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Convergent validity between two questionnaires that evaluate fear of childbirth validated in spanish: childbirth fear questionnaire (CFQ-e) and Wijma delivery expectancy questionnaire (WDEQ-A-Sp)

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Abstract

Background Fear of childbirth is a widespread, multidimensional and complex health issue, which may negatively affect pregnancy, childbirth and post-partum, and should therefore be adequately identified and treated. In the Spanish context, two different validated tools are currently being used to evaluate fear of childbirth i.e., the Spanish versions of the Childbirth Fear Questionnaire (CFQ-e) and the Wijma Delivery Expectancy Questionnaire (W-DEQ-A-Sp).

Methods A comparative methodological study was aimed at evaluating the convergent validity of FOC-measuring tools W-DEQ-A-Sp and CFQ-e in a cohort of pregnant women in their second trimester of pregnancy. Secondarily, the reliability (internal consistency and temporal stability) and acceptability (face validity) of both instruments were studied. The Pearson's correlation coefficient and the Concordance Correlation Coefficient (CCC) were used to evaluate convergent validity. The Cronbach's Alpha and McDonald's Omega coefficients were used for assess reliability (internal consistency) and the Intraclass Correlation Coefficient and the Concordance Correlation Coefficient to temporal stability. Bland-Altman plots were used to illustrate the temporal stability.

Results A final sample of 92 women participated the study. The Pearson Correlation Coefficient obtained between the total scores of the CFQ-e and W-DEQ-A-Sp questionnaires was 0.530 (95%CI: 0.365–0.663; $p < 0.001$). The overall Omega and Cronbach's Alpha coefficients were 0.925 [95% CI: 0.903–0.947] and 0.926 [95% CI: 0.903–0.947] respectively for W-DEQ-A-Sp and 0.957 [95% CI: 0.945–0.970] and 0.956 [95% CI: 0.942–0.968] respectively for CFQ-e. Regarding temporal stability, the Intraclass Correlation Coefficient for the W-DEQ-A-Sp was 0.892 (95% CI: 0.828–0.932;

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$p < 0.05$) and 0.937 (95% CI: 0.899–0.960; $p < 0.05$) for the CFQ-e. Similar results were obtained with respect to face validity (comprehensibility and acceptability) for both questionnaires.

Conclusions It was concluded that the correlation between both questionnaires was positive and moderate, and that convergent validity was confirmed. Reliability values (internal consistency and temporal stability) were adequate and face validity indicated adequate acceptability for both questionnaires.

Keywords Obstetrics, Labour, Surveys and questionnaires, Validation studies as topic, Fear of childbirth

Background

Fear of childbirth (FOC) is a complex, poorly known and unprioritized public health concern [1], often masked by gaps in our knowledge of this issue [2]. This problem entails adverse consequences on women's physical and mental health, wellbeing, and daily activities, and may prevent them from experiencing a happy and healthy maternity. FOC has been associated with higher risk of adverse obstetric outcomes, like preterm birth, prolonged labour, postpartum depression and post-traumatic stress, as well as with higher maternal demand for cesarean Sects [3, 4]. Available evidences highlight the importance of discussing about the need for FOC evaluation and treatment strategies [3, 5].

In a study published in 2019 [6], worldwide FOC prevalence, evaluated with the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ-A) was 14.2%, in line with O'Connell et al., who reported 12% in 2016 [7]; whereas a more recent study described 16% prevalence worldwide, including developed and developing countries [8]. Such variability may be partly due to different studies using different scales or cut-off points, which hinders comparability [9].

Managing FOC and reducing its prevalence requires continuous comprehensive care, including reliable and validated identification of women suffering this problem that allow health professionals activate early effective care strategies for them [10]. The existence of different maternity models and cultural differences, makes it necessary that any FOC screening procedure be adapted to local circumstances [11]. However currently available FOC-measurement tools do not fully meet this requirement [12]. Identifying which tools are preferred by women and how these can be used in the healthcare system can improve the identifying FOC and facilitate the efficient implementation of treatment and support for women with fear of childbirth [13].

Different tools for measuring FOC before, during and after pregnancy have been described [7, 14, 15],. The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) is the most widely used FOC-measurement tool in the clinical practice, and is currently considered the gold standard of FOC evaluation. The W-DEQ shows a high level of accuracy in the detection of FOC and meets the criteria for a "good enough" FOC construct detection tool across several analyses [16–19]. The W-DEQ – developed by Wijma et al. [17] in Sweden in 1998 – is a self-administered tool with two versions, aimed at evaluating FOC through either women's expectancy (version A) or experience (version B) of childbirth. The W-DEQ-A has been translated and validated into a number of different contexts [20–32] showing high internal consistency.

In the Spanish environment, it was not until 2021 that a reliable tool for its diagnosis became available to healthcare professionals and researchers. Its Spanish validation (W-DEQ-A-Sp), carried out by Ortega-Cejas et al. [33], after cultural adaptation, Ortega-Cejas et al. conducted a Confirmatory Factorial Analysis (CFA) based on a unidimensional model, which showed deficient adjustment, followed by an exploratory factorial analysis that motivated removal of 2 items. The final result was as 31-item questionnaire, which identified 4 factors/dimensions: "fear", "isolation", "lack of positive anticipation" and "riskiness", with a reliability and validity, with a Cronbach's Alpha coefficient of 0.91 for the whole tool, and higher than 0.70 for any of the identified factors, plus Omega coefficients over 0.81 for the whole tool and each one of the factors [33]. Test-retest reliability, measured after 2 weeks through the intraclass correlation coefficient, was 0.91, and authors reported that the questionnaire was easily to complete and showed good psychometric properties in terms of reliability and construct validity [33].

Some diagnostic tools such as the WDEQ may have limitations in measuring phenomena that influence FOC,. In this regard, more recently, psychologist Nicole Fairbrother designed the Childbirth Fear Questionnaire (CFQ) [16, 34], a multidimensional tool aimed at providing specific information on different FOC aspects in pregnant women. This tool, validated in several English-speaking countries (Canada, The United States and The United Kingdom), consisted of 40 items that explored 9 FOC-associated dimensions: "loss of sexual pleasure/attractiveness", "pain from a vaginal birth", "medical interventions", "embarrassment", "harm to baby", "caesarean birth", "mum or baby dying", "insufficient pain medication", and "body damage from a vaginal birth". The questionnaire included an additional scale, which enhanced detection accuracy by evaluating the impact of FOC in women's relationships with partners, family members,

prenatal caregivers and others, as well as on their work life, leisure activities and preparation for the new baby.

