

## ORIGINAL ARTICLE

# Psychological Mechanisms in Fear of Childbirth: Intolerance of Uncertainty in Nulliparous and Multiparous Women

Adriana G. Dias<sup>1</sup> | Frédérique M. Van Dunné<sup>2</sup> | Maria A. S. Reijneveld<sup>3</sup> | Madelein T. Hoogwegt<sup>1</sup>

<sup>1</sup>Department of Medical Psychology, Haaglanden Medical Centre, The Hague, the Netherlands | <sup>2</sup>Department of Gynaecology, Haaglanden Medical Centre, The Hague, the Netherlands | <sup>3</sup>Leiden University Medical Centre, Leiden, the Netherlands

**Correspondence:** Madelein T. Hoogwegt ([m.hoogwegt@haaglandenmc.nl](mailto:m.hoogwegt@haaglandenmc.nl))

**Received:** 24 August 2023 | **Revised:** 12 September 2024 | **Accepted:** 4 November 2025

**Keywords:** fear of childbirth (FoC) | inhibitory IU | intolerance of uncertainty (IU) | parity | prospective IU

## ABSTRACT

**Introduction:** To gain more insight into psychological mechanisms associated with fear of childbirth (FoC), this study examined the relationship between intolerance of uncertainty (IU) and FoC in nulliparous and multiparous pregnant women, as well as the moderating role of maternal parity in this relationship, and the role of inhibitory IU and prospective IU in relation to FoC.

**Methods:** Validated Dutch versions of the Wijma Delivery Expectations Questionnaire version A (W-DEQ-A) and the Intolerance of Uncertainty scale (IUS-12) were filled out by 410 nulliparous and multiparous pregnant women. Statistical analyses in this cross-sectional study included correlation analyses and (multivariate) linear regression analyses.

**Results:** A significant, positive correlation was found between IU and FoC ( $\rho = 0.425$ ,  $p < 0.001$ ;  $b = 1.533$ ,  $p < 0.001$ ). Multivariate linear regression identified multiple variables contributing significantly to the level of FoC, with IU remaining the strongest predictor, both for the total group and for nulliparous and multiparous women separately. Maternal parity was not found to moderate the relationship between IU and FoC. Both inhibitory IU and prospective IU were significantly, positively associated with FoC.

**Conclusion:** Higher levels of IU are positively associated with higher levels of FoC in both nulliparous and multiparous women. Psychological treatment targeting FoC may benefit from focusing on managing uncertainty and increasing psychological flexibility. Future research is needed to better understand the role of IU in FoC during pregnancy, in order to increase maternal mental health and improve (post-partum) mother–child relationships.

## 1 | Introduction

For many women, experiences of pregnancy and childbirth are accompanied by both positive and negative emotions. A subgroup of these women suffers from a substantial fear of giving birth (fear of childbirth [FoC], also known as tocophobia), with prevalence rates ranging from 14% to 80% [1], with an average prevalence rate of 11%, depending on differences between countries, varying definitions of FoC and differences in the measurement of FoC [2]. FoC appears to be multifaceted, including fear of pain, lack of support, loss of autonomy and control, fear of

the baby dying or being handicapped, being embarrassed about one's own appearance while giving birth, and/or fear of the unknown [2, 3].

Women with higher levels of FoC experience more emotional distress during pregnancy, and FoC is also associated with intrapartum risks, such as a longer birth duration [4], higher rates of elective caesarean birth [5], and an increased risk of emergency caesarian [6]. Furthermore, FoC is associated with more negative birth experiences [7], difficulties in the mother–infant relationship, and postpartum depression [8]. Likewise, FoC is

associated with a six-fold increased risk of posttraumatic stress disorder after childbirth [9], with experienced lack of control during birth as a key risk factor [10]. Birthing people with FoC may even attempt to avoid pregnancy or decide to terminate their pregnancy [11].

In prior research, psychosocial and obstetric factors associated with FoC have been frequently studied. For example, low levels of social support and a poor partner relationship have been associated with higher levels of FoC. Also, a long duration of infertility, previous miscarriages, and maternal age are related to higher levels of FoC [11, 12]. Another thoroughly studied predictor of FoC is parity. In general, FoC appears to be more common in nulliparous women as compared to multiparous women [1, 13, 14]. In addition to demographic and obstetric factors influencing FoC, psychological factors also contribute significantly to FoC. For example, anxious personality types, previous sexual abuse, and any traumatic experience in health care generally, negatively affect one's stress response, increasing activity of the limbic system and impacting control from the neocortex [15]; all are associated with FoC [16].

