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Article

The Childbirth Fear Questionnaire and the Wijma Delivery Expectancy Questionnaire as Screening Tools for Specific Phobia, Fear of Childbirth

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Abstract: Background: Perinatal anxiety and related disorders are common (20%), distressing and impairing. Fear of childbirth (FoB) is a common type of perinatal anxiety associated with negative mental health, obstetrical, childbirth and child outcomes. Screening can facilitate treatment access for those most in need. Objectives: The purpose of this research was to evaluate the accuracy of the Childbirth Fear Questionnaire (CFQ) and the Wijma Delivery Expectations Questionnaire (W-DEQ) of FoB as screening tools for specific phobia, FoB. Methods: A total of 659 English-speaking pregnant women living in Canada and over the age of 18 were recruited to the study. Participants completed an online survey of demographic, current pregnancy, and reproductive history information, as well as the CFQ and the W-DEQ, and a telephone interview to assess specific phobia FoB. Results: Symptoms meeting full and subclinical diagnostic criteria for specific phobia, FoB were reported by 3.3% and 7.1% of participants, respectively. The W-DEQ met or exceeded the criteria for a "good enough" screening tool across several analyses, whereas the CFQ only met these criteria in one analysis, and came close in three others. Conclusions: The W-DEQ demonstrated high performance as a screening tool for specific phobia, FoB, with accuracy superior to that of the CFQ. Additional research, to ensure the stability of these findings, is needed.

Keywords: Perinatal Mental Health; Anxiety Disorders; Perinatal Anxiety; Fear of Childbirth; Screening

1. Introduction

Anxiety and anxiety-related conditions are the most prevalent of all psychiatric disorders [1,2]. They include the core anxiety disorders (i.e., panic disorder, agoraphobia, specific phobia, social anxiety disorder, and generalized anxiety disorder) as well as obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD) which, until the publication of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [3] had for 34 years, also been classified as anxiety disorders [4]. The DSM-5 now classifies OCD and PTSD separately in their own sections [3]. There is wide agreement that anxiety is a core feature of these disorders, and they are highly relevant to perinatal people [3]. Consequently, many investigators continue to include them in studies of anxiety [3,4].

A third of the adult population will suffer from one or more anxiety or anxiety-related disorder at some time in their life [1]. This is significantly greater than the prevalence of mood disorders (i.e., depressive and bipolar disorders) at 21.4% [1]. Women are also 1.5 times as likely as men to suffer from an anxiety or anxiety-related condition [1,2]. A recent meta-analysis indicates that one in five pregnant and postpartum people suffer from one or more anxiety or anxiety-related disorder during pregnancy or the postpartum

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[5]. This is significantly more than perinatal depression, where six to twelve percent of pregnant and postpartum people suffer from an episode of major depression during the perinatal period [6,7].

Anxiety and anxiety-related disorders are associated with substantial indirect costs related to functional impairment (e.g., diminished work capacity, unemployment) [6]. People with these conditions are significantly more impaired with respect to social, emotional and physical functioning compared with non-anxious individuals [8]. The anxiety and their related disorders are associated with high levels of health care service utilization [9–13].

Maternal prenatal anxiety (i.e., dimensional anxiety not necessarily associated with a diagnosis) is associated with numerous adverse pregnancy outcomes such as preterm delivery, miscarriage, preeclampsia, and low birth weight [14–18], as well as prolonged negative effects on the developing infant (e.g., impaired brain activity, difficult temperament, impaired self-regulation and motor development, and an increased risk for attention-deficit/hyperactivity disorder) [15,19–24]. Prenatal maternal anxiety is also a strong risk factor for postpartum depression, even after controlling for prenatal depression [25–28]. The anxiety and their related disorders, specifically, have also been found to be associated with a deleterious fetal, infant and maternal outcome, including pregnancy complications and preterm birth, spontaneous abortions, neonatal morbidity, and lower birth weight [29–33]. For example, mothers with postpartum obsessive-compulsive disorder have been found to be less confident and sensitive in mother-infant interactions than mothers without obsessive-compulsive disorder [34]. As well, maternal postpartum social anxiety disorder has been associated with reduced cognitive and language abilities in offspring [35]. Overall, maternal AD are predictive of anxiety disorders in offspring [36].

There are a number of domains of anxiety (i.e., content areas) that are a particular focus among perinatal people. These include OCD in which the focus of the obsessions (a core feature of OCD) is on harm coming to one's infant, PTSD subsequent to a traumatic childbirth, a fear of needles or other medical procedures (e.g., instrumental or surgical birth), pregnancy-specific anxiety (i.e., high anxiety related to the wellbeing of one's pregnancy), and fear of childbirth (FoB). FoB is the focus of the current study.

FoB is common among people with childbearing potential (i.e., people who are pregnant, may become pregnant or who have already given birth). In the most comprehensive systematic review and meta-analyses of FoB in pregnant women conducted to date, the worldwide pooled prevalence of FoB was estimated at 14% (95% CI 0.12-0.16) [37]. The study was based on data from 29 primary studies and included a total of 853,988 pregnant women. Prevalence estimates from individual studies varied significantly from 3.7 to 43%. Of concern is that there was a high level of between study heterogeneity, not explained via sensitivity and subgroup analyses. Unexplained variability in prevalence estimates may be a result of the significant methodological variability across studies (e.g., variability in cut-scores and measurement tools). Historically, FoB has not been conceptualized as a diagnosable mental health condition, but rather a form of dimensional psychological distress characterized by fear and anxiety and assessed via self-report inventory [37]. When mental health difficulties are assessed using self-report questionnaires, prevalence estimates tend to be much higher than when formal diagnostic criteria are employed [38–40]. For example, all of the studies included in this meta-analysis of prevalence employed self-report questionnaires and not diagnostic interviews. The one study in which diagnostic criteria was clearly employed also, as expected, reported a much lower prevalence of FoB (3.7%) compared with the meta-analysis as a whole [41].