Due to the growing interest in providing humanised childbirth care in Spain and with the aim of improving the positive birth experience of Spanish women, González de la Torre et al. developed the validated version of the CFQ for the Spanish context [35]. Their study provided the second FOC-evaluation tool available in Spain and the first CFQ validation into a non-English-speaking context. Different from the original version, the Spanish version (CFQ-e) included 37 items distributed in 4 dimensions: "fear of medical interventions", "fear of harm and dying", "fear of pain", and "fear relating to sexual aspects and embarrassment" [35]. The validation study reported a Cronbach's Alpha coefficient of 0.947 for the final version of CFQ-e and 0.898 for the interference scale. The total Omega coefficient was 0.945 for the CFQ-e and 0.898 for the interference scale. Fairbrother et al. compared the screening accuracy of the CFQ versus the screening accuracy of the W-DEQ for FOC [16] and their conclusions were that both tools perform well as screening tools for FOC, for pregnant women in general and for various subgroups.

Given that the validation of W-DEQ-A-Sp and CFQ-e took place simultaneously, the authors could not explore the convergent validity between both tools. Furthermore, while the W-DEQ-A-Sp validation included an evaluation of temporal stability, CFQ-e validation did not. Such gaps in our knowledge hinder the choice of one or the other tools as the most suitable one for identification of FOC in the Spanish context,

Thus, the main objective of this study was to assess the convergent validity between W-DEQ-A-Sp and CFQ-e; while the secondary objective was to compare their reliability (expressed as internal consistency and temporal stability) and acceptability (face validity). Thus, the final objective of this research was to establish whether both tools measure the same construct (fear of childbirth) and can be considered equivalent tools, as well as to provide data to help researchers in the choice of which tool to use in the evaluation of fear of childbirth in Spanish women.

Methods

Design

This comparative methodological study was aimed at evaluating the convergent validity of FOC-measuring tools W-DEQ-A-Sp and CFQ-e in a cohort of pregnant women in their second trimester of pregnancy. Furthermore, the reliability (internal consistency and temporal stability) and acceptability (face validity) of both tools were studied. The study was previously approved by the Committee of Ethics and Research of the Hospital Dr. Negrín (code 2022-451-1), and the management board of the center in which the study was carried out. Written informed consent was requested from all study participants.

Participants

The study was conducted in Gran Canaria (Canary Islands, Spain). Participants were recruited by convenience sampling among women attending the Prenatal Diagnosis Unit of the Insular-Maternal and Child University Hospital Complex of Gran Canaria—a tertiary referral hospital for the island's pregnant population—for the antenatal morphology scan. According to the healthcare activity report 2022 of this center, a total of 3593 women were administered antenatal morphology scan in this hospital, in that year. Thus, an equivalent number of potential participants per year were estimated. Women fulfilling the inclusion criteria: being 18 years of age or older and being in their 20 to 24 weeks of pregnancy were invited to participate: Women with multiple pregnancy, elective cesarean section, unable to understand Spanish or unable to comprehend the questionnaires were excluded. Participants who did not complete the first administered questionnaire or revoked their consent to participate were withdrawn from the study.

Sample size

The necessary sample size was estimated for the main objective of the study, namely assessing the convergent validity between W-DEQ-A-Sp and CFQ-e. Based on the study by Fairbrother et al. [12] – who reported a convergence index between CFQ and W-DEQ-A of 0.58 ($p<0.001$) for the total scale and 0.41 ($p<0.001$) for the subscales, accepting a risk alpha of 0.05 and a statistical power of more than 0.9 in a bilateral contrast, 73 subjects are required for an estimated correlation coefficient of 0.41. A loss-to-follow-up rate of 20% has been anticipated.

Variables

The main variable of the study was fear of childbirth, which was evaluated through the scores assigned by participants to the items in WDEQ-A-Sp [33] and CFQ-e [35]. In the W-DEQ-A-Sp, FOC was evaluated through women's expectancies regarding childbirth, in 31 questions scored 0 to 5 on a Likert scale, where 0 was "extremely/extreme/completely/exactly/never" (depending on the item) and 5 was "nothing/not at all/very often". The minimum and maximum scores were 0 and 155 respectively, with higher scores corresponding to stronger fear. In the CFQ-e, FOC was evaluated in 37 items organized in 4 subscales ("fear of medical interventions", "fear of harm and dying", "fear of pain", and "fear relating to sexual aspects and embarrassment") scored 0 to 4 on a Likert scale. Thus, the total score ranged from 0 to 148, with higher scores corresponding to stronger

fear. Subscale-scores were calculated by adding the scores assigned to individual items in the subscale and dividing by the number of items in that subscale. To evaluate face validity, the research team created the following "ad hoc" assessment items: "the questions are adequately understood", "the questions adequately express my thoughts", and "the length of the questionnaire is adequate", which were also scored on a Likert scale from 1 ("completely disagree") to 4 ("completely agree").

Additionally, the following sociodemographic and obstetric variables were collected: age, relationship status (with or without a partner), education level (no studies, primary school, secondary school, university), gestational age in weeks at the moment of completing the questionnaires (calculated from the date of the last period or through an ultrasound study), and parity (previous childbirth, either by vaginal delivery or cesarean section).

Data collection

Data were collected between December 1, 2022 and February 28, 2023 through an online form (Google Form®), which was made accessible to all recruited participants (women accepting to participate and meeting the inclusion criteria). Participants were first given access to an initial form (F1), which included: questions on sociodemographic variables, the W-DEQ-A-Sp and CFQ-e, and the three assessment items. Two weeks later, they were again contacted and asked to complete a second form (F2), which included only the two FOC questionnaires, with the aim of evaluating the reliability (temporal stability) of these tools.

Every participant was assigned a unique identification number, linked to their Electronic Health Record, through which the researcher team could access the data concerning obstetric variables.

Analysis

Descriptive analysis of the collected variables included frequency and percentage of the qualitative variables, and mean and standard deviation of the quantitative ones; 95% Confidence Intervals of means were calculated for the responses to items. The inferential descriptive analysis was carried out with the JAMOVI software version 2.4.11.

The Pearson's correlation coefficient and the Concordance Correlation Coefficient (CCC) were used to evaluate convergent validity between the tools [36]. In addition, the scores from both questionnaires were standardized and convergence was represented by using a Bland-Altman plot [37]. The Cronbach's Alpha and McDonald's Omega coefficients were used to analyze tools' reliability (internal consistency). The Intraclass Correlation Coefficient and the Concordance Correlation Coefficient were used to assess temporal stability. Bland-Altman plots were used to illustrate the temporal stability [38]. Face validity was studied through the means, standard deviations and percentages of agreement of each assessment item. Finally, an inferential analysis was conducted for known-groups validation by using the Student's t-test. Normality of data distribution was previously verified with the Kolmogórov-Smirnov test. Associations were considered to be significant for p-values lower than the established level of significance, $\alpha = 0.05$.