Originally, anxiety disorders were distinguished as separate concepts. In the past years, however, focus has shifted to transdiagnostic factors, which surpass the specific characteristics of different disorders, and are thought to be causally related to the onset, development, maintenance, and/or recovery of multiple mental disorders [17, 18]. Lately, there has been growing interest in the concept of intolerance of uncertainty (IU) as a transdiagnostic factor in relation to FoC. The core definition of IU is a dispositional fear of the unknown [19]. Intolerance of uncertainty is involved in various anxiety disorders, including generalized anxiety disorder, obsessive compulsive disorder, panic disorder, social anxiety, posttraumatic stress and health anxiety [19, 20]. It has been conceptualized as a multidimensional concept, including inhibitory IU and prospective IU [21], which may be related to different forms of psychopathology. Prospective IU refers to cognitive perceptions of threat pertaining to future uncertainty (e.g., "Unforeseen events upset me greatly"), whereas inhibitory IU refers to behavioral inhibition in the face of uncertainty (e.g., "The smallest doubt can stop me from acting") [21, 22].

Since being pregnant inevitably means some level of uncertainty, individuals experiencing uncertainty as highly distressing are likely to experience some degree of birth-related anxiety [23]. Especially for women with anxiety, these uncertainties are difficult to deal with. Until now, only a few studies have focused on identifying transdiagnostic factors relevant to FoC. Both trait anxiety and anxiety sensitivity have been identified as relevant transdiagnostic mechanisms in FoC [13, 24]. Likewise, one study found higher levels of IU to be associated with increased FoC [25]. However, more research is needed to gain insight into these associations.

Thus, to better understand transdiagnostic psychological mechanisms related to FoC, we examined the association between IU and FoC in nulliparous and multiparous women, and whether maternal parity moderates this relationship. In addition, since the behavioral component (inhibitory IU) and the cognitive component of IU (prospective IU) could be related to FoC in their own way, we examined these concepts separately.

## 2 | Materials and Methods

### 2.1 | Participants and Procedure

Nulliparous and multiparous women with sufficient ability to read Dutch and/or English were eligible to participate in the current study. Pregnant women were informed about the study via flyers at an urban hospital (Haaglanden Medical Centre; HMC) and a community midwifery practice in The Hague (HMC Verloskundigen), as well as via Internet (website HMC, social media). When interested, they received additional information about the study via e-mail. If they agreed to participate by signing an informed consent, they received an e-mail in their third trimester with a personalized link to the online questionnaires. Data were collected between July 2020 and January 2022.

### 2.2 | Measures

The online survey consisted of questions about psychosocial, demographic, and pregnancy-related topics. The questionnaires were completed without a specific time limit and without interference from the researcher.

#### 2.2.1 | Demographic and Medical Characteristics

A self-report form was used to collect the following information: age, marital status, presence and level of partner (support), level of education, country of birth, parity, pregnancy term, type of received care, complications during current pregnancy, whether the current pregnancy was planned for and desired, experience of previous birth (if applicable), preferred mode of birth, and whether the participant has had professional help during this pregnancy because of psychological complaints.

#### 2.2.2 | Fear of Childbirth

FoC was measured with the Wijma Delivery Expectations Questionnaire version A (W-DEQ-A), a self-report questionnaire assessing FoC in pregnant women, based on their cognitive appraisal and expectancies about the delivery [26]. The W-DEQ-A is, to date, the most frequently used questionnaire [27] and the golden standard to assess FoC [28]. The W-DEQ-A consists of 33 items, scored on a six-point scale, with a total score ranging from 0 to 165. Higher scores are indicative of increased FoC. Examples of items are "How do you think your labour and delivery will turn out as a whole?" and "How do you think you will feel during the labour?". Internal consistency is found to be high (Cronbach's  $\alpha = 0.87$ ) [26], displaying good psychometric properties of the W-DEQ-A.

#### 2.2.3 | Intolerance of Uncertainty

The validated Intolerance of Uncertainty Scale Short Form (IUS-12) [29] was used to measure the level of IU. The IUS-12 is derived from the Intolerance of Uncertainty Scale (IUS, 27 items) [30] and has two factors, including inhibitory IU (five

items, e.g., “When it's time to act, uncertainty paralyses me”) and prospective IU (seven items, e.g., “I can't stand being taken by surprise”). Items are scored on a five-point scale (1 = strongly disagree; 5 = strongly agree), and a total scale score can be used [31], with higher scores representing greater intolerance of uncertainty. The Dutch version of the IUS-12 has excellent psychometric properties in clinical and non-clinical samples ( $\alpha = 0.88\text{--}0.94$ ) [30].

### 2.2.4 | Posttraumatic Stress Disorder

To measure the level of posttraumatic stress symptoms and to obtain a preliminary indication for the presence of a posttraumatic stress disorder (PTSD), the Dutch version of the PTSD checklist for DSM-5 (PCL-5) [32] was used. This is a 20-item self-report measure assessing the 20 symptoms of PTSD, according to DSM-5. Participants rate the severity of their posttraumatic symptoms in the past month on a five-point scale from 0 (“not at all”) to 4 (“extremely”). The cut-off value is met when they report at least one B item (questions 1–5), one C item (questions 6–7), two D items (questions 8–14), and two E items (questions 15–20). Psychometric evaluation showed a strong internal consistency ( $\alpha = 0.94$ ) [33]. Since PTSD may be related to FoC independently of the type of trauma (obstetric, health care trauma or other types of psychotrauma), we chose not to differentiate between various types of trauma as sources of PTSD but instead to focus on the symptoms that result from trauma.

