2009), pregnancy, birth and postpartum are the three main stages leading to fatherhood. The foetus becomes real to a father once it is first visualised during an ultrasound (Draper, 2002), and childbirth is a highly emotional moment (Eskandari et al., 2016; Figueiredo et al., 2018). Among these three periods, the postnatal one, lasting up to one year after birth, is considered the most difficult for future fathers to adapt to (Genesoni and Tallandini, 2009; Baldwin et al., 2018).

Although becoming a father is often expected and welcome, it can also be complex and demanding (Philpott and Corcoran, 2018; Philpott et al., 2019). Thus, many fathers experience mental health difficulties during the perinatal period (Philpott et al., 2019). Baldwin et al. (2018) reported that anxiety and depression were the two most common problems fathers faced during this period. In their systematic review of fathers' anxiety during the perinatal period, Philpott et al. (2019) noted that research has focused on perinatal depression with little attention paid to anxiety, which is much more common in the general population. Indeed, 14 % of individuals are affected by anxiety compared to 6.9 % who are affected by depression; 17.4 % of fathers experience anxiety during the first six months postpartum compared to 4.1 % who experience depression (Philpott et al., 2019). Furthermore, anxiety is a risk factor leading to more severe mental disorders, such as depression (Philpott et al., 2019). As men tend to underreport mental health issues and because of limited data on that topic, difficulties arise to properly estimate emotional distress among fathers (Fisher et al., 2021). Perinatal paternal anxiety might be underdiagnosed, and it is associated with many adverse effects, such as lower levels of parental self-efficacy, increased fatigue, decreased support for one's partner and impaired father-child interaction (Philpott et al., 2019). For fathers, it is challenging to balance the various demands placed on them with their personal and professional needs, their new role as parents, the emotional and relational needs of their families as well as societal and economic pressures (Baldwin et al., 2018; Fisher et al., 2021). During the perinatal period, Philpott et al. (2019) posited that while "most of the father's anxiety reactions are transient and adaptive and are related to the stress associated with the transition to fatherhood or the arrival of subsequent children", they can impair quality of life and proper functioning.

Most research on fathers involves men who are becoming fathers for the first time. To date, there is almost no research on the feelings of fathers who are welcoming additional children. The aim of this research was to assess fathers' anxiety during the early postpartum period by comparing two groups of individuals: fathers welcoming their first child, called *first-time fathers*, and fathers who already have at least one child, called *multi-child fathers*.

## 2. Materials and methods

### 2.1. Study design

We used a comparative observational study to evaluate the state- and trait-anxiety levels of first-time and multi-child fathers during the early postpartum period (0–7 days), before the mother and child returned home.

### 2.2. Participants

The studied population included men who welcomed their child in the maternity hospital of the University Hospitals Geneva from June 2020 to September 2020.

Inclusion criteria included (a) being  $\geq 18$  years of age and (b) being able to read and understand French. Exclusion criteria included (a) fathering a newborn who had one or more medical conditions or

malformations (Skreden et al., 2010) and (b) fathering twins (Wenze et al., 2015); both particularities are especially anxiety-inducing.

Recruitment took place during the COVID-19 pandemic. Due to the imposed sanitary restrictions inside hospitals as a result of the current pandemic, the environment surrounding childbirth and the postnatal period was disrupted. At the study's maternity ward, only one person, usually the father, was allowed to visit the mother and her baby in the birth room for a maximum of 2 h. Since access to the mothers' rooms was restricted, recruitment had to be done at the maternity entrance by approaching men who visited their partners and newborns. Only one person oversaw the recruitment; therefore, not all time slots and days were covered. Because of the restrictions, a security agent was controlling the access to the maternity and all visitors had to tell the reason for coming before being allowed to go in or not. The recruiting researcher stood next to the agent, so she could identify fathers and asked them to complete the study questionnaire during the mother and child's hospital stay.

In the absence of preliminary data that would have allowed us to calculate a sample size based on a difference in the mean anxiety level between the two groups, we decided on a simple random sampling of 100 fathers from each group, for a total of 200 participants.