This is problematic because, in the absence of clear diagnostic criteria, it may be difficult to determine what cut-score best represents clinically meaningful fear which may merit treatment. Specifically, to merit the diagnosis of an anxiety disorder, symptoms must be clinically distressing or functionally impairing [3]. Although not yet fully established, it appears that specific phobia may be the most appropriate diagnostic category

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for FoB, in particular for nulliparous people [42–45]. A specific phobia is a fear and avoidance of circumscribed objects and situations (e.g., insects, animals, heights, blood, injections). Given that FoB is a circumscribed fear with symptoms and features closely resembling those of other specific phobias, it has been proposed as perhaps the most appropriate diagnostic classification for FoB [42–45]. In the only study to evaluate this systematically (N = 106), 8.5% of study participants (a general sample of nulliparous pregnant women in Sweden) were found to meet DSM-5 diagnostic criteria for specific phobia FoB [42]. Although small (N = 106), this is also the only study published to date to assess any self-report measure of FoB as a potential screening tool for diagnosable FoB [42]. In this study a W-DEQ score of ≥85 was found to be the optimal cut-off score for identifying FoB, with excellent sensitivity (100%), specificity (93.8%), and agreement between the W-DEQ A and the SCID-5 (specific phobia; Cohen's Kappa coefficient, $\kappa = 0.720$). Determining appropriate cut-scores for self-report measures of FoB can be aided via studies in which diagnostic interviews for specific phobia, FoB are also employed, and screening metrics evaluated. In the absence of this, it is difficult to determine if cut-scores based on other approaches (e.g., the top 25% of scores) actually represent clinically meaningful distress and/or impairment in functioning.

FoB is often distressing, and associated with various psychosocial, mental health, obstetrical, childbirth, and child related outcomes [46–49]. For some, FoB is so intense as to lead to delaying or avoiding pregnancy, and pregnancy termination, even among those who wish to bear children [50–52]. Obstetrical and birth complications include increased requests for epidural anesthesia during labour [50,52], longer labours [53–55] and a higher likelihood of emergency and planned CS [44,54,56–60]. For example, a study of 6,422 pregnant women from six European countries showed that 16.7% of nulliparas and 31.7% of multiparas with severe FoB had a Cesarean section without medical indications (compared to 4.6% and 17.5% of women without severe fear of birth; Ryding et al., 2015). In one Finnish study, 8% of Cesarean sections at one hospital were potentially attributable to fear of vaginal delivery [61]. Elevated fear of vaginal birth is consistently associated with preferences for CS among pregnant women [60,62], and women who plan to become pregnant [63]. There is also a higher likelihood of negative birth experiences among women with a fear of childbirth [64,65], especially if the woman delivered by emergency CS or instrumental vaginal delivery [53,66]. There is also an association between FoB and mental health difficulties including postnatal depression, specific phobia, and posttraumatic stress disorder (PTSD) [67–70].

In particular, there is a strong association between previous negative birth experiences and/or traumatic births, and FoB [69]. Studies have also shown that the odds of FoB increase with the number of obstetric complications experienced during a previous pregnancy [66]. Women with a previous negative birth experience are 5 times more likely to experience FoB in a subsequent pregnancy [66]. History of prior operative or instrumental delivery has also been associated with higher levels of FoB [58,59,71]. Although most studies have found a positive relationship between parity and FoB, with higher levels of childbirth fear reported by nulliparous compared with multiparous women [47,49,52,59,71–74] there is some evidence that the most severe levels of FoB are experienced by multiparous women [41].

A range of socio-demographic variables are associated with higher levels of childbirth fear including lower educational attainment, younger age [75,76], low social support [61,76], and dissatisfaction with partner or support received from partner [61,75], mental health variables such as higher anxiety and stress [44,58,61,73,75,77], history of depression and depression during pregnancy [62,75,78,79], low confidence in one's ability to cope with labour and birth [62,75,78,79], and history of abuse [47,77,80]. In terms of physical health, higher levels of fatigue during pregnancy [81] and lower self-rated health (Qiu et al., 2020) have also been associated with higher levels of FoB.

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Our study team recently developed a new measure of FoB: The Childbirth Fear Questionnaire (CFQ) [82]. The CFQ was designed to overcome limitations of existing measures, and as a screening tool for FoB. Existing measure frequently omit important domains of FoB [57,71,76,83–91], include non-fear related items [83,85,87,89–92], are too brief to encompass the full FoB experience (e.g., 1-2 items only) [57,71,76,86], or include too few items per subscale to achieve stability [87,93]. We developed the CFQ to cover the full range of domains of FoB, with a view to enabling an identification of specific fear domains to be targeted in treatment. We also sought to develop a measure that would function well as a screening tool for diagnosable FoB. Screening represents a critical step in the pathway to treatment [94]. Although diagnostic assessments by trained professionals are the gold standard for providing mental health diagnoses, they are both expensive and time-consuming. Consequently, more rapid, and cost-effective screening is essential for identifying those suffering from clinically meaningful FoB. Without screening, those suffering may fail to be identified and as a result, fail to receive evidence-based care [95]. The CFQ has been evaluated in two separate samples, with both an exploratory and a confirmatory factor analysis. Psychometric properties of the CFQ are strong, and two manuscripts pertaining to this measure have been published with a third currently under review [72,82,96].