Results

Descriptive analysis of the sample and CFQ-e an W-DEQ-A-Sp items

A total of 113 pregnant women who met the inclusion criteria were recruited, although only 92 ($n = 92$) participated finally for the study. These 92 women completed the initial form (F1), but only 73 women completed the second form (F2) two weeks later. Participants' mean age was 32.11 years (SD: 5.26); 98.9% ($n = 91$) had a partner; 47.8% ($n = 44$) had university education, followed by 35.9% ($n = 33$) with secondary education, 15.2% ($n = 14$) with only primary education and one woman without studies. Regarding parity, 65.2% ($n = 60$) were primiparous and 34.8% ($n = 32$) were multiparous. Mean gestational age was 21.35 weeks (SD: 0.72). Means, standard deviations and upper and lower limits of individual items, plus the total W-DEQ-A-Sp score are shown in Table 1. Equivalent results of the CFQ-e are shown in Table 2.

Convergent validity analysis

The symmetry of the total score of both questionnaires was verified with the Kolmogórov-Smirnov test. Statistic Z was 0.560 ($p = 0.912$) for CFQ-e in the F1, and 0.712 ($p = 0.691$) for W-DEQ-A-Sp in F1. Thus, both sets of data followed a normal distribution and parametric statistics could be used.

The Pearson's correlation coefficient between the total scores of the CFQ-e and the W-DEQ-A-Sp was 0.530 (95%CI: 0.365–0.663; $p < 0.001$). Figure 1 The Concordance Correlation Coefficient (CCC), calculated from standardized scores was 0.530 (95%CI: 0.366–0.662).

Figure 1 shows the Bland-Altman plot, based on the standardized scores of both questionnaires. Notice that four measurements (4.35%) fell outside the limits of agreement, with no evident tendency in value differences. The plot indicates good concordance between CFQ-e and W-DEQ-A-Sp, with an upper limit of agreement of −1.90 (95%CI: −2.245 – (−1.556)), a difference between means of −7.66e-16 (95%CI: −0.201- 0.201), and a lower limit of agreement of 1.9 (95% CI: 1.556–2.245). Since the differences between means ranged around 0, the observed error was acceptable in practice, and limits

Table 1 Descriptive analysis of W-DEQ-A-Sp scores*

W-DEQ-A-Sp[a] items	M (SD)[b]	95%CI[c]		Skewness
		Lower	Upper	
How do you think your labour and delivery will turn out as a whole? * [¿Cómo cree que va a ir el proceso de parto en general?]				
Item 1. Fantastic [Fantástico] [d]	2.18 (1.22)	1.93	2.44	0.11
Item 2. Frightful [Horrible] [d]	1.73 (1.14)	1.49	1.96	0.46
How do you think you will feel in general during labour and delivery? [¿Cómo cree que se va a sentir en general durante el proceso de parto?]				
Item 3. Lonely [Sola] [d]	0.90 (1.06)	0.68	1.12	0.99
Item 4. Strong [Fuerte] [d]	2.15 (1.15)	1.91	2.39	−0.39
Item 5. Confident [Confiada] [d]	2.38 (1.16)	2.14	2.62	−0.40
Item 6. Afraid [Asustada] [d]	2.47 (1.26)	2.21	2.73	0.23
Item 7. Deserted [Desatendida] [d]	1.34 (1.16)	1.10	1.58	0.73
Item 8. Weak [Débil] [d]	1.83 (1.10)	1.60	2.05	0.30
Item 9. Safe [Segura] [d]	2.45 (1.17)	2.20	2.69	−0.18
Item 10. Independent [Independiente] [d]	2.75 (1.23)	2.50	3.00	−0.23
Item 11. Desolate [Desolada] [d]	1.46 (1.12)	1.22	1.69	0.78
Item 12. Tense [Tensa][d]	2.54 (1.24)	2.29	2.80	−0.10
Item 13. Glad [Contenta] [d]	1.75 (1.20)	1.50	2.00	0.19
Item 14. Proud [Orgullosa] [d]	1.48 (1.17)	1.24	1.72	0.41
Item 15. Abandoned [Abandonada] [d]	0.77 (1.04)	0.56	0.99	1.38
Item 16. Composed [Íntegra] [e]	1.93 (1.18)	1.69	2.18	−0.11
Item 17. Relaxed [Relajada] [d]	3.11 (1.24)	2.85	3.36	−0.50
Item 18. Happy [Feliz] [d]	1.47 (1.27)	1.20	1.73	−0.47
How do you think you will feel during labour and delivery [¿Cómo cree que se va a sentir durante el proceso de parto?]				
Item 19. Panic [Panico][d]	2.23 (1.28)	1.96	2.49	0.10
Item 20. Hopelessness [Desesperanza] [d]	1.38 (1.23)	1.13	1.64	0.79
Item 21. Longing for the child [Deseosa del bebe][d]	0.55 (1.09)	0.33	0.78	2.41
Item 22. Self-confidence[Autoconfianza][d]	1.89 (1.16)	1.65	2.13	0.09
Item 23. Trust [Confianza][d]	1.90 (1.10)	1.67	2.13	0.04
Item 24. Pain [Dolor][d]	3.08 (1.22)	2.82	3.33	0.11
What do you think will happen when labour is most intense? [¿Qué cree que pasará cuando el trabajo de parto sea más intenso?]				
Item 25. I will behave badly [Me comportaré mal] [d]	1.24 (1.14)	1.00	1.48	0.64
How do you imagine it will feel the very moment you deliver the baby? [¿Cómo se imagina que sentirá el momento de la salida del bebé?]				
Item 26. Funny [Agradable][d]	1.68 (1.50)	1.37	2.00	0.50
Item 27. Natural [Natural][d]	1.46 (1.21)	1.21	1.71	0.50
Item 28. Self -evident [Como debe ser][f]	1.25 (1.20)	1.00	1.50	0.79
Item 29. Dangerous [Peligroso][d]	1.74 (1.31)	1.47	2.01	0.35
Have you, during the last month, had fantasies about labour and delivery, for example… [¿Ha tenido durante el último mes fantasías sobre el proceso de parto y el nacimiento, por ejemplo…]				
Item 30. …fantasies that your child would die during labour/delivery […Fantasías sobre si el bebé se muere durante el parto?] [g]	1.04 (1.47)	0.74	1.35	1.14

Table 1 (continued)