### 2.3. Tool measurement

We used Spielberger's STAI from 1988 to measure anxiety levels. This test is recognized for its reliability and construct validity. In 1993, Bruchon-Schweitzer and Paulhan translated it into French (Langevin et al., 2012). It consists of two parts: The first is the STAI-YA, which assesses the respondent's level of *state anxiety*—that is, his anxiety level at the present moment, to a stressful situation, which, in this study consisted in welcoming a child or adapting to his new role as a father. The second is the STAI-YB, which assesses one's anxiety level as a personality trait to determine one's overall anxiety status. Each part comprises 20 items, all of which are measured using a four-point Likert scale. For the YA scale, participants chose between "no", "rather no", "rather yes" and "yes", whereas the YB scale's response modalities included "almost never", "sometimes", "often" and "almost always". Each response resulted in a score: 1 for the lowest anxiety level and 4 for the highest. The sum of the scores obtained for each scale corresponds to a specific anxiety level (Bruchon-Schweitzer and Paulhan, 1993) (Table 1). Respondents were not told about what specific situation they were assessed on, but we cannot exclude that they could make a personal assumption about anxiety state being related to the birth of their child.

When both forms of the STAI are used, like in this study, it is recommended to administer the YA scale first. The YB scale "has shown little sensitivity to the conditions under which it is administered", whereas responses for the YA scale can "be influenced by the emotional climate induced by the [Y] B scale if it is administered first" (Langevin et al., 2012). We followed this recommendation.

To describe our population, we also collected general questions on the participants' sociodemographic data, such as their level of education, age and nationality. Moreover, we asked obstetrical questions regarding the participants' number of children, whether they took antenatal classes, their partner's mode of delivery and how they felt accompanied personally by the professionals. Finally, because the study was carried out during the COVID-19 pandemic, five questions related to the

**Table 1**  
Anxiety levels by total score.

| Anxiety level | Total score for each scale |
|---------------|----------------------------|
| Very high     | > 65                       |
| High          | 56–65                      |
| Moderate      | 46–55                      |
| Low           | 36–45                      |
| Very low      | < 36                       |

pandemic, including postpartum visit time and concerns about the virus, were asked to report this possible new anxiety factor. The questionnaire took approximately 10 min to answer.

#### 2.4. Procedure

Using a tablet, we electronically administered the questionnaire using the LimeSurvey software (<https://www.limesurvey.org/fr/>). Using this tool allowed us to ensure participants' data confidentiality since the input was anonymous, as well as the automatic reporting of answers in an Excel table avoided manual transcription errors.

#### 2.5. Data analysis

Statistical analyses were carried out using the Stata 16.0 software (<https://www.stata.com>). The statistical tests were bilateral by default. The chosen threshold of significance was 0.05. We calculated means and standard deviations for continuous variables and proportions for categorical variables. The Student *t*-test was used to determine the difference between the two groups' means. A chi-square test was used to analyse the association between categorical variables. In the case of an asymmetrical variable distribution, we used the appropriate nonparametric tests: the Mann–Whitney *U* test for quantitative variables and Fisher's exact test for categorical variables. The feeling to be supported during childbirth and during postpartum and the feeling to be ready to go home was measured using a visual analogue scale (VAS) ranging from 0 (worst feeling) to 10 (best feeling). Finally, we analysed multiple associations through multiple linear regression tests, while controlling for five variables that may explain anxiety chosen as logical variables who could influence anxiety level according to our clinical professional observations and on basis of results of studies on father's experience of childbirth. A VIF test was performed to verify the possible collinearity between the variables.

#### 2.6. Ethical considerations

All analysed data were anonymised. It is impossible to identify a participant using the written publications or oral presentations that have been and will be made of this work.

After the fathers completed the questionnaire, they were given a sheet listing the signs and symptoms of anxiety and depression, with several sets of contact information in Geneva if needed.

Following the Swiss federal law on research on human beings, the Geneva Canton Ethics Commission president confirmed that the Ethics Commission did not need to review this project because the aim was outside of the scope of the law (Req-2020-00463).

### 3. Results

#### 3.1. Participation

Between June 2020 and September 2020, almost 1500 fathers were eligible for participation. Of 347 fathers approached, 235 met the inclusion criteria. Of these, 182 participants (77 %) responded to the questionnaire. Of the respondents, 99 were first-time fathers, and 83 were multi-child fathers (Fig. 1).

Socioeconomic and perinatal data of participants are reported in Table 2.