The primary objective of this research was to evaluate the screening accuracy of the CFQ for specific phobia, FoB. A secondary objective was to compare the screening accuracy of the CFQ to the screening accuracy of the W-DEQ. Given known differences in FoB between nulliparous and multiparous people [41,72,73], we also elected to report screening accuracy of the CFQ and the W-DEQ separately for nulliparous and multiparous participants. As a further distinction, we also report the accuracy of the CFQ and the W-DEQ separately for those primarily fearful of a vaginal birth and those primarily fearful of a cesarean birth. We hypothesized measures of FoB might perform differently for people whose primary fears relate to vaginal delivery compared to those whose primary fears relate to medical and surgical interventions (i.e., cesarean birth) [96]. We chose the W-DEQ as the comparator measure because: (a) the W-DEQ is the most commonly used measure to assess FoB and has broad international acceptance [48], (b) the W-DEQ is the only measure of FoB to be evaluated as a screening tool for specific phobia, FoB [48], and (c) the CFQ was developed with a view of overcoming some of the limitations of the W-DEQ (i.e., inclusion of non-fear-related items, and a failure to assess all of the relevant FoB content domains) [82]. In contrast with the W-DEQ, the CFQ assesses a broader range of FoB content areas, includes only fear-related items, and includes a measure of interference making it more similar to a diagnostic measure (i.e., mental health diagnoses require either distress or interference in order for a diagnosis to be given).

For all of the above evaluations of screening accuracy, we also sought to evaluate the screening accuracy of the CFQ and the W-DEQ against the criteria for a "good enough" screening tool proposed by Fairbrother and colleagues [97]. They propose that, in order for a screening tool to deemed sufficiently accurate for use in clinical settings, it should meet certain minimum standards of accuracy including an area under the curve (AUC) of .8 or greater, a Youden's J index of .5 or more (J = .05 when sensitivity and specificity both equal .75), a negative predictive value (NPV) of .8 or greater, and a positive likelihood ratio (LR+) of 4.0 or more. A LR+ of 4.0 means that with a positive test result, one is 25% more likely to have the condition in question, compared with the baseline probability of having the condition [98]. Any recommendations regarding the accuracy and clinical utility of the CFQ and the W-DEQ will be based on how well they perform in relation to these criteria.

2. Materials and Methods

This paper reports on a secondary analysis of a larger dataset, for which detailed methods have been published [82].

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2.1. Ethics

This research received ethical approval from the Behavioral Research Ethics Board of the University of British Columbia. All participants provided informed, written consent prior to participation.

2.2. Participants

All English-speaking, pregnant individuals over the age of 18 and residing in Canada were eligible to take part in this study. In total, 881 participants took part in the online questionnaire between 11- and 46-weeks' gestation (average 35-weeks). Primary data collection took place between August 2016 and November 2019.

2.3. Procedures

Perinatal people were directed to the online survey via the study advertisement posted on online forums and social media pages frequented by pregnant women (e.g., pregnancy-related Facebook groups and websites). Participants who completed the survey were entered into a draw with the chance to win one of seven $150 prizes.

2.4. Measures

Demographic (e.g., age, education, marital status, income, race/ethnicity, and country of residence), pregnancy (e.g., number of fetuses, and method of conception), and reproductive history (e.g., the number of prior pregnancies, births, miscarriages, and vaginal and cesarian deliveries) was collected via self-report. Participants were also asked about their delivery preferences, using a 7-point Likert-type scale ranging from very strong desire for a vaginal birth (0) to very strong desire for a cesarian birth (7).

The Childbirth Fear Questionnaire (CFQ)[82] is a recently developed self-report measure used to assess fear of childbirth. The questionnaire contains 47 items, scored on a Likert-type scale ranging from 0 (no fear) to 4 (extreme fear), and measuring nine, frequently reported dimensions of FoB and an 8-item interference scale with items covering multiple life domains. Fear dimensions include: (1) fear of loss of sexual pleasure or attractiveness; (2) fear of pain from a vaginal birth; (3) fear of medical intervention; (4) fear of embarrassment; (5) fear of harm to baby; (6) fear of caesarean birth; (7) fear of mom or baby dying; (8) fear of insufficient pain medication; (9) fear of body damage from a vaginal birth. Initial validation of the CFQ produced a Cronbach's alpha reliability coefficient of 0.94 for the overall scale and a range between 0.76 to 0.94 for the individual subscales [72]. The CFQ demonstrated good convergent and discriminant validity, when comparing the associations between the CFQ with other measures of FoB. Evidence suggests that the CFQ is accurate in detecting group differences between pregnant people in relation to delivery mode preference and parity.

The Wijma Delivery Expectancy Questionnaire (W-DEQ-A)[90]. The W-DEQ-A is a 33-item questionnaire. Items are scored on a 0-5 Likert type scale ranging from 0 (extremely) to 5 (not at all). The minimum and maximum scores of the questionnaires are 0 and 165, with higher scores reflecting higher levels of fear. The psychometric properties of the W-DEQ-A are well established [90,99]. The internal consistency reliability in the present sample was 0.92. As well as the the W-DEQ-A total score, there is data to support the administration of a 6-item fear scale, which was found to be highly correlated with the full scale and several other important outcomes [100].

The Diagnostic Assessment Research Tool (DART v1.03.16) [101]. The DART (v1.03.16) is a modular, semi-structured interview designed for the assessment of DSM-5 diagnoses. Although the DART remains early in its development psychometric evidence to date strongly supports the interrater reliability and construct (convergent and discriminant) validity of the measure as a diagnostic interview for DSM-5 disorders [102]. We used the specific phobia section of the DART to assess specific phobia, fear of childbirth in this

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study. Minor wording modifications were made to orient the interview exclusively to fear of childbirth. Interviewers were research assistants, graduate students in clinical psychology and the principal investigator, and were trained and supervised by the principal investigator. Participants' responses were classified as indicating no diagnosis, a subclinical diagnosis, or a full criteria diagnosis of specific phobia, FoB.

2.5. Data Analysis Strategy

All analyses were carried out in R v.4.1.1 [103] and SPSS v.24 [104].