W-DEQ-A-Sp[a] items	M (SD)[b]	95%CI[c]		Skewness
		Lower	Upper	
Item 31. …fantasies that your child would be injured during labour/delivery? [… Fantasías de que su bebé sufrirá lesiones durante el parto?] [g]	1.15 (1.43)	0.86	1.45	1.04
Total score W-DEQ-A-Sp [h]	55.3 (21.0)	50.9	59.6	–0.45

Total *N* = 92

*Items are shown in English, according to the original version, and in Spanish, according to the corresponding validated and adapted version

[a] Items were scored on a 0 to 5 Likert scale. Items 2, 3, 6, 7, 8, 11, 12, 15, 19, 20, 24, 25 and 29 were scored inversely, as shown in the table

[b] M(SD): Mean (Standard Deviation)

[c] Confidence Interval 95% [Lower, Upper]

[d] 0 means "extremely/extreme"; 5 means "not at all"

[e] 0 means "totally"; 5 means "not at all"

[f] 0 means "exactly"; 5 means "not at all"

[g] 0 means "never"; 5 means "very often"

[f] The total score of the questionnaire ranged from 0 to 155 (with higher scores corresponding to stronger fear)

of agreement between the variability of the differences were established.

Reliability analysis

Table 3 shows internal consistency results, measured through the Cronbach's Alfa and McDonald's Omega coefficients

To calculate temporal stability, participants who had completed the initial form F1 were asked to complete the second questionnaire F2; 73 women (79.35%) completed it, while 19 failed to do so (20.65%). The mean time between F1 and F2 measurements was 16.00 days (SD: 2.18). The mean gestational age at the time of the second measurement was 23.68 weeks (SD: 0.98). The Intraclass Correlation Coefficient (ICC) between both CFQ-e measurements calculated with a two-factor random effect model was 0.937 (95%CI: 0.899–0.960; $p < 0.05$), with individual results for each dimension of: 0.876 (95%CI: 0.803–0.922; $p < 0.05$) for subscale "fear of harm and dying", 0.910 (95%CI: 0.958 – 0.944; $p < 0.05$) for "fear of medical interventions", 0.927 (95%CI: 0.884–0.954; $p < 0.05$) for "fear of pain", and 0.911 (95%CI: 0.859–0.944; $p < 0.05$) for "fear relating to sexual aspects and embarrassment". The ICC calculated for W-DEQ-A-Sp with a two-factor random effect model was 0.892 (95%CI: 0.828–0.932; $p < 0.05$). The estimated CCC between both measurements (F1-F2) was 0.880 (95%CI: 0.815–0.923) for the CFQ-e and 0.802 (95%CI: 0.703–0.871) for the W-DEQ-A-Sp.

Bland-Altman plots were built to evaluate the reproducibility of every instrument individually, thus data standardization was not needed. Figure 2 shows that only two CFQ-e measurements (2.74%) fell out of the limits of agreement, with no evident tendency in the differences between values. The concordance between the first and second CFQ-e measurements was good, with an upper limit of agreement of 23.085 (95%CI: 18.39–27.78), a difference between means of 0.123 (95%CI: –2.61–2.86) and a lower limit of agreement of –22.839 (95%CI: –27.53–(–18.15)).

Figure 3 shows that only two W-DEQ-A-Sp measurements (2.74%) fell out of the limits of agreement, with no evident tendency in the differences between values, also with good concordance between the first and second measurements, with an upper limit of agreement of 27.45 (95%CI: 22.28–32.61), a difference between means of 2.16 (95%CI: –0.845–5.17), and a lower limit of agreement of –23.12 (95%CI: –28.28-(–17.95)).

Face validity analysis

Table 4 shows the face validity results for both questionnaires expressed as mean, standard deviation and percentage of agreement for each of the three assessment items.

Known-groups validation

Table 5 shows the mean W-DEQ-A-Sp and CFQ-e scores according to parity. No statistically significant differences were found between multiparous and primiparous women in any of the questionnaires, although both tools indicated stronger fear in primiparous ones.

Discussion

When a new instrument is developed, it is important to assess its ability to reproduce the results of the gold standard, in order to evaluate whether it might eventually replace the latter [38]. Since in our context, although there is certainly no tool that can be considered the gold standard in FOC mediation, the W-DEQ-A-Sp was considered in a way the closest thing to a gold standard because it was for a time the only validated tool available. When a new tool, the CFQ-e, appears, the need to evaluate the concordance between them. Although the correlation between two instruments is usually evaluated by using the Pearson's (or Spearman's) correlation coefficient, other lesser-known methods for estimating