## 2.3 | Statistical Analyses

Descriptive statistics were used to assess frequencies of responses for study and demographic variables. All basic assumptions were checked for variables used in the analyses [34]. Spearman's correlation analyses were conducted to estimate the strengths of associations between FoC, IU (subscales), and posttraumatic stress symptoms. Bivariate linear regression analyses were used to investigate which demographic, psychosocial, obstetric, and pregnancy-related variables were associated with FoC. Subsequently, variables associated with FoC with  $p$ -values  $< 0.05$  were entered in a multivariate linear regression model, using a forward method, to assess their independent association with FoC, using a continuous score on the W-DEQ-A as the dependent outcome measure. The variables “Evaluation of birth plan” and “Preferred birth mode” were recoded into dummy variables: the subgroup of patients that had a positive evaluation of the birth plan was compared to the subgroup of patients not having a positive evaluation of the birth plan (i.e., having either a negative, neutral or no evaluation of the birth plan); and the subgroup of patients not having a preferred birth mode was compared to the subgroup of patients that did have a preferred birth mode (i.e., either a vaginal birth or a caesarian birth). Furthermore, to assess a possible moderating role of maternal parity in the relationship between IU and FoC, the interaction term between parity and IU was entered in the multivariate model as a separate variable as well. Finally, multiple regression analysis was used to investigate the separate relationships between inhibitory IU and prospective IU respectively, and the level of FoC.

All analyses were performed using SPSS for Windows version 26.0 [35].

## 3 | Results

### 3.1 | Participant Characteristics

In total, 435 nulliparous and multiparous women agreed to participate in our study, of whom 410 (94%) completed the survey. See Table 1 or relevant demographic and medical characteristics of the study population. Nulliparous women reported significantly higher levels of FoC, in comparison to multiparous women. Likewise, nulliparous women reported significantly higher levels of intolerance of uncertainty, both prospective IU and inhibitory IU (see Table 2).

### 3.2 | The Relationship Between IU and FoC in Nulliparous and Multiparous Women

The present study showed a significant, positive correlation between IU and FoC ( $\rho = 0.425$ ,  $p < 0.001$ ;  $b = 1.533$ ,  $p < 0.001$ ). Higher scores on IU were associated with higher levels of FoC. The data showed that IU explained a similar proportion of FoC for both nulliparous ( $R^2 = 0.242$ ) and multiparous ( $R^2 = 0.211$ ) pregnant women.

Bivariate linear regression analysis was used to select relevant demographic and medical variables for the multivariate model. The bivariate analyses showed that IU, a positive evaluation of the birth plan, the level of posttraumatic stress symptoms, preference regarding birth mode, planned pregnancy, age, and maternal parity, were all significantly related to FoC ( $p < 0.05$ ). These variables explained together 31% of the variance in FoC ( $R^2 = 0.309$ ;  $F = 23.653$ ,  $p < 0.001$ ).

As shown in Table 3, in multivariate linear regression, IU was most strongly associated with FoC ( $\beta = 1.230$ ;  $t(397) = 8.11$ ,  $p < 0.001$ ). When calculated for both nulliparous ( $\beta = 1.183$ ;  $t(180) = 5.38$ ,  $p < 0.001$ ) and multiparous women ( $\beta = 1.316$ ;  $t(210) = 6.09$ ,  $p < 0.001$ ) separately, IU remained the strongest, significant predictor of FoC. In this model, no other variables remained significant for nulliparous women, except planned pregnancy, whereas for multiparous women several variables still contributed to the level of FoC (i.e., a positive evaluation of the birth plan, having no preferences regarding birth mode, and age).

Finally, the data showed no interaction effect between IU and maternal parity ( $p = 0.527$ ), which means that in this study, parity was not found to moderate the relationship between IU and FoC.

### 3.3 | Prospective and Inhibitory IU in Relation to FoC

Explorative analyses of the subscales of the IUS-12 showed a significant, positive correlation between both prospective IU and FoC ( $\rho = 0.410$ ,  $p < 0.001$ ), and inhibitory IU and FoC ( $\rho = 0.362$ ,

