Validation of the Wijma delivery expectancy/experience questionnaire for pregnant women in Malawi: a descriptive, cross-sectional study

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Abstract

Background: Fear of childbirth is a common health concern for women during pregnancy. The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) is widely used to measure childbirth fear during pregnancy. However, this instrument is yet to be validated in Malawi, Africa. Our study aimed to assess the psychometric properties of the W-DEQ questionnaire in Malawi.

Methods: Healthy pregnant women in the third trimester (N = 476) at a district hospital in Malawi were included. Fear of childbirth, depressive symptoms, and quality of life were assessed using the W-DEQ, the Edinburg Postnatal Depression Scale, and the World Health Organization Quality of Life scale, respectively. The construct validity, reliability, and convergent validity of the W-DEQ were examined using exploratory and confirmatory factor analyses, Cronbach’s alpha, and Pearson correlations.

Results: The mean age of participants was 28.2 (standard deviation = 6.8) years. Exploratory and confirmatory factor analysis of the Malawian version of the W-DEQ indicated a multidimensional structure with three factors: fear, negative appraisal, and a lack of self-efficacy, with acceptable goodness of model fit. The Malawian version of the W-DEQ showed a satisfactory internal consistency (α = 0.84) and was significantly correlated with depressive symptoms (r = 0.23, p < 0.001) and quality of life (r = −0.17 ~ −0.26, ps < 0.05).

Conclusions: Our findings support the Malawian W-DEQ version being a reliable and valid instrument for measuring childbirth fear in African women.

Keywords: Fear of childbirth, Wijma delivery expectancy questionnaire, Pregnancy, Exploratory factor analysis, Confirmatory factor analysis, Malawi

Background

Fear of childbirth (FOC) is a common health concern for women during pregnancy [1, 2]. The prevalence of FOC during pregnancy has been reported around 26% in Swedish women [3], and 24.1% ~ 26% in Australian mothers [4, 5]. Pregnant women who experience high levels of FOC tend to request an elective cesarean section [6, 7], and pain medication during childbirth [2, 7]. Evidence has further shown mothers with elevated fears often suffer from emotional distress [2, 8, 9], have a relatively poor adjustment in the postpartum period [10], or are even fearful of future pregnancies [11]. Thus, it is important to detect FOC and its severity promptly so these fear-associated adverse conditions can be treated...
during pregnancy. A valid instrument is a key to early detection of FOC.

FOC refers to feelings of uncertainty and anxiety arising from women’s expectations of the upcoming birth, and their experiences after delivery [1, 12]. The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) is a 33-item self-reported scale, widely known for measuring childbirth fear, and has been translated and validated in various countries [1, 4, 13–15]. The W-DEQ defines childbirth fear as the following factors including fear (e.g. ‘tense’, ‘afraid’), negative appraisal (e.g. ‘not happy’, ‘not glad’), and lack of self-efficacy (e.g. ‘no trust’, ‘no self-confidence’) in pregnant women [16, 17]. Italian researchers identified a 14-item three-factor solution: fear, negative feelings, and lack of confidence [16]. Subsequent analysis in Australia and Hungary identified a four-factor solution: fear, isolation, lack of positive emotions, and moment of birth [18, 19]. In Norway, a 25-item six-factor model was reported, including fear, negative appraisal, loneliness, lack of self-efficacy, lack of positive anticipation, and concerns for the child [20]. Despite the original W-DEQ being developed as a unidimensional instrument [1], evidence suggests that the scale is multidimensional [16, 18, 19]. Fear is a common factor experienced by pregnant women in different countries; however, the factor structure of the W-DEQ varies in different cultural contexts [13].

In Malawi, qualitative studies reported that most women recognize childbirth as a normal delivery that is spontaneous and without any interventions, and are expected to persever during childbirth [21, 22]. Malawian women tend to have more children, and a proper assessment of childbirth experience, in particular of childbirth fear, requires a suitable instrument. Therefore, validating an existing instrument, such as the W-DEQ, in the Malawian context is necessary. Given vast cultural differences, it is expected that the Malawian factor structure of the W-DEQ would differ from those in Western countries.