#### 3.2. Antenatal classes

First-time fathers were interested in antenatal classes; 61 (62 %) undertook one or several courses (90 % took traditional antenatal classes; 4 % attended specific meetings with other fathers; 2 % undertook haptonomy and 7 % prepared with a midwife, either on the internet or through books). Of the 38 % who did not take antenatal classes, 44 % stated that it was due to the cancellation of courses because of COVID-

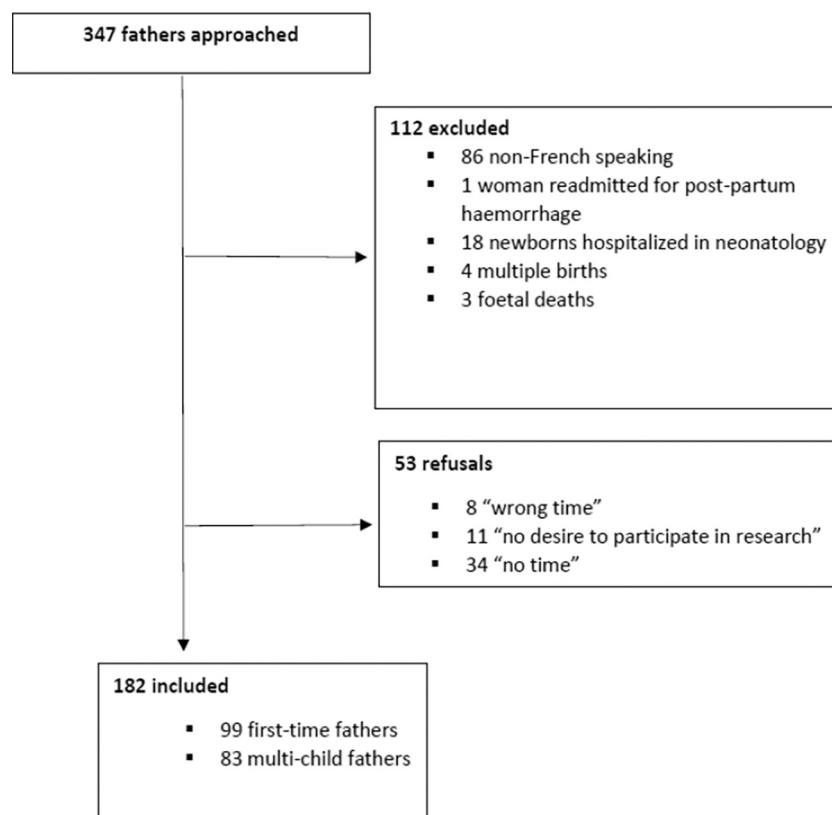


Fig. 1. Flow chart.

**Table 2**  
Participant characteristics.

|  | Total             | First-time fathers | Multi-child fathers | P-value |
|--|-------------------|--------------------|---------------------|---------|
| Participants n (%)                             | 182 (100)         | 99 (54.40)         | 83 (45.60)          | < 0.001 |
| Median age in years (range; IQR 25–75)         | 35 (22–58; 31–39) | 32 (22–52; 30–35)  | 37 (24–58; 34–40)   | < 0.001 |
| Education n (%)                                |                   |                    |                     | 0.747   |
| Minimum education                              | 7 (3.85)          | 3 (3.03)           | 4 (4.82)            |         |
| Secondary school certificate                   | 37 (20.33)        | 22 (22.22)         | 15 (18.07)          |         |
| Higher school certificate                      | 29 (15.93)        | 13 (13.13)         | 16 (19.28)          |         |
| Bachelor's/master's degree                     | 100 (54.95)       | 56 (56.57)         | 44 (53.01)          |         |
| Other  | 9 (4.95)          | 5 (5.05)           | 4 (4.82)            |         |
| Attended antenatal classes n(%)                | 76 (41.76)        | 61 (61.62)         | 15 (18.07)          | < 0.001 |
| Felt prepared for birth n (%)                  |                   |                    |                     | < 0.001 |
| Very well prepared                             | 60 (32.97)        | 21 (21.21)         | 39 (46.99)          |         |
| Well prepared                                  | 102 (56.04)       | 62 (62.63)         | 40 (48.19)          |         |
| A little prepared                              | 16 (8.79)         | 14 (14.14)         | 2 (2.41)            |         |
| Not prepared at all                            | 4 (2.20)          | 2 (2.02)           | 2 (2.41)            |         |
| Attended childbirth n (%)                      | 171 (93.96)       | 97 (97.98)         | 74 (89.16)          | 0.013   |
| Felt supported during childbirth VAS mean (SD) | 9.33 (1.52)       | 9.48 (1.27)        | 9.16 (1.76)         | 0.147   |
| Felt supported during postpartum VAS mean (SD) | 8.92 (1.97)       | 9.08 (1.83)        | 8.72 (2.11)         | 0.222   |
| Felt ready to go home VAS mean (SD)            | 8.76 (1.86)       | 8.28 (1.93)        | 9.32 (1.60)         | < 0.001 |

19. Regarding multi-child fathers, only 15(18 %) took classes; 26 indicated that they were not interested in them, and 24 indicated that they had already done it for their first child. Having attended antenatal classes was statistically significantly different between first-time fathers and multi-child fathers (61.6 % versus 18 % respectively,  $p < 0.001$ ).