**TABLE 1** | Participant characteristics total sample.

| Variable                                   | N= 410       | %    |
|--------------------------------------------|--------------|------|
| Age (years), mean (SD)                     | 32.63 (4.41) |      |
| Gestational age (weeks), mean (SD)         | 31.59 (4.44) |      |
| Parity                                     |              |      |
| Nulliparous                                | 190          | 46.3 |
| Multiparous                                | 220          | 53.7 |
| Country of birth                           |              |      |
| The Netherlands                            | 333          | 81.2 |
| Other country                              | 77           | 18.8 |
| Type of participant                        |              |      |
| HMC participant                            | 199          | 48.5 |
| Social media participant                   | 211          | 51.5 |
| Type of received care                      |              |      |
| Midwife                                    | 201          | 49.0 |
| Gynecologist                               | 164          | 40.0 |
| Shared care                                | 45           | 11.0 |
| Educational level <sup>a</sup>             |              |      |
| Low-middle                                 | 86           | 21.0 |
| High                                       | 324          | 79.0 |
| Relationship status                        |              |      |
| Supportive partner                         | 390          | 95.1 |
| No (supportive) partner                    | 20           | 4.9  |
| Pregnancy planned                          |              |      |
| Yes                                        | 354          | 86.3 |
| No                                         | 56           | 13.7 |
| Pregnancy desired                          |              |      |
| Yes                                        | 406          | 99.0 |
| No                                         | 4            | 1.0  |
| Expectations of birth plan                 |              |      |
| Positive effect                            | 115          | 28.0 |
| Neutral and negative effect                | 97           | 23.7 |
| No plan (yet)                              | 198          | 48.3 |
| Complications during pregnancy             |              |      |
| Yes                                        | 98           | 23.9 |
| No                                         | 312          | 76.1 |
| Last childbirth experience (if applicable) |              |      |
| Negative                                   | 48           | 21.8 |
| Positive and neutral                       | 172          | 78.2 |
| Preferred method of birth                  |              |      |

(Continues)

**TABLE 1** | (Continued)

| Variable                             | N= 410 | %    |
|--------------------------------------|--------|------|
| Vaginal delivery                     | 343    | 83.7 |
| Cesarean section                     | 26     | 6.3  |
| No preference                        | 41     | 10.0 |
| Psychological help during pregnancy? |        |      |
| Yes                                  | 58     | 14.1 |
| No                                   | 352    | 85.9 |

<sup>a</sup>Educational levels: low-middle = none, primary school and preparatory secondary education, senior general secondary education, secondary vocational education and pre-university education; high = higher professional education and (post)university education.

$p < 0.001$ ). Linear regression analyses confirmed a significant association between both prospective IU ( $\beta = 2.464$ ;  $t(399) = 10.51$ ,  $p < 0.001$ ), and inhibitory IU ( $\beta = 2.710$ ;  $t(399) = 9.39$ ,  $p < 0.001$ ), in relation to FoC.

#### 4 | Discussion

The aim of the present study was to investigate the association between intolerance of uncertainty and FoC, and whether this relationship was different for prospective IU and inhibitory IU. Additionally, the potential moderating role of maternal parity in the relationship between IU and FoC was studied.

Overall, this study shows that in both nulliparous and multiparous women, IU is associated with higher levels of FoC. Moreover, IU proved to be most strongly associated with FoC, when compared to biographic, medical and psychological variables also included in this study. Subgroup analyses showed FoC to be more prevalent in nulliparous women, which is in line with multiple previous studies [1, 36]. Moreover, our findings are in line with previous research identifying predisposing personality traits and possible mechanisms of childbirth-related fear in pregnant women. Consistent with Rondung et al., who identified intolerance of uncertainty as a relevant mechanism in understanding FoC, we also found that IU is closely tied to the level of FoC in both nulliparous and multiparous women. Likewise, IU was shown to be associated with pregnancy-related anxiety [37, 38]. IU may contribute to a proneness for anticipatory anxiety, negative expectations and avoidance behavior that all are part of FoC [39]. To conclude, our study illustrates, in line with earlier work, the importance of IU in relation to the psychological health of (future) mothers. Given the above-listed associations found between IU and FoC, both before, during, and after pregnancy, IU might indeed be identified as a transdiagnostic factor of importance for FoC.

Even though nulliparous women had significantly higher scores on measurements of both IU and FoC, which is in line with previous studies [13, 14], we found no evidence for parity being a moderator in the relationship between IU and FoC. The underlying mechanisms that play a role in the relationship between IU and FoC may differ for the group of nulliparous and multiparous women. For nulliparous, the impending childbirth represents



**TABLE 2** | Fear of childbirth and intolerance of uncertainty in nulliparous and multiparous pregnant women.

| Variable                   | Total sample |       | Nulliparous |       | Multiparous |       | Mean difference |
|----------------------------|--------------|-------|-------------|-------|-------------|-------|-----------------|
|                            | Mean         | SD    | Mean        | SD    | Mean        | SD    |                 |
| Fear of childbirth         | 58.86        | 23.67 | 61.61       | 23.06 | 56.48       | 23.98 | 5.13*           |
| Intolerance of uncertainty | 31.33        | 7.45  | 32.68       | 7.56  | 30.17       | 7.18  | 2.51**          |
| Prospective IU             | 19.06        | 4.43  | 19.81       | 4.55  | 18.40       | 4.23  | 1.42**          |
| Inhibitory IU              | 12.28        | 3.68  | 12.86       | 3.70  | 11.77       | 3.60  | 1.09**          |

Abbreviations: IU, intolerance of uncertainty; SD, standard deviation.