This study aimed to evaluate the psychometric properties of the W-DEQ in Malawi. The study objectives were to: (a) explore the construct validity of the W-DEQ scale using exploratory (EFA) and confirmatory factor analyses (CFA); (b) evaluate whether the one-factor structure of the original W-DEQ scale fits the Malawian sample; and (c) assess the reliability and convergent validity of the Malawian version of the W-DEQ.

**Methods**

**Study design**

A descriptive, cross-sectional study of pregnant women ($N = 212$) in their third trimester was conducted at a district hospital in Malawi from August to September 2018, and was used for the exploratory factor analysis. For confirmatory factor analysis, a secondary analysis was conducted using data from the baseline time point ($N = 264$) of a prospective cohort study which followed pregnant women from 34-weeks’ gestation, postpartum 1 day, and 1 week, to examine the changes of childbirth fear and quality of life over time. The study was approved by the institutional review board of Taipei Medical University, Taiwan, and the National Health Science Research Committee, Ministry of Health, Malawi. Each participant provided written informed consent before participating in the study. Investigators read out the consent form and assisted participants to fill it out if participants were unable to read and write.

**Sample and recruitment**

Pregnant women receiving prenatal care at the antenatal clinic were screened for their eligibility and recruited by the investigators. The study site was a primary hospital for a catchment area including 538,345 people, with approximately 5712 deliveries per year [23], and covers 22 health centers for medical care referral [24]. According to the 2015 Malawi Demographic Health Survey (MDHS), estimates of hospital deliveries in Malawi are around 91% [25]. Being the primary hospital that provides comprehensive maternity care, the study hospital is comparable to other district hospitals where childbirth services are provided.

**Study participants**

A convenience sampling method was used in this study. The inclusion criteria of participants were as follows: aged 20 ~ 50 years, spoke and understood Chichewa, in their third trimester ($\geq$34 weeks) of primipara or multipara, and with a singleton pregnancy. The exclusion criteria were women who had obstetric complications, including preeclampsia or hemorrhage, or had a history of medical or mental illness. Women who met the inclusion criteria and agreed to participate were included in the study. We used medical health records to confirm the eligibility of participants.

Considering the ratio of five participants per item for the factor analysis [26, 27], at least 165 women were required to complete the W-DEQ A scale. As the W-DEQ A has 33 items [1], a sample of 330 was needed for both the exploratory and confirmatory factor analysis. Taking into account the potential attrition rate and missing data of 30%, a sample size of approximately 470 was needed.

**Procedure**

The Malawian version of the W-DEQ was assessed in two steps including translation process and psychometric analytical procedures (Table 1). In step 1, we translated the English version of the W-DEQ A to Chichewa language following recommended guidelines by Wild...
et al. [28]. In brief, the original English version of the W-DEQ A was translated to Chichewa by a professional bilingual translator. Malawian-speaking experts were then asked to review the translated version for appropriate wording and clarity. Back translation of the Chichewa version into English was subsequently completed by three independent bilingual translators. The final Malawian version of the W-DEQ A was obtained after comparing the original and back-translated questionnaires. A pilot test of 15 pregnant women was conducted to confirm the wording and adequacy of the final version at a prenatal clinic. The content validity of the Malawi W-DEQ A scale in areas of relevance and clarity of the instrument was evaluated by an expert group of four nurses and midwives in Malawi. A content validity index (CVI) of > 0.80 was considered as valid [29]. We then conducted the psychometric analysis of the W-DEQ A scale at the step 2 (Table 1).

Measures
Data were collected using the paper-based questionnaire with seventy-four questions and it approximately took 30 min to complete. For women who were unable to read and write, the investigator read out the questionnaire in Chichewa language and assisted them to fill it out.

Fear of Childbirth (FOC)
The Chichewa version of the W-DEQ was used to measure FOC [30]. The instrument was developed in Sweden to assess women’s expectations concerning an upcoming birth [1]. The 33-item self-reported questionnaire measures FOC on a six-point Likert scale that ranges 0 ~ 5, with a total score of 0 ~ 165. A higher score indicates a higher level of childbirth fear. For the participants with only one W-DEQ item missing, the item was substituted by the item mean score. The number of participants with the mean substitution was 12 (5.6%) in the EFA sample and 4 (1.5%) in the CFA sample. The original W-DEQ had a Cronbach’s α of > 0.87 in Swedish pregnant women [1]. Our study reported a Cronbach’s α of 0.84.