### 3.3. Felt prepared for birth

Aside from 4 multi-child fathers, half of them felt “very well prepared” and the other half felt “well prepared”. In contrast, despite high participation in antenatal classes, only 21 % of first-time fathers felt “very well prepared” at birth, and 16 % felt “little or not at all prepared”. Although fathers generally felt well prepared (89 % reported feeling well to very well prepared), first-time fathers were significantly more likely to feel little or not at all prepared than multi-child fathers (16.2 % versus 4.8 % respectively,  $p = 0.015$ ).

### 3.4. Support from health professionals

With an overall VAS average of 9.33 out of 10, support from professionals during childbirth was perceived as of very high quality and appreciated by most fathers.

### 3.5. Felt ready to go home with mother and baby

First-time fathers felt most supported by professionals at birth and during the postnatal period. However, fathers in this group felt less ready to return home with their new families than multi-child fathers (VAS mean of 8.28 versus 9.32 respectively;  $p < 0.001$ ).

### 3.6. Mode of birth

Participants' partners gave birth differently in both groups. Without being able to verify this, it is likely that the wives of the first-time fathers were mostly primiparous and these of the multiple fathers multiparous. The statistically significant differences in mode of delivery were

expected from an obstetrical point of view. The percentages for primiparous and multiparous women were as follows: spontaneous vaginal birth 55.6 % versus 65 %, instrumental birth 20 % versus 6 %, scheduled caesarean sections 5 % versus 15.7 % and emergency caesarean sections during labour 19.2 % versus 13.3 % respectively,  $p = 0.004$ .

### 3.7. Day of questionnaire completion

The median day on which participants responded to the questionnaire was Day 2. One-third of the participants responded on Day 1 and another third on Day 2. There was no difference between the groups regarding the day of response ( $p = 0.719$ ).

### 3.8. STAI scores

Anxiety levels were low or very low for both trait anxiety (166/182, 91.21 %) and state anxiety (177/182, 97.25 %) among most fathers in both groups. None of the participants showed very high anxiety levels, and few had high or moderate levels (Table 3). For state anxiety, results were statistically significantly lower in the multi-child group than in the first-time group: 70/83 (84 %) of multi-child fathers had very low anxiety levels compared to 71/99 (71 %) of first-time fathers ( $p = 0.029$ ). Men experiencing their first birth were more likely to be anxious than those who already had children, even if their anxiety remained at low or very low levels. Approximately 91 % of the fathers in each group demonstrated trait anxiety of very low or low levels with no difference between first-time and multi-child fathers.

### 3.9. Predictive factors for anxiety

By conducting a multiple linear regression on five factors that could have predicted state anxiety (level of education, feeling of preparedness for birth, having taken antenatal classes, mode of delivery, and day of questionnaire completion), we found that feeling prepared for birth was statistically significantly associated with state anxiety ( $p < 0.001$ ) among first-time fathers only. The test carried out to check the collinearity between the variables in the model showed an independence of the variables between them ( $VIF < 2$ ).

### 3.10. COVID-19 context

Results from questions related to the pandemic revealed no statistically significant difference between the two groups of fathers (Table 4).

## 4. Discussion

Our study showed low to very low levels of both trait anxiety and state anxiety among fathers. These results were surprising, especially because we collected the data during the COVID-19 health crisis. We did find different anxiety levels between first-time fathers and multi-child fathers with higher level for first-time fathers. These results are in line with another study's findings, which highlighted that young men who attended childbirth for the first time felt more uncomfortable during delivery than those who had already experienced it (Vehviläinen-Julkunen and Liukkonen, 1998). Despite this difference, anxiety levels remained very low in both groups in our study.