The precision of estimates of a diagnostic accuracy study depends on the prevalence of the condition in the sample [105]. The lower the prevalence, the larger the number of participants with cases needed to precisely estimate metrics such as sensitivity and specificity, as lower prevalence results in estimated metrics that can be unreliable and imprecise [106]. For these reasons, we conducted an assessment of screening accuracy for both subclinical and full criteria diagnoses of specific phobia, FoB. Specifically, we began by comparing cases with a diagnosis meeting full criteria for specific phobia, FoB to the remainder of the sample (Table 3). However, due to small numbers of cases meeting full criteria, we also compared cases of full and subclinical criteria to the remainder of the sample (see Tables 4 and 5 of the Results).

Given the data indicating that childbirth fears may differ among nulliparous and multiparous people [73], we felt it was important to provide information about screening accuracy for each group separately. We have also provided screening accuracy data for the CFQ (total scores) with and without the Interference subscale included. We sought to investigate whether the interference subscale would improve screening accuracy.

To determine optimal cutpoints we used the 'cutpointr' [107] package in R. Cutpoints were estimated by maximizing the Youden's J index using 1000 bootstrap replicates. The returned optimal cutpoint, and its associated AUC, sensitivity, specificity, J index, NPV and (LR+) were the means of these metrics across all 1000 replicates. This whole process was itself bootstrapped 100 times to validate the out of sample performance. These 'out of bag' or oob estimates are reported in the Results.

3. Results

3.1. Participants

A total of 659 pregnant people participated in this study. Participants ranged in age from 21 to 49 (M = 32.9, SD = 4.10). Of these, 270 (48%) were nulliparous at the time of participation, and 296 (52%) were multiparous. Information pertaining to participant demographics, current pregnancy and reproductive history is provided in Table 1. Means and standard deviations for the CFQ and the W-DEQ are reported in Table 2.

Table 1. Participant demographic information and reproductive information (N = 659).

Demographic variables		
	Percentage	**n**
Married or cohabitating	93.3%	613
Cis-gender female	99.1%	652
Some postsecondary education	94.4%	623
European heritage	76.3%	502
English spoken at home	95.4%	629
Current pregnancy		
Singleton pregnancy	97.7%	642
Weeks pregnant: M (SD)	34.6 (2.1)	497
Pregnancy complications	30.8%	202
Reproductive history		
Prior births	52.3%	296
Prior vaginal birth	51.2%	198

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Prior cesarean birth	17.7%	66
Prior pregnancy loss < 20 weeks	40.6%	157
Prior pregnancy loss > 20 weeks	1.3%	5

Table 2. Means and standard deviations for CFQ (total and subscales) and the W-DEQ.

	Full Sample M (SD)	Nullips Only M (SD)	Multips Only M (SD)
CFQ Total	1.11 (.59)	1.23 (.61)	1.02 (.56)
CFQ Interference	.42 (.47)	.44 (.47)	.39 (.45)
W-DEQ	55.44 (23.76)	59.07 (22.77)	52.8 (24.09)

Note: *CFQ Total and CFQ Interference scores are mean items scores (i.e., out of a possible 0-4). W-DEQ scores are for the total out of 33 items.*

3.2. Prevalence of specific phobia, fear of childbirth

Twenty-two (3.3%) participants reported symptoms meeting full diagnostic criteria for specific phobia, fear of childbirth, and 47 (7.1%) reported symptoms meeting subclinical criteria for specific phobia, fear of childbirth. When segregated by parity, fewer (1.9%) nulliparous participants met full criteria for specific phobia compared with multiparous participants (5.1%). However, similar proportions of nulliparous and multiparous participants met subclinical criteria for specific phobia, fear of childbirth (6.3 and 6.8%, respectively).

3.3. ROC curves and diagnostic accuracy

We present the screening metrics for the CFQ and the W-DEQ in Tables 3 through 5, with corresponding ROC curves presented in Figures 1 through 3. In Table 3, screening metrics are provided for the CFQ (both with and without the Interference Subscale) and the W-DEQ for specific phobia, FoB, full criteria across parity groups. In Table 4, we present the same findings, but for specific phobia FoB, full criteria and subclinical combined. In Table 5, we present the screening metrics for the CFQ (including the Interference Subscale) and the W-DEQ across parity groups, separately for those primarily fearful of a vaginal birth and those primarily fearful of a cesarean birth. For this table, there were not enough cases to present the screening accuracy of the W-DEQ for fear of cesarean birth. Consequently, only the W-DEQ screening accuracy for fear of vaginal birth is provided. Given the smaller samples available for this final analysis, screening metrics are provided for subclinical and full diagnostic criteria cases combined.

The W-DEQ evidenced the highest level of screening accuracy, meeting or exceeding the criteria for a "good enough" screening tool across several analyses. Specifically, when comparing those reporting symptoms meeting full diagnostic criteria for specific phobia, FoB compared to the remainder of the sample, the W-DEQ met or exceeded the "good enough" criteria for both nulliparous and multiparous participants, and came close to meeting these criteria for the full sample. When comparing those who reported symptoms meeting full or subclinical diagnoses with the remainder of the sample, the W-DEQ exceeded the criteria for a "good enough" screening tool for multiparous participants (in general and among those primarily fearful of a vaginal birth), as well as for all participants primarily fearful for a vaginal birth.

The CFQ only met or exceeded the criteria for a "good enough" screening tool for nulliparous participants primarily fearful of a vaginal birth. When comparing those reporting symptoms meeting full or subclinical diagnoses with the remainder of the sample, the CFQ came close to meeting the criteria for a "good enough" screening tool for nulliparous participants in general, for nulliparous participants primarily fearful of a cesarean birth, and for those primarily fearful of a vaginal birth (full sample).

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Table 3. ROC results for the CFQ and the W-DEQ across parity (full diagnostic criteria ONLY).