Table 2 Descriptive analysis of CFQ-e scores*

CFQ-e subescale	CFQ-e[a,e] items	M (SD)[b]	95%CI[c]		Skewness
			Lower	Upper	
Fear relating to sexual aspects and embarrassment [Miedo respecto a aspectos sexuales y vergüenza]	Item 7. Other people seeing me naked during labour/birth [Que otras personas te vean desnuda durante el parto]	0.61 (0.82)	0.44	0.78	1.57
	Item 12. Stretching of my vagina from giving birth vaginally [Que tu vagina se estire por tener un parto vaginal]	1.75 (1.27)	1.49	2.01	0.09
	Item 13 Enjoying sexual intercourse less because of stretching from a vaginal birth [Disfrutar menos de las relaciones sexuales por el estiramiento de la vagina a causa del parto vaginal]	1.91 (1.19)	1.67	2.16	-0.03
	Item 15. My body looking less attractive following the birth [Que tu cuerpo sea menos atractivo tras el parto]	1.37 (1.09)	1.14	1.59	0.37
	Item 21. Having other people see me urinate during labour/birth [Que otras personas te vean orinar durante el parto]	0.86 (0.98)	0.66	1.06	0.87
	Item 23. Being watched by strangers during labour/birth [Sentirte observada por desconocidos durante el parto]	0.81 (0.92)	0.624	1.01	1.23
	Item 24. My vagina looking less attractive following a vaginal Childbirth [Que tu vagina se vea menos atractiva tras un parto vaginal]	1.24 (1.08)	1.01	1.46	0.57
	Item 26. Enjoying sexual intercourse less because of pain or discomfort from the birth [Disfrutar menos de las relaciones sexuales por sentir dolor o molestias tras el parto]	2.00 (1.16)	1.76	2.24	-0.04
	Item 27. My partner enjoying sexual intercourse less because of stretching of my vagina from having a vaginal birth [Que tu pareja disfrute menos de las relaciones sexuales después del parto por el estiramiento de tu vagina tras el parto]	1.87 (1.26)	1.61	2.13	-0.02
	Item 32. Que otras personas te vean defecar durante el parto [Other people seeing me have a bowel movement during labour/birth]	1.59 (1.29)	1.32	1.85	0.44
	Total subescale Fear relating to sexual aspects and embarrassment[d]	1.40 (0.82)	1.23	1.59	0.24
Fear of Medical Interventions [Miedo a Procedimientos médicos]	Item 4. Having general anesthetic [Recibir anestesia general]	1.63 (1.14)	1.40	1.87	0.27
	Item 5. Being administered injections [Que te administren inyecciones]	1.01 (1.02)	0.80	1.22	1.12
	Item 22. Being administered an epidural [Que te administren la epidural]	1.32 (0.99)	1.11	1.52	0.42
	Item 28. Needing to have stitches after the birth [Necesitar puntos de sutura tras el parto]	1.64 (1.16)	1.40	1.88	0.35
	Item 33. Not being able to have a vaginal birth, even though this is what I would prefer [No poder tener un parto vaginal a pesar de ser lo que prefieres]	1.86 (1.13)	1.62	2.03	0.01
	Item 36. Having a caesarian birth [Tener una cesárea]	2.15 (1.29)	1.88	2.42	-0.16
	Item 38. Having a catheter inserted (a tube inserted into the urethra to collect urine) [Que te sonden (un tubo que se inserta en la uretra para recoger la orina)]	1.95 (1.26)	1.68	2.21	0.07
	Item 39. Experiencing pain during a cesarean birth [Sentir dolor durante una cesárea]	2.42 (1.18)	2.18	2.67	-0.22
	Item 40. Not being able to have the kind of birth I want (i.e., either vaginal or cesarean) [No poder tener el tipo de parto que te gustaría (por ejemplo vaginal o cesárea)]	2.03 (1.24)	1.77	2.29	-0.10
	Item 25. Being left with scars from a cesarean birth [Que te queden cicatrices tras la cesárea]	1.21 (1.19)	0.96	1.45	0.94
	Total subscale Fear of Medical Interventions [d]	1.72 (0.76)	3.02	3.31	0.10
Fear of pain [Miedo al dolor]	Item 29. Not being able to have an epidural during labour if I want/need one [Que no te pongan la epidural durante el parto en el caso de quererla o necesitarla]	1.92 (1.28)	1.66	2.19	0.14
	Item 30. Experiencing pain during labor [Sentir dolor durante el parto]	2.14 (1.25)	1.88	2.40	-0.03
	Item 31. Having a vaginal birth [Tener un parto vaginal]	1.21 (1.16)	0.97	1.45	0.61
	Item 34. Experiencing pain while pushing the baby out [Sentir dolor mientras empujas al bebe]	1.64 (1.20)	1.39	1.89	0.34
	Item 35. Experiencing pain during a vaginal birth [Sentir dolor durante un parto vía vaginal]	1.72 (1.25)	1.46	1.98	0.42
	Item 37. Experiencing pain during contractions [Sentir dolor durante las contracciones]	1.70 (1.12)	1.46	1.93	0.39
	Item 18. Not getting the pain medication I need [No recibir la medicación para el dolor que necesitas]	1.98 (1.22)	1.73	2.23	0.19
	Total subscale Fear of pain[d]	1.76 (1.02)	1.55	1.97	0.29

Table 2 (continued)

CFQ-e subescale	CFQ-e[a,e] items	M (SD)[b]	95%CI[c]		Skewness
			Lower	Upper	
Fear of harm and dying [Miedo al daño corporal y a la muerte]	Item 1. Being harmed because of incompetent medical care [Que te hagan daño por una asistencia médica incompetente]	2.96 (0.98)	2.75	3.16	-0.84
	Item 2. Rectal tearing/damage as a consequence of labour/birth [Sufrir un desgarro o daño rectal como consecuencia del parto]	2.72 (1.04)	2.50	2.93	-0.42
	Item 3. Dying during labor/birth [Morir durante el parto]	2.85 (1.31)	2.58	3.12	-0.80
	Item 6. The baby being damaged/handicapped as a consequence of labour/birth [Que dañen o perjudiquen al bebe como consecuencia del parto]	3.59 (0.70)	3.44	3.73	-1.61
	Item 8. Vaginal tearing during labour/birth [Sufrir un desgarro vaginal durante el parto]	2.54 (1.12)	2.31	2.78	-0.16
	Item 9. The baby being harmed during labour/birth [Que el bebe sufra algún daño durante el parto]	3.62 (0.66)	3.48	3.76	-1.74
	Item 10. Baby being hurt by a medical intervention that takes place during labour/birth (e.g., vacuum, anesthetics) [Que dañen al bebe en una intervención médica durante el parto (ej, ventosa, anestesia, fórceps ...)]	3.57 (0.76)	3.41	3.72	-1.68
	Item 16. The baby suffocating during labour/birth [Que el bebe se asfixie durante el parto]	3.51 (0.92)	3.32	3.70	-2.15
	Item 17. Requiring vacuum or forceps [Necesitar un fórceps o ventosa]	2.65 (1.05)	2.43	2.87	-0.47
	Item 20. The baby dying during labor/birth [Que el bebe muera durante el parto]	3.66 (0.88)	3.48	3.85	-2.83
	Total subescale Fear of harm and dying[d]	3.17 (0.70)	3.02	3.31	-1.06
Puntuación total CFQ-e[e]		75.2(25.54)	69.9	80.5	-0.17

Total *N* = 92

* Items are shown in English according to the original version, except for the names of the subscales, and in Spanish according to the corresponding validated and adapted version

[a] Items were scored 0 to 4 on a Likert scale, corresponding to

- 0 = not at all (no fear of this aspect of childbirth)
- 1 = slightly (slight fear of this aspect of childbirth)
- 2 = moderately (considerable fear of this aspect of childbirth)
- 3 = much (strong fear of this aspect of childbirth)
- 4 = extremely (extremely strong fear of this aspect of childbirth)

[b] M(SD): Mean (Standard Deviation)

[c] Confidence Interval 95% [Lower, Upper]

[d] The subscale's score was calculated by adding the scores of its composing items and dividing the total by the number of items

[e] The total score of the questionnaire ranged from 0 to 148 (with higher scores corresponding to stronger fear)

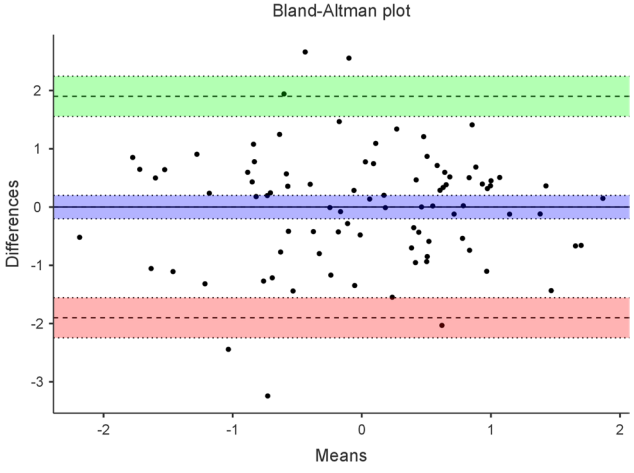

Fig. 1 Bland-Altman plot for the estimation of concordance between CFQ-e and W-DEQ-A-Sp. Total N = 92. *differences between W-DEQ-A-Sp and CFQ-e measurements are shown on the vertical axis; the corresponding mean values of both measurements are shown on the horizontal axis