\* $p < 0.05$ .\*\* $p < 0.01$ .**TABLE 3** | Associates of fear of childbirth for total sample and separate for nulliparous and multiparous pregnant women (multivariate analyses).

| Variable           | Total sample (N = 410) |       |           | Nulliparous (N = 190) |       |          | Multiparous (N = 220) |       |           |
|--------------------|------------------------|-------|-----------|-----------------------|-------|----------|-----------------------|-------|-----------|
|                    | b                      | SE    | $\beta$   | b                     | SE    | $\beta$  | b                     | SE    | $\beta$   |
| IU                 | 1.230                  | 0.152 | 0.388***  | 1.183                 | 0.220 | 0.393*** | 1.316                 | 0.216 | 0.390***  |
| Pos. birth plan    | -0.509                 | 2.193 | -0.181*** | -4.963                | 3.269 | -0.099   | -13.771               | 3.010 | -0.256*** |
| PTSD-symptoms      | 0.246                  | 0.095 | 0.123*    | 0.218                 | 0.143 | 0.111    | 0.247                 | 0.127 | 0.123     |
| No pref            | 8.924                  | 3.306 | 0.113**   | 5.505                 | 4.671 | 0.075    | 12.004                | 4.735 | 0.144*    |
| Caes. section      | 8.356                  | 4.107 | 0.087*    | 13.450                | 8.992 | 0.096    | 6.952                 | 4.686 | 0.085     |
| Planned pregnancy  | -7.803                 | 2.895 | -0.114**  | -9.938                | 4.974 | -0.130*  | -6.475                | 3.593 | -0.101    |
| Age                | 0.655                  | 0.244 | 0.123**   | 0.634                 | 0.398 | 0.104    | 0.651                 | 0.312 | 0.119*    |
| Parity             | 4.979                  | 2.154 | 0.106*    | —                     | —     | —        | —                     | —     | —         |
| IU $\times$ parity | -1.71                  | 0.270 | -0.124    | —                     | —     | —        | —                     | —     | —         |

Abbreviations: C-section, caesarian section as preferred birth mode; IU, intolerance of uncertainty; N, number; No pref, having no preference regarding birth mode (vs. having a preference regarding birth mode, either vaginal birth or caesarian section); Pos. birth plan, a positive evaluation of the birth plan (vs. having negative, neutral or no evaluation of the birth plan); PTSD, post-traumatic stress disorder; SE, standard error.

\* $p < 0.05$ .\*\* $p < 0.01$ .\*\*\* $p < 0.001$ .

something unknown, or could be related to a history of anxiety (disorder) or linked to other's fearful and negative stories about childbirth experiences, resulting in higher levels of (intolerance of) uncertainty [7]. Whereas in multiparous women, FoC is often found to be strongly associated with previous negative or traumatic childbirth, sometimes followed by a posttraumatic stress disorder [40, 41]. However, other studies have shown a higher prevalence of FoC in multiparous women [1], or multiparous women being not able to define any specific cause for their FoC [42], contradicting the role of negative previous experiences and PTSD in the development of FoC. Further research into the potential mechanisms exploring the relationship between IU and development of FoC, is therefore necessary. Since IU has also been associated with PTSD [43], and PTSD has been associated with FoC in both our study and in previous research [41, 42], yet the mechanisms may differ for nulli- and multiparous women, future research on the role that PTSD may play in this context, is especially warranted.

It remains unclear whether a theoretical and/or clinical distinction between prospective IU and inhibitory IU, in relation to FoC, is necessary. Only limited research has been executed

yet, with varying results. In our analyses, both inhibitory IU and prospective IU were significantly associated with FoC, indicating that the cognitive component as well as the behavioral component of IU are relevant in understanding FoC. Rondung et al. found only behavioral manifestations of IU (i.e., inhibitory IU) being associated to FoC [25]. However, they used different instruments to measure the cognitive and behavioral manifestations of IU. It is possible that the pathways in which inhibitory IU and prospective IU are related to FoC may be different, but both are resulting in anxiety. More research into the dimensions of IU is needed to further increase our understanding of the concept of IU in relation to FoC.

This study has important strengths. First, our relatively large sample size allowed us to thoroughly study the relationship between IU and FoC and include important other variables within the analyses. Second, the survey was distributed in both Dutch and English, striving for and resulting in a relatively diverse sample of pregnant women born in the Netherlands and women born elsewhere (81.2% vs. 18.8%), corresponding to the ratio in Dutch society [44]. Finally, since our sample was recruited during the Covid-19-pandemic, and a significantly lower

prevalence of FoC in pregnant women was found during the pandemic than before [45], the association between IU and FoC might even be stronger than shown by the current results.

Some limitations of the study should be recognized as well. Due to the cross-sectional design, no causal relationships between concepts can be established. Furthermore, data in the present study was collected in the third trimester, therefore conclusions can only be drawn about the association between IU and FoC in late pregnancy, while a recent study shows that the course of FoC may vary during pregnancy [45]. Finally, despite our effort to create a diverse group of participants, a majority of the women in our sample had a higher educational level (79.0%). The impact of educational levels on risk of FoC is yet unclear, with some studies reporting increased risk of FoC in higher educated women [11], and other studies reporting higher levels of FoC in lower educated women [46].