		Prevalence	AUC	*J*	Cutpoint	Sensitivity	Specificity	NPV	LR+
CFQ Total Scores	Full sample	3.3%	.63	.11	1.17	.56	.55	.97	1.24
	Nulliparous only	1.9%	.45	.45	1.34	.60	.45	.98	1.09
	Multiparous only	5.0%	.67	.17	1.05	.60	.57	.96	1.40
CFQ Total & Interference Subscale Scores	Full sample	3.3%	.62	.10	1.13	.53	.57	.97	1.23
	Nulliparous only	1.9%	.56	.23	.69	1.00	.23	1.0	1.30
	Multiparous only	5.0%	.69	.35	1.63	.47	.89	.97	4.27
W-DEQ	Full sample	3.9%	.82	.43	78.87	.62	.81	.98	3.26
	Nulliparous only	***2.5%***	***.88***	***.69***	***95.37***	***.75***	***.94***	***.99***	***12.50***
	Multiparous only	***5.9%***	***.83***	***.53***	***76.56***	***.70***	***.83***	***.98***	***4.12***

Note: Cut scores for the CFQ are mean items scores (i.e., out of a possible 0-4). W-DEQ cut scores are for the total out of 33 items.

Table 4. ROC Results for the CFQ and the W-DEQ across parity (subclinical and full diagnostic criteria combined).

		Prevalence	AUC	*J*	Cutpoint	Sensitivity	Specificity	NPV	LR+
CFQ Total Scores	Full sample	10.0%	.72	.29	1.18	.29	.69	.90	.94
	Nulliparous only	8.0%	.75	.30	1.46	.66	.64	.96	1.83
	Multiparous only	12.0%	.71	.26	1.13	.63	.63	.93	1.70
CFQ Total & Interference Subscale Scores	Full sample	10.0%	.73	.30	1.13	.69	.61	.95	1.77
	Nulliparous only	8.0%	.77	.37	1.38	.71	.66	.96	2.09
	Multiparous only	12.0%	.73	.30	1.05	.67	.63	.93	1.81
W-DEQ Total Scores	Full sample	9.0%	.79	.47	73.59	.68	.79	.96	3.24
	Nulliparous only	7.0%	.68	.26	81.51	.44	.82	.95	2.44
	Multiparous only	***11.0%***	***.88***	***.53***	***70.62***	***.74***	***.79***	***.96***	***3.52***

Note: Cut scores for the CFQ are mean items scores (i.e., out of a possible 0-4). W-DEQ cut scores are for the total out of 33 items.

Table 5. ROC Results for the CFQ (Total and Interference Subscale scores) and the W-DEQ, separately for fear of vaginal and fear of cesarean birth (subclinical and full diagnostic criteria combined).

CFQ Total & Interference Subscale scores									
		Prevalence	**AUC**	***J***	**Cutpoint**	**Sensitivity**	**Specificity**	**NPV**	LR+
Fear of Vaginal Birth	Full sample	3.2%	.81	.43	1.38	.71	.72	.99	2.54
	Nulliparous only	***1.5%***	***.88***	***.67***	***1.42***	***1.00***	***.67***	***1.00***	***3.03***
	Multiparous only	4.1%	.80	.44	1.38	.67	.77	.98	2.91
Fear of cesarean birth	Full sample	6.9%	.71	.27	1.04	.73	.54	.96	1.59
	Nulliparous only	4.9%	.78	.49	1.51	.77	.72	.98	2.75
	Multiparous only	8.6%	.73	.39	.94	.84	.55	.97	1.87
W-DEQ									
		Prevalence	AUC	*J*	Cutpoint	Sensitivity	Specificity	NPV	LR+
Fear of Vaginal Birth	Full sample	***4.2%***	***.86***	***.56***	***78.87***	***.74***	***.83***	***.99***	***4.35***
	Nulliparous only	2.5%	.73	.70	96.36	.75	.95	.99	15.0
	Multiparous only	***5.3%***	***.92***	***.70***	***75.24***	***.89***	***.81***	***.99***	***4.68***

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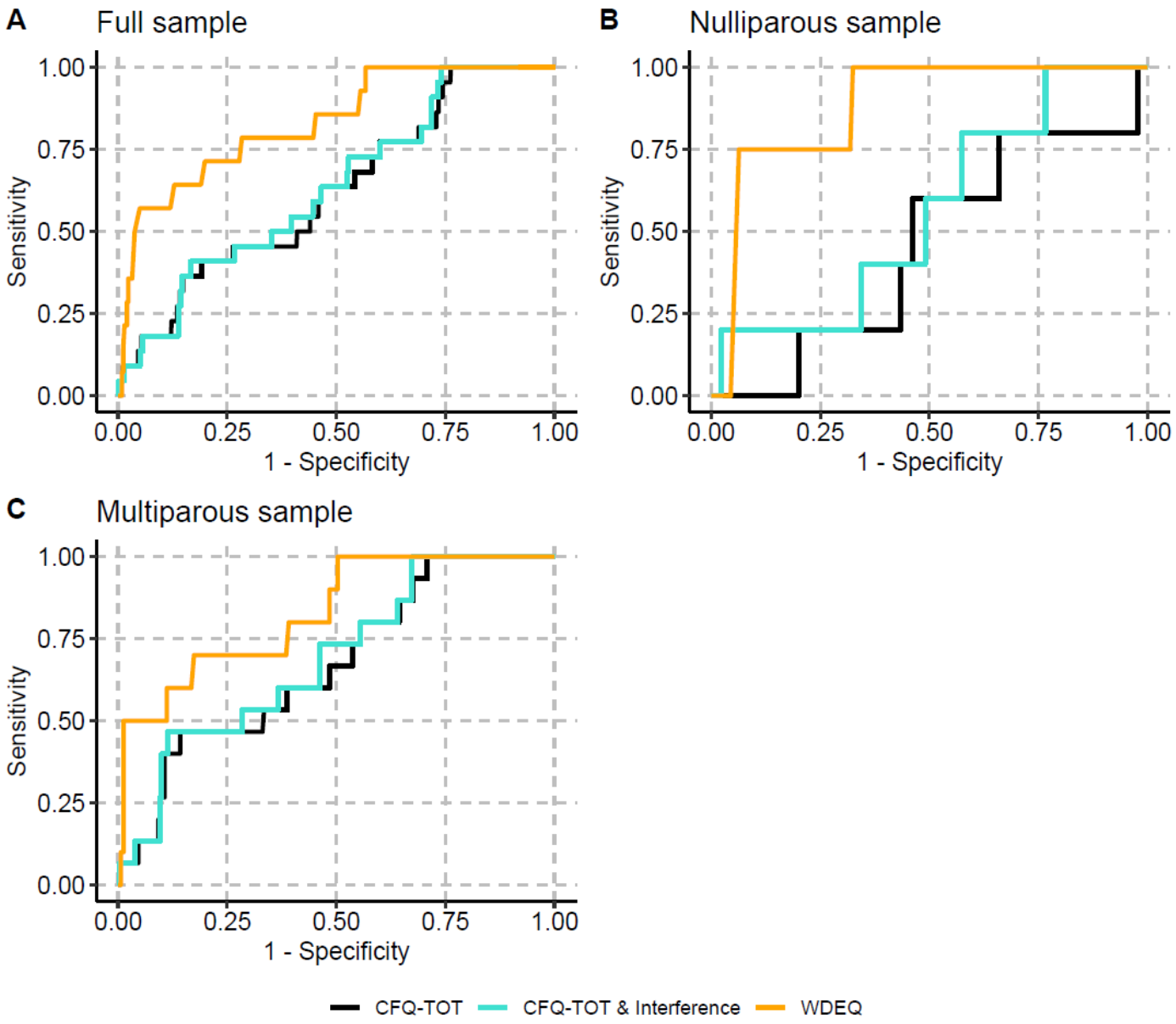