Table 3 Internal consistency of W-DEQ-A-Sp and CFQ-e

Scale		Cronbach's Alpha [95%CI]	McDonald's Omega [95%CI]
W-DEQ-A.-Sp		0.926 [0.902–0.946]	0.925 [0.903–0.947]
CFQ-e	Total	0.956 [0.942–0.968]	0.957 [0.945–0.970]
	Sub. "Fear of Medical Interventions"	0.863 [0.821–0.902]	0.860 [0.816–0.897]
	Sub. "Fear of harm and dying"	0.902 [0.872–0.932]	0.889 [0.858–0.932]
	Sub. "Fear of pain"	0.929 [0.906–0.951]	0.926 [0.901–0.946]
	Sub. "Fear relating to Sexual and embarrassment"	0.903 [0.872–0.931]	0.903 (0.876–0.932]

Sub: subscale; 95%CI: 95% confidence interval [lower, upper]

concordance have been proposed, like the Lin's Concordance Correlation Coefficient (r) [36], which quantifies the strength of the linear relationship between two variables in a correlation analysis, measuring both accuracy

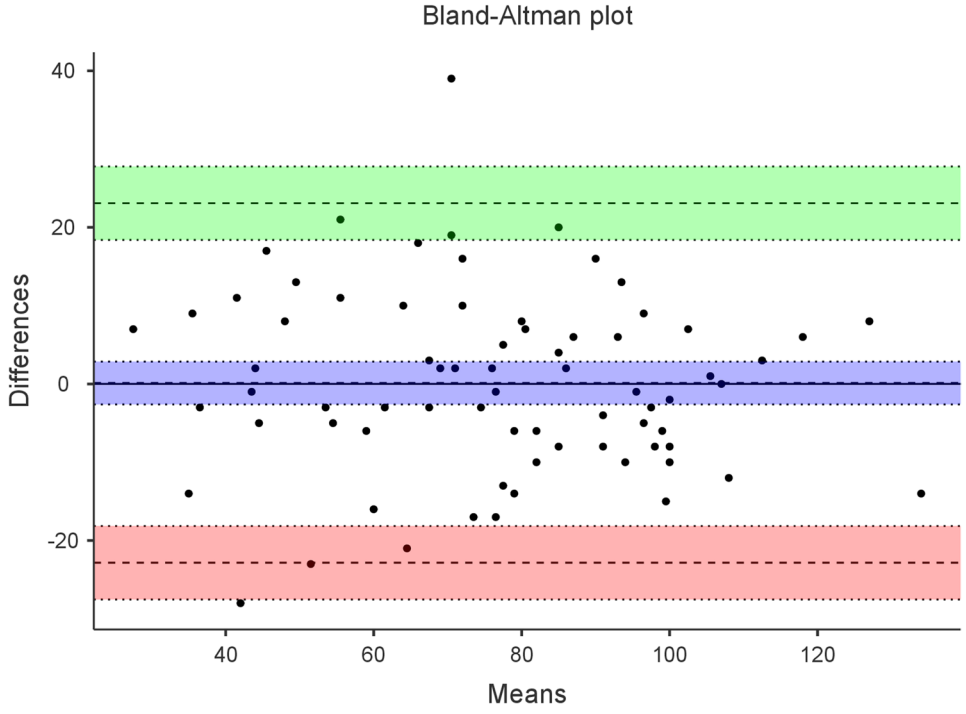

Fig. 2 Bland-Altman plot* for the estimation of agreement between the first and second CFQ-e measurements. Total N = 73. *Differences between the first and second CFQ-e measurements are represented on the vertical axis; the corresponding means of both measurements are represented on the horizontal axis

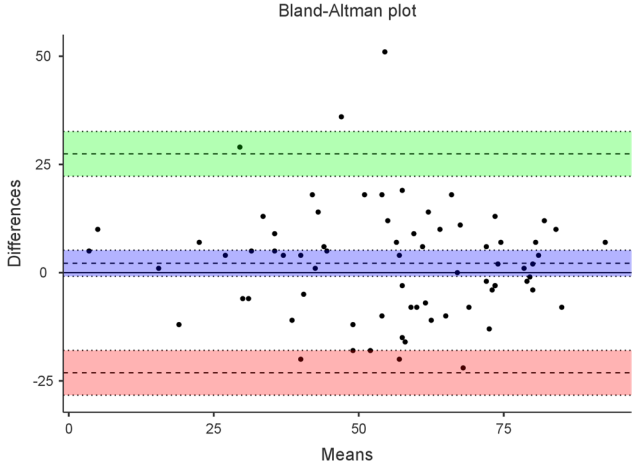

Fig. 3 Bland-Altman plot* for the estimation of agreement between the first and second W-DEQ-A-Sp measurements. Total *N* = 73. *Differences between the first and second W-DEQ-A-Sp measurements are represented on the vertical axis; the corresponding means of both measurements are represented on the horizontal axis

and precision [36]. In this study, the Pearson's Coefficient evidenced a strong positive correlation, while the Concordance Coefficient indicated a more discrete correlation. Such numerically intermediate results should be interpreted with caution. Given that coefficients close to ± 1 correspond to almost perfect agreement (or discordance), while coefficients close to 0 mean no correlation,

Table 4 Results of face validity items

Assessment items[a]	W-DEQ-A-Sp		CFQ-e	
	M (SD)[b]	%[c]	M (SD)[b]	%[c]
The questions are adequately understood	3.29 (0.75)	89.2	3.45 (0.72)	93.4
The questions adequately express my thoughts	3.22 (0.72)	89.2	3.18 (0.71)	87.0
The length of the questionnaire is adequate	3.36 (0.70)	91.3	3.37 (0.74)	91.3

Total *N* = 92

[a]Responses to these questions were scored according to agreement with the item, on a 1–4 Likert scale where: 1 was "completely disagree", 2 was "mostly disagree", 3 was "mostly agree" and 4 was "completely agree"

[b]M(SD); Mean (Standard Deviation)

[c]The percentage of agreement was calculated by adding the number of "completely agree" and "mostly agree" responses

Table 5 Validation results according to parity

	Primiparous (*n* = 60) M(SD)[a]	Multiparous (*n* = 32) M(SD)[a]	*p*-value[b]	Effect size[c]
Total Score W-DEQ-A-Sp	57.9 (18.5)	50.3(24.6)	0.094	0.36
Total Score CFQ-e	78.5 (25.1)	69.1(25.7)	0.097	0.39

[a] M(SD): Mean (Standard Deviation)

[b] p-value, Student t-test

[c] Effect size Hedges-g

our results indicated that the correlation between both tools was moderate and acceptable.