Depressive symptoms
The Chichewa version of the Edinburgh Postnatal Depression Scale (EPDS) was used to assess depressive symptoms [31]. The 10-item self-reported questionnaire measures depressive symptoms on a four-point Likert scale ranging from 0 ~ 3, with a total score ranging from 0 ~ 30 [32]. A higher score represents a higher level of depressive symptoms. The mean substitution was used for the participants with only one EPDS item missing. The number of participants with the mean substitution was 12 (5.6%) in the EFA sample and 4 (1.5%) in the CFA sample. The original W-DEQ had a Cronbach’s α of > 0.87 in Swedish pregnant women [1]. Our study reported a Cronbach’s α of 0.78.

Quality of Life (QOL)
The Chichewa version of the World Health Organization Quality of Life-Short Form (WHOQoL-BREF)
instrument was used to measure QOL [33]. The 26-item questionnaire measures QOL on a five-point Likert scale, and domain scores are transformed to a linear scale of 0 ~ 100 with a higher score indicating a higher QOL [34]. Two items of the QOL scale assess the overall and general health QOL, with 24 items assessing the following four domains of the QOL: physical health, psychological health, social relationships, and environmental. The item was substituted by the item mean score for the participants with only one WHOQoL item missing. The number of participants with mean substitution was 11 (5.2%) in the EFA sample. No missing data was noted in the CFA sample. The Chichewa version of the QOL scale had a Cronbach’s α of > 0.70 for the domains [33]. Our study reported Cronbach’s α values of 0.64, 0.58, 0.44, and 0.76 for the physical health, psychological health, social relationships, and environmental domains, respectively. The low Cronbach’s α was noted in the domain of social relationship, which is similar to prior studies in Bangladesh [35] and Iran [36] women that ranged from 0.55 ~ 0.57. The low alpha of this domain might be explained by three items included. The entire QOL scale had a Cronbach’s α of 0.87.

Demographic variables
Demographic characteristics of participants, including age in years, marital status, educational level, employment status, and income per month were assessed using a structured questionnaire.

Statistical analysis
Data analysis were conducted using the Statistical Package for the Social Sciences (SPSS) vers. 21 (SPSS, Chicago, IL, USA), and AMOS vers. 25 (SPSS, Chicago, IL, USA). We used descriptive statistics, including frequency, percentage, mean, and standard deviation (SD) to summarize participants’ characteristics. Validation of the W-DEQ A scale was assessed using exploratory (EFA) and confirmatory factor analysis (CFA) [37]. For EFA, the adequacy of the data was confirmed using the Kaiser-Meyer-Olkin (KMO) method with > 0.6 considered acceptable [38], and a significant Bartlett’s test of sphericity [39]. Principal component analysis and varimax rotation were used to extract factors and improve the interpretability of the solution. The number of factors retained was based on an eigenvalue of > 1 and an assessment of the scree plot [40]. A factor loading of ≥ 0.35 was used to identify whether an item satisfactorily represented its factor [41]. Items were eliminated one at a time, rerunning the analysis at each step to achieve an optimal solution [41]. For cross-loadings, if any, the rule of retaining an item to its factor was based on (a) whether the item’s loadings in the main factor are higher than loadings in others and (b) at least a difference of 0.20 between loadings [42].