Figure 1. ROC curves for the CFQ and the W-DEQ across parity (full diagnostic criteria ONLY).

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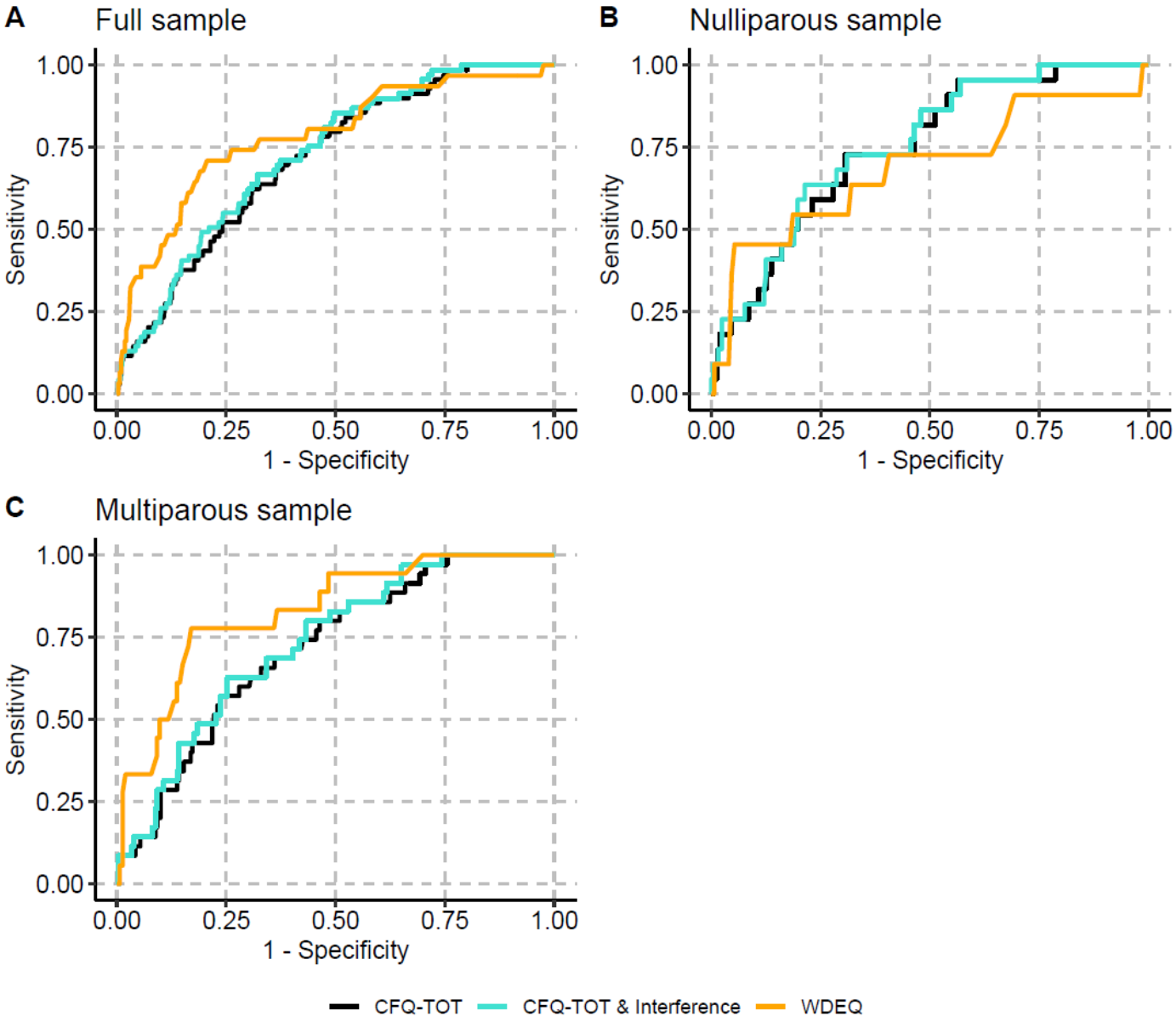

Figure 2. ROC curves for the CFQ and the W-DEQ across parity (subclinical and full diagnostic criteria combined).