The results of the current study provide useful clinical implications. For many pregnant women, the approaching delivery is an important topic and represents a period of uncertainty, which can be accompanied by disabling and clinically relevant levels of FoC. Clinicians may provide information to patients about the prevalence of FoC and increase their attention for the difficulties in coping with the uncertainty that comes with the delivery. This information might already help patient in normalizing their fears and raise awareness of the issues around coping with childbirth-related uncertainty. Screening for FoC in pregnancy, preferably at multiple times to monitor the possibly varying course of FoC during pregnancy, might help clinicians and pregnant women to intervene at an earlier stage. This may help in preventing normal levels of anxiety to develop into pathological levels of fear. Once clinically relevant FoC and/or IU has been established, psychotherapy aimed at learning to deal with uncertainties can be offered. Both cognitive behavioral techniques [47], mindfulness-based therapy [48], techniques from Acceptance and Commitment Therapy (ACT) [49], as well as tailored modules of the Intolerance of Uncertainty Therapy (IUT) [50], have proven to be effective in reducing anxiety levels amongst (pregnant) women. Key factor in these types of psychotherapy is building an adapting and non-judgmental attitude towards the challenges of pregnancy and childbirth, by developing more effective coping strategies and increasing resilience. Importantly, given the high prevalence of FoC, adequate psychological treatment may not only provide beneficial effects regarding empowering motherhood and improving (post-partum) mother-child relationships, but also with respect to health care costs and medical outcomes.

## 5 | Conclusion

We found that higher levels of IU were associated with higher levels of FoC, both in nulliparous and multiparous women. Maternal parity did not moderate this relationship. To decrease levels of FoC and to increase maternal mental health and early mother-child relationships, explicit attention for FoC during the course of pregnancy is needed. In psychotherapy, by also focusing on IU as an important transdiagnostic factor during anxiety preceding birth, treatment can be further tailored to the specific needs of pregnant women.

## Acknowledgments

We would like to thank Monique Boon-Appelman and Petra Lörx for their indispensable efforts regarding the inclusion of the patients in the study, and we acknowledge Edwin Martens for his contribution to the statistical analyses of this study.

## Ethics Statement

Ethical approval was granted by the Medical Ethic Review Committee (METC LDD) in Leiden-Den Haag-Delft, the Netherlands, on April 22, 2020 (reference number: N20.064).

## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

Research data are not shared.

## References

1. M. A. O'Connell, P. Leahy-Warren, A. S. Khashan, L. C. Kenny, and S. M. O'Neill, "Worldwide Prevalence of Tocophobia in Pregnant Women: Systematic Review and Meta-Analysis," *Acta Obstetrica et Gynecologica Scandinavica* 96 (2017): 907–920.
2. C. Nilsson, E. Hessman, H. Sjöblom, et al., "Definitions, Measurements and Prevalence of Fear of Childbirth: A Systematic Review," *BMC Pregnancy and Childbirth* 18 (2018): 28.
3. S. Garthus-Niegel, H. T. Storksen, L. Torgersen, T. Von Soest, and M. Eberhard-Gran, "The Wijma Delivery Expectancy/Experience Questionnaire: A Factor Analytic Study," *Journal of Psychosomatic Obstetrics and Gynaecology* 32 (2011): 160–163.
4. S. S. Adams, M. Eberhard-Gran, and A. Eskild, "Fear of Childbirth and Duration of Labour: A Study of 2206 Women With Intended Vaginal Delivery," *BJOG* 119 (2012): 1238–1246.
5. B. Larsson, A. Karlstrom, C. Rubertsson, and I. Hildingsson, "The Effects of Counseling on Fear of Childbirth," *Acta Obstetrica et Gynecologica Scandinavica* 94 (2015): 629–636.
6. E. L. Ryding, K. Wijma, and B. Wijma, "Experiences of Emergency Cesarean Section: A Phenomenological Study of 53 Women," *Birth* 25 (1998): 246–251.
7. J. E. Handelzalts, G. Becker, M. P. Ahren, et al., "Personality, Fear of Childbirth and Birth Outcomes in Nulliparous Women," *Archives of Gynecology and Obstetrics* 291 (2015): 1055–1062.
8. Z. Alipour, M. Lamyian, and E. Hajizadeh, "Anxiety and Fear of Childbirth as Predictors of Postnatal Depression in Nulliparous Women," *Women and Birth* 25 (2012): 37–43.
9. J. Soderquist, B. Wijma, G. Thorbert, and K. Wijma, "Risk Factors in Pregnancy for Post-Traumatic Stress and Depression After Childbirth," *BJOG* 116 (2009): 672–680.
10. L. de Bruijn, C. A. Stramrood, M. P. Lambregtse-van den Berg, and O. N. Rius, "Treatment of Posttraumatic Stress Disorder Following Childbirth," *Journal of Psychosomatic Obstetrics and Gynaecology* 41 (2020): 5–14.
11. S. Raisanen, S. M. Lehto, H. S. Nielsen, M. Gissler, M. R. Kramer, and S. Heinonen, "Fear of Childbirth in Nulliparous and Multiparous Women: A Population-Based Analysis of All Singleton Births in Finland in 1997–2010," *BJOG: An International Journal of Obstetrics & Gynaecology* 121 (2014): 965–970.
12. M. Zar, K. Wijma, and B. Wijma, "Pre- and Postpartum Fear of Childbirth in Nulliparous and Parous Women," *Scandinavian Journal of Behaviour Therapy* 30 (2001): 75–84.