The CFA was undertaken to determine the one-dimensional fit of the original W-DEQ A scale and to confirm the EFA structure solution identified in this study. A maximum-likelihood (ML) estimator was used to achieve robust results [43]. Goodness-of-fit indices were used to confirm the model fit, namely, a Chi-squared test (χ²) and its p-value (≥ 0.05 = acceptable fit; ≥ 0.10 = good fit), which is sensitive to large sample size. Therefore, the Chi-squared test divided by its degrees of freedom (χ²/df: ≤ 5 = acceptable fit; ≤ 3 = good fit) was considered [44, 45]. Other indices included root mean square error of approximation (RMSEA: ≤ 0.08 = acceptable fit; ≤ 0.05 = good fit), comparative fit index (CFI: ≥ 0.85 = acceptable fit; ≥ 0.95 = good fit), Tucker-Lewis index (TLI: ≥ 0.80 = acceptable fit; ≥ 0.95 = good fit), and the Akaike information criterion (AIC: the smaller, the better) [44, 45]. At least three adequacy indices with values within the acceptable ranges were considered in analyzing the goodness of fit of data [46, 47]. Internal consistency reliability was assessed using Cronbach’s α coefficient, and a level of ≥ 0.70 was acceptable [48]. Pearson’s correlation coefficient was used to assess the convergent and divergent validities. We tested the extent to which the W-DEQ A scale and its factors were correlated with other concepts of depressive symptoms and the QOL. We expected the W-DEQ A scale and its factors to be positively correlated with depressive symptoms and negatively correlated with domains of the QOL.

Results
Characteristics of participants
In total, 476 pregnant women were included in this study, with 212 women for EFA, 264 women for CFA, and a response rate of 100% for both analyses (Table 2). For EFA, the mean age of participants was 28.8 (SD = 7.3) years. The majority of women were older (≥ 25 years, 61.8%), married (97.6%), and illiterate or had a primary school education (78.3%) (Table 2). Most of the women were employed (96.2%), and more than half of them earned less than Malawi Kwacha (MK) 20,000/month (56.1%) (US$1 = MK719). For CFA, the mean age of participants was 27.7 (SD = 6.4) years. Most women were older (≥ 25 years; 58.7%), married (95.5%), and illiterate or had a primary school education (70.5%) (Table 2). The majority of the women were employed (93.9%), and more than half of them earned less than MK20,000/month (53.0%). The t-test or χ² test showed EFA and CFA samples had similar characteristics (p > 0.05 ~ 0.50). The mean score of the 33 items of the W-DEQ ranged 0.57 ~ 2.92, with an absolute skewness of < 1.66 and absolute kurtosis of < 4.2, indicating little deviation from a
Seven items failing to load at a 3-factor solution was optimal and interpretable with an accounted for 60.98% of the variance. However, visual inspection of the scree plot revealed three factors that were not strong, and there was at least a 0.2 difference between the loadings. Likewise, item 4 (not strong), and 10 (not independent) loaded on negative appraisal and lack of self-efficacy factors, while item 31 (dangerous) loaded on fear and lack of self-efficacy factors at the same time. These three items (items 4, 10, 31) were appropriately retained to its factors. After eliminating items one at a time, rerunning the analysis at each step, the final 26-item 3-factor solution was obtained and accounted for 38.44% of the variance. The first factor accounted for 22.27% of the variance, with the second and third factors accounting for 8.50 and 7.67% of the variance, respectively. The reliability of the internal consistency for the total scale and the three factors were: total scale = 0.85; fear = 0.78; negative appraisal = 0.69; and lack of self-efficacy = 0.73.

**Confirmatory Factor Analysis (CFA)**

The CFA was conducted to test the factor structure identified by the EFA in our study, and the one-factor solution of the original W-DEQA scale. Specifically, we examined the 33-item 1-factor dimension, 26-item 3-factor structure, and 23-item 3-factor structure (Table 4). The results confirmed that a 23-item 3-factor structure of fear (10-item, e.g. ’deserted’, ’weak’), negative appraisal (5-item, e.g. ’not proud’, ’not being composed’), and lack of self-efficacy (8-item, e.g. ’not surrendering my body’, ’not independent’) instead of the 33-item 1-factor dimension (Table 4). The CFA confirmed that the entire scale of the W-DEQA with a one-factor solution yielded a very poor model fit ($\chi^2/df = 2.43$, RMSEA = 0.07, CFI = 0.71, TLI = 0.68, and AIC = 823). Due to low standardized coefficients for item 1 = 0.17, item 9 = -0.01, and item 31 = 0.22 in a factor of negative appraisal, these three items were deleted one at a time. The fitting index of the three-factor solution consisting of 23 items was improved ($\chi^2/df = 2.52$, RMSEA = 0.07, CFI = 0.75, TLI = 0.68, and AIC = 725). These results showed that our model was satisfactory based on the indices of $\chi^2/df$, RMSEA, and AIC. Although the CFI and TLI were not of a good fit, they were close to acceptable fit values. The modified 23-item 3-factor solution adopted in this study is illustrated in Fig. 1. The reliability of the internal consistency of the total scale and the three factors were: total scale = 0.84; fear = 0.78; negative appraisal = 0.65; and lack of self-efficacy = 0.73.

