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# Measuring fear of childbirth among a diverse population in the United States:

# A revised Wijma Delivery Expectancy/Experience Scale (WDEQ-10)

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Precis

The WDEQ-10 is a brief, readable, useful scale for capturing what fear of childbirth looks like for pregnant people in the United States.

**Abstract**

Introduction: The current gold standard instrument used to measure fear of childbirth is the Wijma Delivery Expectancy/Experience Questionnaire (WDEQ). However, the existing scale is long, has translational challenges, and lacks data specific to experiences of a diverse population in the United States making it challenging to assess how fear of childbirth impacts perinatal health care disparities. The objective of this study was to revise the WDEQ and analyze its reliability and validity for use in the United States.

Methods: The questionnaire was revised using qualitative data from a previously published study of fear of childbirth within a racially, ethnically, and economically diverse group of pregnant or postpartum people in the United States. Psychometric properties were analyzed in terms of construct validity, reliability, and factor analysis from a group of 329 participants.

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Results: The revised and shortened 10 item WDEQ-10 comprises 3 subscales: Fear of environmental factors, Fear of death or injury, and Fear of how they feel. The results indicate that the WDEQ-10 demonstrates good reliability and validity and confirmed the multidimensionality of fear of childbirth through a 3-factor solution.

Discussion: The WDEQ-10 is a readable and accessible instrument that will allow health care providers and researchers to accurately measure complex components of how pregnant people experience fear of childbirth.

**Key words**

Survey research, Perinatal mental health, Health equity

**Quick Points**

- Fear of childbirth has not been well studied in the United States and the current gold standard instrument has conceptual and translational challenges.
- Fear of childbirth is a complex phenomenon that extends past individual psychopathology and is instead grounded in culture and interactions with care providers and the health care system.
- The revised and shortened WDEQ-10 demonstrates good reliability and validity and can be used by health care providers and in research to assess dimensions of fear of childbirth in pregnant people.

**INTRODUCTION**

Despite what is generally framed as an anticipated experience of growth or a defining event in one's life, there are individuals for whom the experience of childbirth generates a high level of fear. The concept "fear of childbirth" has been used in the literature as a broad label for a wide variety of anxieties and fears that people experience in relationship to pregnancy and childbirth.[1] In some of the first studies of fear of childbirth, the prevalence for pregnant people in Scandinavia was reported as 20%, with approximately 5%-10% of people experiencing intense fear.[2] More recent studies have reported the prevalence from 6.8%-44% in Sweden, Canada, and Rwanda.[3] The overly broad conceptualization of fear of childbirth and variation in how it is measured may contribute to inconsistency of prevalence rates.[1,4] Additionally, the wide variation in conceptualization and measurement may suggest that fear of childbirth may vary by country, culture, context, and population studied.

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In the current literature, the most widely used measure of fear of childbirth is the Wijma Delivery Expectancy Questionnaire (WDEQ) which results in an estimate of fear a person may experience before and during birth.[6.] The WDEQ is identified as the gold standard measure for fear of childbirth by international organizations such as the International Society of Psychosomatic Obstetrics and Gynaecology.[7] However, despite its wide use internationally, there has been limited use of the WDEQ with people in the United States. The WDEQ was informed by the theory that the expectations a pregnant person has about birth are highly relevant for both their experience of, and behavior during, the birth. The 33-item scale was derived from the authors' clinical experiences of people with fear of childbirth.[6] The content related to fear of childbirth was operationalized using items comprising statements about intensities of emotions and magnitude of cognitions regarding birth.[6] Each question has a 6-point Likert scale with anchors from not at all (0) to extremely (5; minimum score, 0, maximum score, 165).