13. N. Jokić-Begić, L. Žigić, and S. Nakić Radoš, "Anxiety and Anxiety Sensitivity as Predictors of Fear of Childbirth: Different Patterns for Nulliparous and Parous Women," *Journal of Psychosomatic Obstetrics and Gynaecology* 35 (2014): 22–28.
14. H. Rouhe, K. Salmela-Aro, E. Halmesmäki, and T. Saisto, "Fear of Childbirth According to Parity, Gestational Age, and Obstetric History," *BJOG* 116 (2009): 67–73.
15. M. M. Quinones, A. M. Gallegos, F. V. Lin, and K. Heffner, "Dysregulation of Inflammation, Neurobiology, and Cognitive Functioning in PTSD: An Integrative Review," *Cognitive, Affective, & Behavioral Neuroscience* 20 (2020): 455–480.
16. E. L. Ryding, E. Wirfelt, I. B. Wangborg, B. Sjogren, and G. Edman, "Personality and Fear of Childbirth," *Acta Obstetrica et Gynecologica Scandinavica* 86 (2007): 814–820.
17. S. Sauer-Zavala, C. A. Gutner, T. J. Farchione, H. T. Boettcher, J. R. Bullis, and D. H. Barlow, "Current Definitions of "Transdiagnostic" in Treatment Development: A Search for Consensus," *Behavior Therapy* 48 (2017): 128–138.
18. E. Watkins, "An Alternative Transdiagnostic Mechanistic Approach to Affective Disorders Illustrated With Research From Clinical Psychology," *Emotion Review* 7 (2015): 250–255.
19. R. N. Carleton, "Into the Unknown: A Review and Synthesis of Contemporary Models Involving Uncertainty," *Journal of Anxiety Disorders* 39 (2016): 30–43.
20. M. E. Oglesby, J. W. Boffa, N. A. Short, A. M. Raines, and N. B. Schmidt, "Intolerance of Uncertainty as a Predictor of Post-Traumatic Stress Symptoms Following a Traumatic Event," *Journal of Anxiety Disorders* 41 (2016): 82–87.
21. R. N. Carleton, "The Intolerance of Uncertainty Construct in the Context of Anxiety Disorders: Theoretical and Practical Perspectives," *Expert Review of Neurotherapeutics* 12 (2012): 937–947.
22. P. A. Boelen and L. I. M. Lenferink, "Latent Class Analysis of Indicators of Intolerance of Uncertainty," *Scandinavian Journal of Psychology* 59 (2018): 243–251.
23. H. L. Melender, "Fears and Coping Strategies Associated With Pregnancy and Childbirth in Finland," *Journal of Midwifery & Women's Health* 47 (2002): 256–263.
24. K. Spice, S. L. Jones, H. D. Hadjistavropoulos, K. Kowalyk, and S. H. Stewart, "Prenatal Fear of Childbirth and Anxiety Sensitivity," *Journal of Psychosomatic Obstetrics and Gynaecology* 30 (2009): 168–174.
25. E. Rondung, J. Ekdahl, and O. Sundin, "Potential Mechanisms in Fear of Birth: The Role of Pain Catastrophizing and Intolerance of Uncertainty," *Birth* 46 (2018): 61–68.
26. K. Wijma, B. Wijma, and M. Zar, "Psychometric Aspects of the W-DEQ: A New Questionnaire for the Measurement of Fear of Childbirth," *Journal of Psychosomatic Obstetrics and Gynaecology* 19 (1998): 84–97.
27. H. M. Haines, J. F. Pallant, J. Fenwick, et al., "Identifying Women Who Are Afraid of Giving Birth: A Comparison of the Fear of Birth Scale With the WDEQ-A in a Large Australian Cohort," *Sexual & Reproductive Healthcare* 6 (2015): 204–210.
28. I. den Boer, Y. M. M. A. Hendrix, H. Knoop, and M. G. van Pampus, "Identifying Women With Fear of Childbirth With the Dutch Fear of Birth Scale and Its Added Value for Consultations," *Journal of Psychosomatic Obstetrics and Gynaecology* 43 (2022): 419–425.
29. R. N. Carleton, M. A. Norton, and G. J. Asmundson, "Fearing the Unknown: A Short Version of the Intolerance of Uncertainty Scale," *Journal of Anxiety Disorders* 21 (2007): 105–117.
30. K. Helsen, E. van den Bussche, J. W. Vlaeyen, and L. Goubert, "Confirmatory Factor Analysis of the Dutch Intolerance of Uncertainty Scale: Comparison of the Full and Short Version," *Journal of Behavior Therapy and Experimental Psychiatry* 44 (2013): 21–29.
31. K. Buhr and M. J. Dugas, "The Intolerance of Uncertainty Scale: Psychometric Properties of the English Version," *Behaviour Research and Therapy* 40 (2002): 931–945.