**Convergent validity**

Correlation analysis of the 23-item W-DEQA A scale with depressive symptoms and subscales of the QOL was conducted to test the convergent and divergent validities of the instrument (Table 5). The 23-item W-DEQA A scale was significantly positively correlated with the total of depressive symptoms measured by the EPDS ($r = 0.23$, $p < 0.001$), and was significantly negatively correlated with domains of QOL measured by the WHOQol-BREF (physical health: $r = -0.26$, $p < 0.001$; psychological

### Table 2 Characteristics of participants

| Variable                  | EFA sample | CFA sample | $\chi^2$ | $p$ |
|---------------------------|------------|------------|----------|-----|
| Age (years), mean (SD)    |            |            |          |     |
| < 25                      | 28.8 (7.3) | 27.7 (6.4) | 1.66     | 0.10|
| ≥ 25                      | 131 (61.8) | 155 (58.7) |          |     |
| Marital status            |            |            |          |     |
| Unmarried                 | 5 (2.4)    | 12 (4.5)   | 1.63     | 0.20|
| Married                   | 207 (97.6) | 252 (95.5) |          |     |
| Educational level         |            |            |          |     |
| Illiterate/Primary school | 166 (78.3) | 186 (70.5) | 3.76     | 0.05|
| Secondary and above       | 46 (21.7)  | 78 (29.5)  |          |     |
| Occupation                |            |            |          |     |
| Unemployed                | 8 (3.8)    | 16 (6.1)   | 1.29     | 0.26|
| Employed                  | 204 (96.2) | 248 (93.9) |          |     |
| Family income/month       |            |            |          |     |
| < MK20,000                | 119 (56.1) | 140 (53.0) | 0.46     | 0.50|
| ≥ MK20,000                | 93 (43.9)  | 124 (47.0) |          |     |

Note: EFA exploratory factor analysis, CFA confirmatory factor analysis, SD standard deviation, MK Malawi Kwacha (US$1 = MK746)

Exploratory Factor Analysis (EFA)

In EFA, we identified a 26-item 3-factor solution of fear (10-item, e.g., ’frightful’, ’hopelessness’), negative appraisal (8-item, e.g., ’not relaxed’, ’not fantastic’), and lack of self-efficacy (8-item, e.g., ’not longing for the child’, ’not strong’) (Table 3). The sampling adequacy of EFA was confirmed by a KMO of 0.80 and a significant Bartlett’s sphericity ($\chi^2 = 1499.4$, $p < 0.001$). Principal component analysis of the 33-item of the W-DEQ revealed ten factors with eigenvalues of $> 1$, which accounted for 60.98% of the variance. However, visual inspection of the scree plot revealed three factors that were appropriate for retention. Varimax rotation of the 3-factor solution was optimal and interpretable with seven items failing to load at $\geq 0.35$ (i.e., item 19, panic; item 24, pain; item 27, loss of self-control; item 29, not natural; item 30, not self-evident; item 32, child will die; and item 33, child will be injured). 3 items (i.e., item 7, deserted; item 11, desolate; item 15, abandoned) loaded on a factor of fear and negative appraisal simultaneously and were retained to the factor which had the highest factor loading, and there was at least a 0.2 difference between the loadings. Likewise, item 4 (not strong), and 10 (not independent) loaded on negative appraisal and lack of self-efficacy factors, while item 31 (dangerous) loaded on fear and lack of self-efficacy factors at the same time. These three items (items 4, 10, 31) were appropriately
health: $r = -0.23, p < 0.001$; social relationships: $r = -0.17, p < 0.01$; environmental: $r = -0.25, p < 0.001$).