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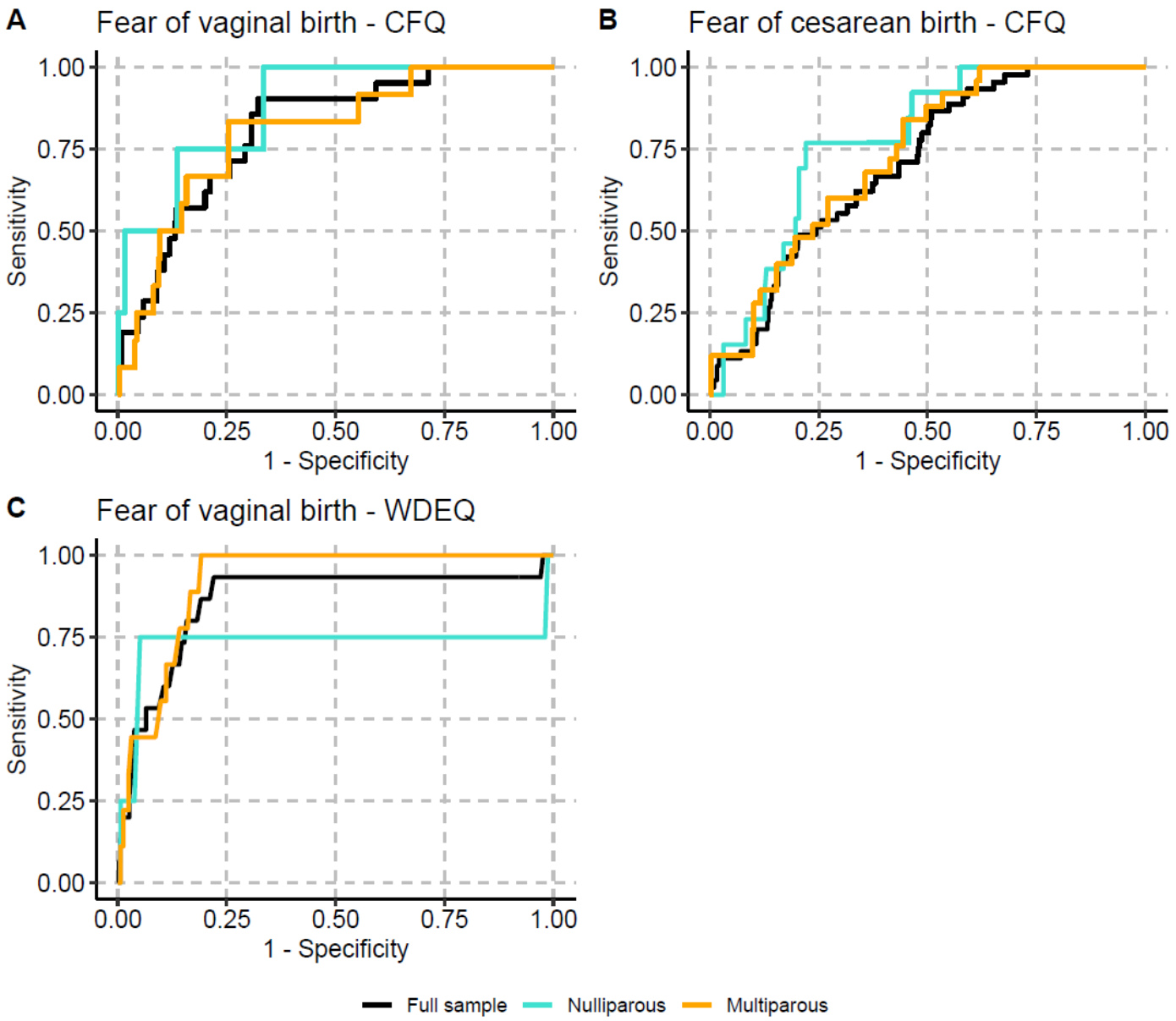

Figure 3. ROC curves for the CFQ (Total and Interference Subscale scores) and the W-DEQ, separately for fear of vaginal and fear of cesarean birth (subclinical and full diagnostic criteria combined).

4. Discussion

In the current study, strong support was found for the W-DEQ as a screening tool for specific phobia, FoB. Specifically, the W-DEQ either met or exceeded the criteria for a "good enough" screening tool across multiple comparisons. These findings are consistent with, and build upon, findings from the only other study of the W-DEQ as a screening tool for specific phobia, FoB [42]. In that previous small (N = 106) study of the screening accuracy of the W-DEQ for specific phobia, FoB, among nulliparous pregnant people, the W-DEQ evidenced an AUC of .96, and a Youden's index of .93. The optimal cut score was determined to be 85. The authors compared participants reporting symptoms meeting full criteria for specific phobia, FoB to those who did not. In the present study, the same analysis (i.e., full diagnostic criteria for nulliparous participants only) produced an AUC of .88, a Youden's index of .69, and an optimal cut score of 95.4. Together, these two studies support the screening accuracy of the W-DEQ for specific phobia, FoB. A note of caution

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regarding these findings is merited given the small numbers of positive cases in both studies, in particular the smaller study by Calderani and colleagues [42].