While the WDEQ is used most widely, a number of other measurement tools have been developed to evaluate fear of childbirth. In a recent review of the available instruments to measure fear of childbirth, authors found 28 different instruments. These instruments range from a single item to a questionnaire with 73 items.[9,10] The majority of these instruments were developed in the Scandinavian countries, and none were developed in the United States.[11] Many of these measures were not subject to theoretical grounding or psychometric evaluation.[12] Additionally, instruments developed and validated in other countries cannot simply be translated with the expectation that they will have the same psychometric properties in other languages and cultural contexts. The instruments may not capture the constructs they are intended to measure where meaning, clustering, and experience of symptoms and language used to express symptoms may differ. Utilization of instruments from one country to another without psychometric validation may lead to misclassification and distortion of prevalence rates.[13]

A qualitative study with US participants, conducted by 2 of the present authors (LKL, LKR), sought to explore people's responses to the experience of completing the WDEQ and to analyze the readability and applicability of the instrument within a racially, ethnically, and socioeconomically diverse population of people in the United States. Study participants identified several challenges with missing elements of fear that were rooted in the US health care system. That study challenged the utility and appropriateness of the WDEQ in its current form as a screening tool in a US context where there are many systematic differences in health care compared to the Swedish context where the questionnaire was originally developed.[8] Participants discussed concepts shared by the researchers that appeared in previous research, however, there were other concepts that

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participants indicated contributed to fear that were not identified in the WDEQ. The authors identified themes from these concepts as fear of lack of respect from health care providers and fear of how larger pervasive hierarchies, such as racism, classism, and homophobia, as well as structural aspects of the perinatal care system affected care they received during birth. In addition, participants identified language and conceptual challenges with the WDEQ.

Very little is known about fear of childbirth in the United States, particularly among marginalized populations with additional risk factors for poor perinatal outcomes. Until recently, only three studies with a total sample size of 408 had been conducted in the United States.[14–16] Small sample sizes, lack of participant diversity, variation in measurement approaches and varying conceptualizations of what constitutes fear of childbirth represent a challenging gap in the literature making it difficult to address the national health priorities of maternal mortality, health equity, and racial disparities.[17–19] Efforts to resolve racial and ethnic disparities in maternal health are often constrained by lack of reliable data of patient identity and how constructs of maternal care, such as fear of childbirth, impact persons from marginalized populations. An accurate approach to measuring fear of childbirth would aid in advancing understanding of its contributions to care during childbirth, subsequent health outcomes, and how systems level processes impact marginalized populations.[8] Considering these findings, we determined that revision and psychometric testing of the instrument, using accessible language appropriate to people in the United States would be beneficial. The purpose of this study was to revise the WDEQ based on prior qualitative findings and perform psychometric testing of the revised instrument with a racially, ethnically, and socioeconomically diverse population of people from the United States.

## METHODS

The initial qualitative phase in the development of the WDEQ-10 was accomplished through focus groups with twenty-two participants who were pregnant or had recently given birth and has been published previously.[20] This article describes the exploratory design process used to develop the WDEQ-10 and test its psychometric properties. The development of the WDEQ-10 consisted of three phases: item generation, expert content validation, and pilot testing with factor analysis in a diverse sample of pregnant people. The study was approved by the University of Michigan Institutional Review Board.

### Phase 1: Item Generation

The goal of the previously published focus group study[8] was to elucidate and conceptually organize components related to fear of childbirth in a diverse sample of people from the United

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States. Analysis of focus group data was then used in this study to adapt the WDEQ for use in the United States; to establish face validity for certain items, to hone wording, and to generate additional ideas for new and emerging themes not included in the WDEQ. The existing structure of the WDEQ scale was retained including emotions and sentiments regarding childbirth measured on a 6-point Likert scale. Words that were used by more than three focus group participants that were clear, concise, readable and distinct were chosen to replace similar words in the original scale. Words were chosen that articulated the construct well so as not to introduce sources of error variance, which would reduce strength of correlations among items in the factor analysis. Additionally, words that are stable descriptors and have appeared in the literature over the past thirty years and continue to be present in current data were chosen in order to ensure that the revised instrument would be useable in the future. In some cases, if words exceeded a 5$^{th}$ grade reading level, synonyms were chosen that would reflect the construct while maintaining integrity of the instrument for use with a majority of people.