We also observed that trait anxiety was classified as medium or high among 8 % of fathers whereas state anxiety reached such levels for only 2–3 % of participants. We expected that men of an anxious nature would have developed state anxiety during the early postpartum period, but this was not the case. Paradoxically, our results reflected less state anxiety than trait anxiety. Several hypotheses could explain the low anxiety rate despite fears related to childbirth.

**Table 3**  
STAI scores.

|               | STAI-YA state anxiety |                    |                     | P-value | STAI-YB trait anxiety |                    |                     | P-value |
|---------------|-----------------------|--------------------|---------------------|---------|-----------------------|--------------------|---------------------|---------|
|               | Total                 | First-time fathers | Multi-child fathers |         | Total                 | First-time fathers | Multi-child fathers |         |
| Anxiety level | n (%)                 | n (%)              | n (%)               |         | n (%)                 | n (%)              | n (%)               |         |
| Very low      | 141 (77.47)           | 71 (71.72)         | 70 (84.34)          | 0.029   | 113 (62.09)           | 55 (55.56)         | 58 (69.88)          | 0.18    |
| Low           | 36 (19.78)            | 25 (25.25)         | 11 (13.25)          |         | 53 (29.12)            | 35 (35.35)         | 18 (21.69)          |         |
| Moderate      | 4 (2.2)               | 2 (2.02)           | 2 (2.41)            |         | 14 (7.69)             | 7 (7.07)           | 7 (8.43)            |         |
| High          | 1 (0.55)              | 1 (1.01)           | 0                   |         | 2 (1.1)               | 2 (2.02)           | 0                   |         |
| Very high     | 0                     | 0                  | 0                   |         | 0                     | 0                  | 0                   |         |

**Table 4**  
Specific questions on restricted Covid 19 measures in the maternity ward.

|   | Total<br>n (%) | First-time<br>fathers<br>n (%) | Multi-<br>child<br>fathers<br>n (%) | P-<br>value |
|---|----------------|--------------------------------|-------------------------------------|-------------|
| Health measures taken by the staff in the maternity ward during the pandemic have                           |                |                                |                                     | 0.264       |
| Reassured me  | 120<br>(65.93) | 71<br>(71.72)                  | 49<br>(59.04)                       |             |
| Worried me  | 4 (2.20)       | 1 (1.01)                       | 3 (3.61)                            |             |
| Neither   | 50<br>(27.47)  | 23<br>(23.23)                  | 27<br>(32.53)                       |             |
| Other   | 8 (4.40)       | 4 (4.04)                       | 4 (4.82)                            |             |
| During the stay of my child and his mother, I was able to visit them  |                |                                |                                     | 0.33        |
| At my convenience   | 105<br>(57.69) | 61<br>(61.62)                  | 44<br>(53.01)                       |             |
| Two hours a day   | 71<br>(39.01)  | 36<br>(36.36)                  | 35<br>(42.17)                       |             |
| Only to go back home  | 2 (1.10)       | 0                              | 2 (2.41)                            |             |
| Other   | 4 (2.20)       | 2 (2.02)                       | 2 (2.41)                            |             |
| In my opinion, the protective measures put in place at the maternity hospital during the health crisis were |                |                                |                                     | 0.147       |
| Insufficient  | 2 (1.10)       | 0                              | 2 (2.41)                            |             |
| Sufficient  | 141<br>(77.47) | 83<br>(83.84)                  | 58<br>(69.88)                       |             |
| Excessive   | 21<br>(11.54)  | 9 (9.09)                       | 12<br>(14.46)                       |             |
| Unjustified   | 4 (2.20)       | 1 (1.01)                       | 3 (3.61)                            |             |
| Other   | 14<br>(7.69)   | 6 (6.06)                       | 8 (9.64)                            |             |
| Are you worried about mother and/or baby being infected with COVID-19                                       |                |                                |                                     | 0.728       |
| Not at all  | 97<br>(53.30)  | 52<br>(52.53)                  | 45<br>(54.22)                       |             |
| A little  | 77<br>(42.31)  | 43<br>(43.43)                  | 34<br>(40.96)                       |             |
| A lot   | 7 (3.85)       | 3 (3.03)                       | 4 (4.82)                            |             |
| Enormously  | 1 (0.55)       | 1 (1.01)                       | 0                                   |             |

4.1. The power of love

Although several studies have shown that fathers' anxiety is high during childbirth, this feeling seems to disappear once it is over (Johansson et al., 2012). The first time a father sees his newborn, a complex neurobiological phenomenon occurs, revealing a unique and exalted feeling: love (Bartels and Zeki, 2004). By triggering a set of brain-activity reactions, love activates regions of the reward system and inhibits activity in regions associated with negative emotions to aid the formation of strong bonds between individuals (Bartels and Zeki, 2004). By acting on psychological, emotional and neurobiological areas, love can result in a sense of security, thus reducing anxiety and stress (Esch and Stefano, 2005). Moreover, stress and love are biologically connected; oxytocin, a major hormone in the physiology of love, has been

associated with stress reduction as well (Scatliffe et al., 2019; Esch and Stefano, 2005).