In contrast with our expectations, the CFQ performed less well than the W-DEQ as a screening tool for specific phobia, FoB. We had anticipated that the CFQ, by virtue of its emphasis on fear, and its multidimensional assessment of FoB, would outperform the W-DEQ, but this was not the case. Furthermore, the CFQ only met the criteria for a "good enough" screening tool (excluding the positive likelihood ratio) for nulliparous participants primarily fearful of a vaginal birth. The CFQ came close to meeting these criteria in three other comparisons: for nulliparous participants in general, for those primarily fearful of a cesarean birth, and for those primarily fearful of a vaginal birth (nulliparas and multiparas together). Differently from the CFQ, the W-DEQ includes items assessing other, non-fear-related cognitive and emotional responses to childbirth (e.g., fantastic, lonely, strong, weak, desolate) with only a small number of items specifically assessing fear. On the other hand, the CFQ attempts to encompass the range of perinatal people's childbirth related fears by assessing multiple domains of FOB. It may be that items assessing broad cognitive and emotional responses to childbirth, similarly to the W-DEQ, provide an easier and more accurate measure of pregnant people's immediate emotional reaction to thinking about childbirth.

The W-DEQ appears to perform best when comparing pregnant people who have reported symptoms meeting full diagnostic criteria for FoB compared to those who did not report symptoms meeting these criteria, whereas the CFQ performed best when comparing participants reporting symptoms meeting full or subclinical criteria for specific phobia FoB to the remainder of the sample. A note of caution here is also merited due to the fact that the number of participants meeting full criteria was small rendering estimates of performance unstable. Additional research involving larger samples is needed to fully clarify the merits and disadvantages of screening for specific phobia, FoB full criteria versus full or subclinical, and to ensure the stability and replicability of estimates of performance, especially for comparisons of specific phobia, FoB full diagnostic criteria to all other participants.

Interestingly, when we compared participants who reported symptoms meeting full or subclinical diagnostic criteria for specific phobia, FoB to the remainder of the sample, the W-DEQ performed best when limiting these analyses to participants who were primarily fearful of a vaginal birth. It may be that the W-DEQ performs best for people who are most fearful of vaginal birth, but additional research will be needed to clarify this. Of note, when limiting the analysis to those primarily fearful of a vaginal birth, the W-DEQ performed best for multiparous participants. This is counter-intuitive in that one might expect the fears of multiparous people to more closely resemble symptoms of posttraumatic stress disorder, and not specific phobia [50,68].

When both subclinical and full criteria diagnoses were considered together, the screening accuracy of the CFQ was highest for nulliparous participants. This was true overall, but also when assessing screening accuracy separately for participants primarily fearful of vaginal birth and those primarily fearful of cesarean birth. This same pattern did not hold when only those reporting symptoms meeting full criteria for specific phobia, FoB were compared to the remainder of the sample. Again, additional research is needed to better understand the implications of comparing pregnant people who report symptoms meeting full diagnostic criteria for specific phobia, FoB to the remainder of the sample, versus when comparisons involve grouping together those who report symptoms meeting full and subclinical diagnostic criteria.

What was clear in this study is that the inclusion of the Interference subscale of the CFQ improved the measure's screening accuracy. This pattern was consistent across evaluations of the CFQ when comparing participants who reported symptoms meeting full diagnostic criteria against all other participants, as well as when comparisons were made with participants reporting symptoms meeting full or subclinical diagnostic criteria

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against all other participants. Any clinical applications of the CFQ as a screening tool for specific phobia, FoB should include this component of the measure.

Limitations and future directions

Although this study was adequately powered (N = 659), subsamples of participants reporting symptoms meeting full diagnostic criteria for specific phobia, FoB were much smaller. Consequently, we were unable to conduct all ROC analyses comparing participants whose symptoms met full criteria for specific phobia, FoB against the remaining participants. Some ROC analyses we compared those who reported symptoms meeting full or subclinical criteria against the remaining participants. This improved power but may not fully generalize to pregnant people with symptoms meeting full criteria for specific phobia FoB. Future research with larger samples will be able to refine some of the findings from the present research.

Given that specific phobia may not be the only diagnostic category most relevant for FoB, it would be extremely helpful to evaluate the ability of the CFQ and the W-DEQ to screen for any mental health diagnosis under which a particular person's FoB may fall. For example, for some people, FoB may be best characterized as posttraumatic stress disorder, whereas for others it may be best understood as specific phobia or health anxiety. It would be helpful to know if the majority of people whose FoB is severe enough to merit a mental health diagnosis can be captured by the CFQ or the W-DEQ. Studies in which the screening ability of these two measures are assessed against a broader range of anxiety-related conditions will be able to answer this question.

Future research may benefit from regression analyses of the CFQ subscales to ascertain if there may be scoring algorithms which increase the screening accuracy of the CFQ for particular subgroups (i.e., nulliparas versus multiparas, and those primarily fearful of one specific mode of delivery). It may be the that the screening accuracy of the CFQ can be enhanced via this approach. Future research will also be needed to ascertain the utility of the CFQ and W-DEQ in diverse cultural groups, social contexts (e.g., lower socio-economic status) and countries.

5. Conclusions

The W-DEQ performs well as a screening tool for specific phobia, FoB, for pregnant people overall and across various subgroups (e.g., nulliparous and multiparous pregnant people). The CFQ performs less well as a screening tool for specific phobia, FoB, but nevertheless holds promise. Additional research is needed to ensure replicability of findings, and to further evaluate the potential of the CFQ to accurately screen for diagnosable FoB.

Author Contributions: NF developed the manuscript concept and was responsible for the study design. NF and FC were responsible for, supervision of data collection, and interpretation of the data. AA, in collaboration with NF and FC, was responsible for data analyses. All authors were involved in manuscript drafting. All authors provided scientific input and edited and reviewed the manuscript content. All authors provided their final approval ad agree to be accountable for all aspects of the work, ensuring integrity and accuracy.

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Data Availability Statement: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki. Ethical approval for this study was obtained from the Behavioural Ethics Board of the University of British Columbia (H15-03356), and written informed consent was obtained from all participants. The University of British Columbia's Behavioural Research Ethics Board follows the Canadian Tri-Counsel Policy Statement (TCPS): Ethical Conduct for Research Involving Humans.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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