**Discussion**

To our knowledge, this is the first study to validate the W-DEQ A scale in pregnant women generally in Africa and specifically in Malawi. In our study, a 23-item 3-factor dimension, namely, fear, negative appraisal, and lack of self-efficacy, was found to define FOC in pregnant women, rather than the 33-item 1-factor structure. Therefore, our study confirms the multidimensionality of the Malawi W-DEQ version with a three-factor structure. Our findings are similar to previous studies that reported the W-DEQ to be multidimensional, and 33-item 1-factor structure to be of a very poor model fit [16, 18, 19]. Ten items were removed from the original scale to obtain an acceptable model fit. The reliability of the internal consistency for all the three factors was

Table 3 Factor structure of the Wijma Delivery Expectancy/Experience Questionnaire A identified by explanatory factor analysis ($N = 212$)

| Items | Eigenvalue | Explained variance (%) | Factor loading |
|-------|------------|-------------------------|----------------|
| Factor 1: Fear | 3.54 | 22.27 | 0.551 |
| 7 Desertion | | | |
| 15 Abandonment | | | 0.524 |
| 12 Tenseness | | | 0.668 |
| 11 Desolation | | | 0.524 |
| 6 Fear | | | 0.602 |
| 3 Loneliness | | | 0.652 |
| 8 Weakness | | | 0.515 |
| 2 Frightfulness | | | 0.567 |
| 20 Hopelessness | | | 0.481 |
| 25 Bad behavior | | | 0.374 |
| Factor 2: Negative appraisal | 3.43 | 8.50 | 0.588 |
| 14 A lack of pride | | | |
| 17 Not being relaxed | | | 0.558 |
| 31 Danger | | | 0.477 |
| 1 Not being fantastic | | | 0.556 |
| 18 A lack of happiness | | | 0.485 |
| 13 A lack of gladness | | | 0.478 |
| 9 A lack of safety | | | 0.432 |
| 16 Not being composed | | | 0.453 |
| Factor 3: Lack of self-efficacy | 3.03 | 7.67 | 0.675 |
| 21 Not longing for the child | | | |
| 22 No self-confidence | | | 0.609 |
| 26 Not surrendering my body | | | 0.592 |
| 23 A lack of trust | | | 0.559 |
| 4 A lack of strength | | | 0.516 |
| 28 A lack of enjoyment | | | 0.526 |
| 5 A lack of confidence | | | 0.494 |
| 10 A lack of independence | | | 0.385 |

Table 4 The goodness of fit statistics for comparative models of the Wijma Delivery Expectancy/Experience Questionnaire A ($N = 264$)

| Model | Country | Items | $\chi^2$ | df | $\chi^2$/df | p | RMSEA | CFI | TLI | AIC |
|-------|---------|-------|----------|----|-------------|---|--------|-----|-----|-----|
| 1-factor | Sweden | 33 | 1204 | 495 | 2.43 | < 0.001 | 0.08 | 0.54 | 0.51 | 1336 |
| 3-factor | Malawi | 26 | 713 | 296 | 2.41 | < 0.001 | 0.07 | 0.71 | 0.68 | 823 |
| | | 23 | 571 | 227 | 2.52 | < 0.001 | 0.07 | 0.75 | 0.72 | 669 |

Note: RMSEA root mean square error of approximation, CFI comparative fit index, TLI Tucker-Lewis index, AIC Akaike information criterion
acceptable. The convergent and divergent validities of the W-DEQ were high in satisfactory correlations for depressive symptoms and the QOL. The strength of the study lies in the rigorous validation procedure (i.e., EFA and CFA), which was used to identify and confirm a factor structure suitable for the Malawian culture. Validation of the W-DEQ will allow comparisons of FOC among pregnant women in Malawi, Africa, and other regions of the world. Most importantly, the key FOC factors can be identified to facilitate the development of interventions that are critically important for optimizing childbirth outcomes in Malawian women.