Compared to the results of Fairbrother et al. [12], who initially reported a 0.41 ($p < 0.001$) correlation coefficient between the original versions of CFQ and W-DEQ-A, our results showed better correlation between the Spanish versions of these questionnaires. Fairbrother et al. [12] supported the validity of CFQ as a FOC-measurement tool based on the finding that it showed stronger correlation with W-DEQ-A than with other tools designed to measure similar constructs, like depressed mood (EPDS), post-traumatic stress symptoms (PDS-5) or blood and injuries fear (Mutilation Questionnaire-MQ) [12].

The correlation between both analysed questionnaires was additionally evaluated by using a Bland-Altman plot [37, 39], which showed 95.65% of values within the confidence area. Since the scoring systems of both tools were not identical, this analysis required previous standardization of the total scores.

Evaluation of the questionnaires' reliability, measured through the Cronbach's Alpha and the McDonald's Omega coefficients, indicated high internal consistency for both tools, as well as for the four CFQ-e subscales. In both cases, values were similar to those reported in the original validation studies [33, 35]. Since a CFA to assess the dimensional structure of W-DEQ-A-Sp has not been conducted yet, internal consistency coefficients for the dimensions of this tool were not calculated.

Temporal stability was explored with the CCI because of its methodological advantages, since it does not require the same number of evaluators for each measurement [38]. In this study, the CCI for W-DEQ-A-Sp was 0.89 ($p < 0.05$), which indicated very good, close to excellent, temporal stability. Furthermore, the Bland-Altman plot for this tool showed 97.26% of values within the confidence area, thus supporting good concordance between the first and second measurements. These results were slightly poorer than those of the validation carried out by Ortega-Cejas et al. [33], who reported CCI values of 0.91 for the total questionnaire, and higher than 0.84 for their four proposed W-DEQ-A-Sp dimensions. Like in the evaluation of internal consistency, we did not calculate the CCI for W-DEQ-A-Sp dimensions. The CCI values obtained for this tool were slightly lower than those reported in other validation studies, such as that of the Japanese [22] or the Chinese [30] versions of W-DEQ-A, both of which reported 0.86 CCI ($p < 0.001$).

Results also showed that CFQ-e was a reliable tool in terms of temporal stability. Its CCI with a two-factor random effects model was 0.93 ($p < 0.05$), which can be considered excellent, like those of scales "fear of harm and dying", "fear of pain", and "fear relating to sexual aspects and embarrassment"; while it was slightly lower than 0.9 for subscale "fear of medical interventions". The Bland-Altman plot analysis showed 97.26% of values within the confidence area, with good concordance between the first and second CFQ-e measurements. This was the first evaluation of CFQ temporal stability, since this psychometric property was not evaluated in the original CFQ-development study by Fairbrother et al. [12], nor in the Spanish validation study [35]. Regarding the CCC, the CFQ-e was closer to a moderate concordance than W-DEQ-A-Sp.

Given that both studied questionnaires measured the same construct and their psychometric properties indicated high reliability in both cases, we postulate that the dimensionality of each questionnaire may be a decisive factor in the choice of the most suitable one to measure FOC in Spain; although this aspect was not addressed in the present study. W-DEQ was initially conceived as a one-dimensional instrument [17], although in a first factor analysis, four conceptually different FOC-related categories were identified, with "fear" being the closest related one [9, 19]. In subsequent studies, different dimensions have been proposed for the W-DEQ, most of them decarding items that do not fit into any of the dimensions explored.

The exploratory analyses support the multidimensionality of the WDEQ-A in its different versions, resulting in acceptable fit indices for the different models. The different analyses identify from six [19, 40], five [26, 31, 41], four [18, 31, 42] and three [20] factors, which include from the 33 items of the original version, to the 14 items of the Italian version [20]. The authors of the Spanish validation considered that the W-DEQ-A-Sp included four factors or dimensions [31]. It has been suggested that the W-DEQ-A is multidimensional and that it can be used as such to better explore the differential impact of various FOC-related aspects [18]. However, this suggestion still has to be confirmed, and further psychometric studies are needed to assess the structure proposed by Ortega-Cejas et al. [33].

The confirmatory analysis of the multidimensionality was not within the scope of this study, but it is evident that a more robust analysis is needed to support the model explored by the authors or to propose another more adjusted model, where items that may be ambiguous or do not fit the scope of the WDEQ-A-Sp are eliminated. They propose analysis such as the Rasch type that has also been applied in models of the WDEQ-A, specifically the study by Pallant et al. [18] on the original version of the WDEQ-A and that of Lin-Lewry et al. [43] on the Taiwanese version. For the first, the analysis showed serious deviations from Rasch's model in the total model, not supporting one-dimensionality; the independent analysis for each of the four subscales obtained from the exploratory analysis showed some mismatch, requiring the elimination of items to obtain a good fit of the

Rash model for the 4-factor and 27-item version. For the model derived from the exploratory analysis in the Taiwanese version, Rasch's analysis supports the reliability and validity of the WDEQ, with the subscales performing adequately within expectations, demonstrating excellent orientation, with no floor or ceiling effects in a model with 3 factors and 30 items.