4.2. Temporality

In women, there is variability and specificity of anxiety, depending on the perinatal period (Nakić Radoš, 2018; Floris et al., 2017). Anxiety is highest during pregnancy, with fears related to foetal well-being and childbirth. And decreases right after birth. It increases again during the postnatal period, resulting from decreased self-confidence (Nakić Radoš, 2018). A similar curve for stress has been observed in men by Philpott et al. (2017). described an antenatal increase in paternal stress levels. Indeed, as their partner's pregnancy progresses, fears related to the health of the mother and child and to the sight of their partner in pain during childbirth increase, along with fears related to becoming a father and feelings of incompetence (Baldwin et al., 2018). Baldwin et al. described the year after the birth of the child to be particularly difficult because of the need to balance personal and professional needs with the new role of being a father. It seems that fears developed during the antenatal period fade at birth and that new concerns would appear during the postpartum period. Stress and anxiety are two different but closely related concepts, as it seems that stressful events, such as childbirth, trigger anxiety (Ghaffari et al., 2021).

4.3. Participants' trait anxiety

In total, 91 % of participants demonstrated low or very low trait anxiety. Individuals who are not prone to anxiety use effective cognitive and behavioural coping strategies to respond to stressful situations (Li and Miller, 2017). Coping strategies based on the theory of positive emotions improve resilience during times of stress and against future adversity (Gloria and Steinhardt, 2016). Thus, a combination of high resilience and effective coping skills promotes positive mental health outcomes (Li and Miller, 2017). Weger and Sandi's (2018) study revealed opposite results for individuals with high trait anxiety. These individuals respond ineffectively to stressful events and are highly vulnerable to psychological degradation caused by stress. They are more at risk of developing negative feelings and even depressive symptoms (Weger and Sandi, 2018). Having low trait anxiety could explain low state anxiety during early postpartum days. Indeed, responding with emotionally adequate mechanisms in stressful situations protects individuals from developing anxiety symptoms.

4.4. The STAI tool used

The validity and reliability of this test have been widely proven for the general population, but few psychometric studies have used this test during the perinatal period (Gunning et al., 2010). Although there have been reports supporting the idea that STAI is "a reasonably valid screening tool for anxiety disorders to be used during pregnancy and postpartum", (Meades and Ayers (2011); Tendais et al. (2014)) other reports have stated the opposite. For example, Reymond et al. (2020) concluded that Spielberger's inventory assessed general and non-specific anxiety and was therefore unsuitable for measuring pregnancy-specific

anxiety. No information was given, however, on the existence of postpartum-specific anxiety, but it can be assumed that anxiety symptoms developed throughout the perinatal period, from conception to postpartum, are specific to this unique and emotionally intense period. Because the use of the STAI test during the perinatal period seems controversial, further studies should be conducted on this subject.

#### 4.5. Feeling prepared

It appears that feeling well prepared for childbirth is the only predictor of a reduced state of anxiety in first-time fathers. The place of fathers has enormously changed over time as they have become much more invested in their partners' pregnancy than before (Eggermont et al., 2017). Much effort has been made to provide fathers with birth information and preparation programs (Xue et al., 2018). Although only 62 % of first-time fathers reported having taken antenatal courses, nearly 83 % felt well prepared or very well prepared at birth; in our study, these two variables appeared uncorrelated.

In their systematic review, Poh et al. (2014) reported that fathers, especially first-time fathers, are eager for information regarding pregnancy and childbirth. To meet this informational need, they not only participate in antenatal courses but also use magazines, brochures, the internet or exchange with other people, such as their partners, relatives, friends and health professionals (Poh et al., 2014). Similarly, Xue et al. (2018) reported that fathers who feel that they have not received sufficient informational support tend to feel less prepared and less involved in their paternal roles. Baldwin et al. (2018) found similar results, concluding that fathers who feel unprepared experience negative feelings and increased fears related to uncertainty about their new roles, leading them to feel helpless and excluded.