In this study, we identified a 3-factor structure of childbirth fear which is consistent with findings in Western countries. Specifically, the fear factor of the W-DEQ comprised items of desertion, tenseness, fear, being frightened, and hopelessness, similar findings as reported in previous studies conducted in Italy [16], Hungary [19], and Norway [20]. The factor of negative appraisal which included items of a lack of pride, being relaxed, happiness, gladness, composure, and behaving badly, was also similar to factors identified by Italian [16], Australian [18], Hungarian [19], and Norwegian [20] studies. Furthermore, the factor of a lack of self-efficacy...
had similar items (i.e., a lack of self-confidence, surrendering my body, trust, strength, confidence, and independence) which corresponded to factors in Italy [16] and Norway [20]. Women across different cultural contexts share some common factors of childbirth fear despite the provision of maternity care varying in different countries. This finding highlights the importance of assessing FOC in pregnant women and providing appropriate care and timely counseling to reduce their high fear or associated complications. Finding effective interventions to reduce childbirth fear has drawn a lot of attention globally. A recent meta-analysis of interventions on reducing FOC indicated that educational intervention was effective in reducing childbirth fear, but adopting proper cut-offs of the W-DEQ and large samples in future trials are required [49].

The Malawian version of the W-DEQ can easily be used by health professionals as an effective measure and screening tool for unspoken fears in Malawian women. The Malawian version of the W-DEQ can easily be used by health professionals as an effective measure and screening tool for unspoken fears in Malawian women during pregnancy. Thus, the use of the W-DEQ will enhance the quality of prenatal care by addressing women’s fears. Based on the assessment results, health professionals can provide a safe and caring environment where women are encouraged to express their feelings and concerns about childbirth in Malawian women.

In the current study, seven items in the EFA and three items in the CFA were removed to achieve a better model fit, such as panic, pain, loss of self-control, childbirth not being fantastic, a lack of safety, not natural, and danger. Although pain or injuries during childbirth are among the most important causes of fear, those could not be confirmed in this study. Our model showed that retaining ten factors would contribute to an unstable factor structure even though a relatively high percentage of variance can be explained. The final three-factor solution identified in this study was optimal and interpretable. The variance explained by the final 3-factor model was lower than the one in the 10-factor model. However, the results were consistent with previous studies in Australia [4] and the United Kingdom [14], which reported a 49.4% of the variance of the factor structures of childbirth fear. Furthermore, the fit criteria (i.e., CFI and TLI indices) were close to the acceptable fits [44, 45], although less than the excellent fit. Taken together, the three-factor 23-item solution retained in this study could be a reflection of cultural viewpoints about childbirth in Malawian women.

In Malawi, normal spontaneous vaginal birth without any interventions is considered as a good care process by pregnant women [21]. Most women are expected to remain calm throughout the labor process and persevere during childbirth [22, 51]. The patriarchal cultural atmosphere in Malawi might further negatively affect women’s perceptions and decisions about childbirth, as women’s feelings and concerns are often ignored, and women tend to hide their expectations of childbirth [22].

The Malawian version of the W-DEQ can easily be used by health professionals as an effective measure and screening tool for unspoken fears in Malawian women during pregnancy. Thus, the use of the W-DEQ will enhance the quality of prenatal care by addressing women’s fears. Based on the assessment results, health professionals can provide a safe and caring environment where women are encouraged to express their feelings and concerns about childbirth in Malawian women.

FOC and its relation to poor mental health have been reported in pregnant women. We found that the depressive symptoms were highly correlated with the factor of negative appraisal, followed by the overall W-DEQ score, and the fear factor. This finding is congruent with the previous studies that used the EPDS scale to assess the convergent validity with the W-DEQ scale [16–18]. It appears that women with high levels of depression tend...
to have a high fear of their pregnancy and appraise their pregnancy experiences negatively. Our study also demonstrated a meaningful correlation pattern in W-DEQ factors. Among them, the fear factor was strongly correlated with the total W-DEQ score. The items retained in the fear factor need further explorations on the possibility of using an abbreviated questionnaire to measure FOC due to a high proportion of illiteracy for women in Africa. Studies in Finland [54] and Norway [55] have validated the use of a numeric rating scale (NRS) to measure childbirth fear and found the NRS a reliable tool. Women were asked to respond to the question, “How much do you fear childbirth?” and mark their response on a straight line from 0 to 10 [54, 55]. The higher the score, the higher the level of FOC. The NRS for childbirth fear has been recommended as it is easier to use and evaluate [54, 55]. Further evaluations of different scale type in measuring FOC and their feasibility in various childbearing populations in Africa are warranted.