The CFQ is a more recently created tool, little used up to date. Consequently, available information on its performance and psychometric properties is still scarce. Fairbrother et al. provided interesting data in this regard [16]; they compared the full CFQ both with the full W-DEQ-A, and the subscale proposed by Garthus-Niegel et al. [19]. Their results showed poorer correlation for the full W-DEQ-A than for its fear-subscale. This finding supported the proposal that CFQ is a FOC-measurement tool centered in fear, different from the W-DEQ-A [12]. The fact that the CFQ correlation was stronger with the W-DEQ-A fear-subscale than with the full questionnaire indicated that the W-DEQ-A does not exclusively measure fear, but includes multiple items assessing other feelings and emotions. This proposal has also been supported by other authors, who described good correlation between the W-DEQ-A and other tools, which measured different constructs, like quality of life [27], depressive symptoms [20, 25–27, 29, 30], anxiety [20, 22, 25, 29], neurotic personality traits [20, 29], or self-efficacy [22]. As mentioned, although the psychometrics of the W-DEQ-A is well-established, this tool does not exclusively assess FOC but includes a wide range of women's perceptions of childbirth. However, the W-DEQ-A omits certain aspects closely related to FOC (e.g., pain, pain perception, pressure to receive/avoid pain medication, safety, changes in body or sexual function, fear of medications or interventions), so that some women experiencing FOC might remain undetected in a screening based on this tool [44]. In this regard, published focus-groups qualitative studies have questioned its usefulness and adequacy as a screening tool to identify pregnant women with FOC in the U.S. context [45], while others have postulated that it may restrict researchers' ability to evaluate whether specific FOC aspects were caused by certain life experiences and/or resulted in different outcomes [12]. Studies conducted on British women [46] reported ambiguity issues in some W-DEQ-A items, and described that, although women positively considered that the questionnaire provided a detailed FOC assessment, they perceived considerable burden of administration and prevalence of the emotional over the physical aspects of childbirth. In this regard, although of a similar length, the CFQ – and consequently its Spanish version – is a comprehensive multidimensional tool, which assesses multiple FOC domains, providing clinicians and researchers with subscale scores that help identify specific areas, in which education and/or intervention are required. Thus, clear objectives can be established for education or cognitive modifications regarding fear of childbirth [36, 46]. A recent version of the CFQ highlights the need to adapt this tool to the study environment, since fears and concerns related to childbirth may be less relevant or expressed differently, thus in Jordanian women [47], their cultural values, around femininity and modesty, were more in line with their cultural values, around femininity and modesty. also including a reduction of the items that improved relevance and practical applicability.

This study did not include an analysis of the correlation per parity. However, the measurements of multiparous versus primiparous women were compared, with no significant differences observed for either questionnaire. This result supported the hypothesis that, despite their differences, both tools measure a similar construct. Neither original validation study of the W-DEQ-A-Sp [33], nor the original validation study of the CFQ-e [35], analysed possible differences with respect to parity. The observation in the present study that stronger FOC in primiparous women was consistent with the available literature on the prevalence of FOC [7, 48]. Fairbrother et al. [12] reported higher FOC scores for primiparous women on seven of the original nine CFQ subscales; although, their confirmatory factor analysis revealed that the CFQ model was replicable and generalizable across parity groups, and could therefore be used in women with different pregnancy experience. This finding was in line with the results originally provided by Wijma et al. [17]. Further studies with these two instruments are still needed to evaluate the diagnostic capacity of these tools in different population groups of Spanish women.

Face validity illustrates the degree to which a questionnaire "appears" to measure what it is meant to measure, as well as its acceptability, as according to subjects' opinions [49]. Our results were positive for both tools, with good comprehensibility, length, and adequacy to women's thoughts about the fear of childbirth. "Comprehensibility" showed the largest differences between questionnaires, with 93.4% agreement for the CFQ-e versus 89.2% for the W-DEQ-A-Sp, which supports the existence of ambiguity issues in certain W-DEQ-A items. Conversely, the W-DEQ-A-Sp appeared to perform slightly better in capturing women's thoughts, with a 89.2% agreement versus 87.0% for the CFQ-e. Regarding the length of the questionnaire, both tools showed equivalent differences in mean and percentage of agreement, despite the fact that the CFQ-e was longer, with 6 items more than the W-DEQ-A-Sp. We would like to highlight the importance of assessing face validity of scales and tools, given that its acceptance by the target population is essential.

On interpreting our results, the following limitations should be considered. Firstly, the limitations of non-probability sampling, which cannot ensure the generalisability of the results obtained. In an attempt to reduce this limitation, a larger than estimated sample was used, especially with the aim of reducing the impact of the loss of subjects for the second measurement. Furthermore, asking participants to complete two long questionnaires might have induced what is known as fatigue bias. It should be noted that the results of this study are certainly not valid for other Spanish-speaking environments, but with different sociocultural characteristics, where the use of specifically validated versions would be more pertinent.

FOC is currently gaining prominence in the field of pregnancy care, and a growing body of evidence is becoming available in this regard. As a result, many studies are being published on the validation and adaptation of FOC-measurement tools into different languages. However, although numerous development and validation studies are being published, there are few comparative studies, which evaluate and compare tools measuring similar constructs. Thus, when several instruments that measure different constructs are available, the choice is often based mainly on the data reported in the validation study. Comparative studies like the present one provide valuable information for researchers to select the tool that best suits their objectives. In addition, further research is needed to develop adapted shorter versions, on the basis of already developed tools, in order to facilitate their use in the daily clinical practice.

Conclusions

The observed moderate positive correlation between the CFQ-e and the W-DEQ-A-Sp, and their convergent validity suggests that both measure the same construct. It can be concluded that, in the Spanish context, there is not a FOC-measurement gold standard, but both questionnaires are equally valid and reliable. The CFQ-e presents the advantage of including dimensions/subscales, which provide specific information on certain FOC aspects, and that such dimensions are reliable and stable over time. W-DEQ-A-Sp was also confirmed as a reliable tool, both in terms of internal consistency and temporal stability. Face validity results showed similar acceptability by pregnant women for both questionnaires. CFQ-e excelled in comprehensibility, while W-DEQ-A-Sp seemed to better capture women's thoughts. The present study fills a gap in our knowledge of the psychometric properties of W-DEQ-A-Sp and CFQ-e and improves our understanding of their performance in our context. Our research opens the question whether W-DEQ should continue to be the gold standard in FOC-evaluation, or other tools assessing more specific contents of the construct should be considered.

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Authors' contributions
Conceptualization: SMP, EPE, NMM, PGT; Methodology: SMP, HGT, AMM; Formal analysis: HGT; Investigation; SMP, EPE, NMM, PGT; Writing-original draft preparation: SMP, HGT; Writing-review and editing: HGT, AMM; Supervision: HGT, AMM. All authors have read and agreed to the published version of the manuscript.

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Data availability
All data generated or analysed during this study are included in this published article. The raw data from the response to each item for the two instruments (W-DEQ-A-Sp and CFQ-e) and without the rest of the sociodemographic obstetric variables could be shared with those researchers who contact the corresponding author if requested with a reasoned and logical request.

Declarations

Ethics approval and consent to participate
Informed consent was obtained from the participants and their legal guardians prior to their participation. Approval was obtained from the Ethics and Drugs Committee of the Province of Las Palmas (CEIm HUGCDN Code: 2022-451-1). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and its subsequent amendments, as well as with current data protection regulations, including the European General Data Protection Regulation (EU GDPR 2016/679) and the Spanish Organic Law on Data Protection and Digital Rights (LOPDGDD 3/2018).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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