Continuing efforts to inform and involve fathers during pregnancy, childbirth and the postpartum period appear critical to their mental well-being. Gaining knowledge seems to improve fathers' personal feelings about parenting and their behaviour toward their children.

#### 4.6. Moderate and high anxiety

In 2–3 % of participants, state anxiety was found to be medium or high during the postpartum period. Although this percentage is extremely low and concerns a minority of the study population, it cannot be ignored and requires an appropriate response.

Despite the transition to paternity being the best experience of many fathers' lives (Baldwin et al., 2018), it comes with unique challenges (Eskandari et al., 2016). Indeed the emergence of a family identity, the fear of not being a “good father”, disruptions in daily life and the necessity to provide for the child's financial needs are all challenges to overcome (Baldwin et al., 2018; Cheng et al., 2019). Moreover, Philpott et al. (2019) demonstrated that increased anxiety had a negative impact on fathers' role fulfilment, lowering their parenting self-efficacy during the first six months postpartum. Furthermore, this anxiety can lead to more severe mental health problems, such as depression (Philpott et al., 2019) and affects both maternal well-being and the quality of the father–child relationship (Philpott et al., 2019; Fletcher et al., 2020; Cheng et al., 2019).

The birth of one's first child is particularly demanding, and even experienced fathers may struggle to welcome and integrate a new child into a pre-existing family dynamic (Cheng et al., 2019). Difficulties in adjusting to the new paternal role, along with the related physical and emotional requirements, can impact men's mental health (Cheng et al., 2019). Identifying anxious fathers as early as possible could allow health professionals to provide the additional support needed to help them adjust to their fatherhood and to the associated changes (Eskandari et al., 2016).

#### 4.7. Strengths and limitations of the study

Our study has many strengths. Despite not being able to include 200 fathers due to organisational concerns, the sample size was substantial and the response rate was very high (77 %). We overcame constraints related to COVID-19 by adapting our recruitment approach. The use of a validated questionnaire, despite its limitations, reinforces the validity of the obtained results. In addition, our study is the first to measure and compare the anxiety of first-time fathers with that of multi-child fathers in the days following childbirth.

However, our study has several limitations. First, only 347 fathers were approached among 1500 potential participants during our recruitment period because of both organisational constraints and COVID-19 restrictions. Non-French-speaking men were excluded and given that Geneva has a high proportion of foreigners—38 %, according to the OFSP (2019)—their exclusion represents an important selection bias. Men from minority cultures may be more anxious and require more support than their francophone counterparts. Second, participation was based on volunteerism. The least anxious fathers were probably more easily approachable and more likely to take the time to answer the questionnaire, resulting in the potential exclusion of those who were more anxious. Finally, our results only apply to fathers whose postpartum periods did not present complications, those with children born at term and in good health. These fathers' needs are probably less important than those whose births present difficulties.

#### 4.8. Recommendations for future practice and research

During the early postpartum period, the results of our study showed low or very low anxiety levels for most fathers, which does not encourage the development of specific support for fathers during this period.

To better understand the anxiety phenomenon studied here, it would be interesting to conduct a longitudinal study, at different perinatal times, to evaluate the possible fluctuations of paternal anxiety throughout pregnancy, childbirth and later postnatal stages as well as to understand its specific causes. We suggest measuring both stress and anxiety as these two feelings are probably interdependent. Furthermore, conducting qualitative interviews with fathers would allow researchers to specifically explore fathers' experiences of the birth process to better understand their emotions and needs during this early postpartum period. Finally, it would be important to develop a questionnaire assessing the paternal anxiety specifically related to the perinatal period. This stage of life is not comparable to any other and should be properly evaluated.

### 5. Conclusion

Anxiety levels in the early post-partum are low or very low among fathers, although first-time fathers are more likely to develop anxiety than multi-child fathers. The feeling of preparedness for childbirth seemed to be an important influencing factor for first-time fathers' anxiety in our study. A small group of fathers presented high anxiety levels. These people should be identified and helped.

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#### CRediT authorship contribution statement

Charlotte Daire: conception and design, acquisition of data, analysis, interpretation of data and writing. Begoña Martínez de Tejada: interpretation of data and writing. Marie-Julia Guittier: conception and design, interpretation of data and writing. All authors approved the final

version to be submitted.

## Conflict of interest

The authors declare that they have no conflict of interest.

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