The negative correlations between the QOL and factors of negative appraisal and fear were statistically significant, indicating the divergent validity of the Malawian W-DEQ. We used a QOL scale instead of a validated self-efficacy scale due to a lack of validated self-efficacy tools in Malawi. The validated tool of measuring QOL, i.e., WHOQoL-BREF adopted in this study has been widely used among childbirth women in Iran [56], Australia [57], and Portugal [58]. Previous studies have shown childbirth-related concerns such as fears and anxiety during pregnancy are negatively associated with women’s QOL [59, 60]. Our finding is consistent with a previous study in Japan that adopted the Childbirth Self-Efficacy Scale and found a significant negative correlation with the W-DEQ scale [15]. Future researchers can consider validating a Malawian version of the Childbirth Self-Efficacy Scale and establishing/or evaluating its divergent validity. It is important to note that the inverse association between fear and QOL was limited to the prenatal period in this study. Further investigations are required to examine whether such a correlation exists in the postpartum period. A comprehensive understanding of FOC and QOL in the pre-and postnatal periods will help improve the quality of childbirth care in Malawi.

Study limitations

The following limitations need to be taken into account when interpreting the study results. First, we included low-risk pregnant women, and thus the results might not apply to women with high-risk pregnancies. Furthermore, women included in this study were consecutive attendees at prenatal clinics in the study hospital, the generalizability to women with home delivery was limited. Second, the study was conducted in a rural setting, and therefore, the use of this scale in urban samples should be further explored. Third, larger sample size was required for the measurement invariance analysis in CFA, which is important for examining whether the factor structure identified is equivalent in different groups of participants [61]. It is estimated a sample size of 200 each group is required for this analysis [62]. Despite these limitations, this study is the first attempt to evaluate an instrument that measures fear during pregnancy in Malawi and Africa. The instrument will provide healthcare professionals with a basis for understanding the phenomenon and can lead to further development of interventions that will improve the quality of health care and childbirth outcomes for Malawian women.

Conclusion

The W-DEQ measures three domains of childbirth in this study, confirming that the W-DEQ scale is multidimensional. The Malawian version of the W-DEQ scale was demonstrated as a reliable and valid instrument for assessing FOC. The 23 items of the Malawian version of the W-DEQ scale in this study provided a satisfactory internal consistency, confirming that the scale is reliable and can be easily adapted for professional use to enhance routine clinical prenatal care in Malawi. Future studies may use the items retained in the factor of fear to assess FOC but not the overall W-DEQ scale.

Abbreviations

CFA: Confirmatory factor analysis; CVI: Content validity index; EFA: Exploratory factor analysis; EPDS: Edinburgh Postnatal Depression Scale; FOC: Fear of childbirth; MK: Malawi Kwacha; QOL: Quality of Life; W-DEQA: Wijma Delivery Expectancy/Experience Questionnaire A

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Authors’ contributions

MK designed the study, prepared the data and statistical analysis, and drafted the manuscript. HH directed the statistical analysis and drafting of the manuscript. GTL read and critically revised the entire manuscript. SK designed the study, directed the statistical analysis, revised the manuscript, and approved the final manuscript. The author(s) read and approved the final manuscript.

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Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author upon request.

Ethics approval and consent to participate
Written informed consent was obtained from all individual participants included in the study. The study was approved by the Institutional Review Board of Taipei Medical University, Taiwan (N2018B05010), and the National Health Science Research Committee, Ministry of Health, Malawi (No. 2153).

Consent for publication
Not applicable.

Competing interests
The authors declare that no competing interests exist.

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