32. M. A. Boeschoten, A. Bakker, R. A. Jongedijk, and M. Olff, "PTSD Checklist for DSM-5-Nederlandstalige versie," Oegstgeest, Stichting Centrum '45, Arq Psychotrauma Expert Groep, 2014.
33. C. A. Blevins, F. W. Weathers, M. T. Davis, T. K. Witte, and J. L. Domino, "The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation," *Journal of Traumatic Stress* 28 (2015): 489–498.
34. J. Osborne and E. Waters, "Four Assumptions of Multiple Regression That Researchers Should Always Test," *Practical Assessment, Research & Evaluation* 8 (2002): 1–9.
35. IBM, *SPSS Statistics for Windows, Version 26.0* (IBM Corp, 2016).
36. E. Rondung, J. Ekdahl, I. Hildingsson, C. Rubertsson, and O. Sundin, "Heterogeneity in Childbirth Related Fear or Anxiety," *Scandinavian Journal of Psychology* 59 (2018): 634–643.
37. E. Ternström, I. Hildingsson, H. Haines, and C. Rubertsson, "Higher Prevalence of Childbirth Related Fear in Foreign Born Pregnant Women—Findings From a Community Sample in Sweden," *Midwifery* 31 (2015): 445–450.
38. C. Treleaven, "Intolerance of Uncertainty and Emotion Regulation in Pregnant Women (Publicationnr. 818737)," Dissertation, University of Exeter. ProQuest Dissertations Publishing; 2020.
39. M. Furtado, B. N. Frey, and S. M. Green, "Validation of the Intolerance of Uncertainty Scale as a Screening Tool for Perinatal Anxiety," *BMC Pregnancy and Childbirth* 21 (2021): 829.
40. K. Hofberg and M. R. Ward, "Fear of Pregnancy and Childbirth," *Postgraduate Medical Journal* 79 (2003): 505–510.
41. H. T. Størksen, S. Garthus-Niegel, S. Vangen, and M. Eberhard-Gran, "The Impact of Previous Birth Experiences on Maternal Fear of Childbirth," *Acta Obstetrica et Gynecologica Scandinavica* 92 (2013): 318–324.
42. T. Saisto, O. Ylikorkala, and E. Halmesmaki, "Factors Associated With Fear of Delivery in Second Pregnancies," *Obstetrics and Gynecology* 94 (1999): 679–682.
43. A. M. Raines, M. E. Oglesby, J. L. Walton, G. True, and C. L. Franklin, "Intolerance of Uncertainty and DMS-5 PTSD Symptoms: Associations Among a Treatment Seeking Veteran Sample," *Journal of Anxiety Disorders* 62 (2019): 61–67.
44. Central Bureau for Statistics, *Bevolking; hoogstbehaald onderwijsniveau en onderwijsrichting [Population; highest attained level of education and education]* (Central Bureau of Statistics (CBS), 2022), accessed October 6, 2022, <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/85313NED/table?ts=1665059795409>.
45. Y. M. G. A. Hendrix, M. A. M. Baas, J. W. Vanhommerig, A. de Jongh, and M. A. van Pampus, "Fear of Childbirth in Nulliparous Women," *Frontiers in Psychology* 13 (2022): 923819.
46. E. L. Ryding, M. Lukasse, A. S. van Parys, et al., "Fear of Childbirth and Risk of Cesarean Delivery: A Cohort Study in Six European Countries," *Birth* 42 (2015): 48–55.
47. S. Striebach, E. Mattern, and G. M. Ayerle, "Support for Pregnant Women Identified With Fear of Childbirth (FOC)/Tokophobia—A Systematic Review of Approaches and Interventions," *Midwifery* 61 (2018): 97–115.
48. R. T. van der Meulen, I. K. Veringa-Skiba, F. J. A. van Steensel, S. M. Bögels, and E. I. de Bruin, "Mindfulness-Based Childbirth and Parenting for Pregnant Women With High Fear of Childbirth and Their Partners: Outcomes of a Randomized Controlled Trial Assessing Short- and Longer-Term Effects on Psychological Well-Being, Birth and Pregnancy Experience," *Midwifery* 116 (2023): 103545.

49. S. Howard, C. M. G. Houghton, R. White, V. Fallon, and P. Slade, "The Feasibility and Acceptability of a Single-Session Acceptance and Commitment Therapie (ACT) Intervention to Support Women Self-Reporting Fear of Childbirth in a First Pregnancy," *Psychology & Health* 21 (2022): 1022.
50. C. van der Heiden, P. Muris, and H. T. van der Molen, "Randomized Controlled Trial on the Effectiveness of Metacognitive Therapy and Intolerance-Of-Uncertainty Therapy for Generalized Anxiety Disorder," *Behaviour Research and Therapy* 50 (2012): 100–109.