**Phase 2: Expert Content Validation**

Content validity refers to how well a survey measures the construct that it sets out to measure.[21] To determine content validity of the instrument, seven individuals considered to be experts in the fear of childbirth field were asked to assess content representativeness of items in the scale. All experts were doctorally prepared clinicians with research and clinical practice expertise in understanding fear of childbirth. Content experts were asked to complete a content validity index (CVI) rating items on the revised WDEQ scale as: 1=not relevant, 2=somewhat relevant, 3=quite relevant, and 4=highly relevant.[22] For each item, item level content validity index (I-CVI) was computed as number of experts giving a rating of either 3 or 4, thus dichotomizing the ordinal scale into relevant and not relevant, divided by total number of experts. All items had an I-CVI of over .80 except for one question. That question, regarding how independent a person would feel during birth had an I-CVI of .50, therefore it was deleted. In addition to the I-CVI a scale level content validity index (S-CVI) was also calculated and was 92.5%, indicating the measure was successful in measuring fear of childbirth. At the end of Phase 2, an 18-item revised version of the WDEQ was created which we will refer to as the Revised WDEQ.

**Phase 3: Pilot Test and Factor Analysis**

Individuals aged 18 years or older and currently pregnant were recruited from prenatal care clinics at three large, academic medical centers in the Southeast Michigan area and through social media postings. Interested participants were given a document with information to review and

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those who elected to participate were then given the paper survey packet or directed to an identical Google survey.

Construct validity was verified by comparing the Revised WDEQ to other tests that measure similar qualities to see whether the measures were correlated.[21] The survey packet administered to participants consisted of the Revised WDEQ as well as the following instruments used to test reliability and concurrent, convergent, and discriminant validity of the revised instrument: (1) *Patient Health Questionnaire – 2 (PHQ-2),*[23] (2) *Generalized Anxiety Disorder – 7 (GAD-7),*[24] (3) *Posttraumatic Stress Disorder (PTSD) Checklist -6 (PCL-6),* [25] (4) *Wijma Delivery Expectancy Questionnaire – Version A (WDEQ).* [26] The 18 items of the Revised WDEQ were subjected to principal components analysis (PCA) using SPSS version 22.

## RESULTS

### Participants

A total of 329 participants completed all study materials. Most were white (59.6%) or Black (33.5%), with 5.9% other racial identities represented. The majority of participants lived in households with less than $30,000 annual income and had given birth previously. Demographic and perinatal characteristics are presented in Table 1 and Table 2. Participants were split relatively evenly between the prenatal clinics (127) and online recruitment (202). Demographic information did not differ between the two groups.

### Suitability of the scale for factor analysis

Prior to analysis, negatively worded items were reverse coded. The full data set was analyzed for factor analysis suitability. The Kaiser-Meyer-Olkin value was .816 exceeding the recommended value of 0.6 [27] and Bartletts' Test of Sphericity was highly significant ($P$<.001), supporting factorability of the correlation matrix. Consistent with our human subjects approval, some participants exercised the option to skip items they did not wish to answer, resulting in a small amount of missing data and therefore pairwise deletion of a small number of cases from analyses.

### Item Reduction

The correlation matrix was examined and revealed 6 items whose correlations were <0.30, suggesting they should be removed.[26] Items removed from the final scale were: (1) Fantastic, (2) Scary, (3) Painful, (4) Strong, (5) Afraid, (6) Excited, and (7) Unhappy.

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Two items (respected and understood) were highly correlated with one another (r>.75) suggesting multicollinearity, or duplication of items.[28] The item with highest commonality, respected (0.70), was retained and the other was removed.

The final refined and revised version of the WDEQ included 10 items meeting criteria for content validity, sufficiently correlated with other items without exhibiting multicollinearity, and exhibiting commonalities of 0.30 or greater. The refined and revised WDEQ was renamed the WDEQ-10. A comparison of the items in the original WDEQ, the Revised WDEQ, and the WDEQ-10 are included in Table 3.

**Factor Analysis of the WDEQ-10**

A new factor solution with 10 remaining items was performed. The revised factor analysis had a Kaiser-Meyer-Olkin sampling adequacy value of .778 with a significant (*P*<.001) Barlett's Test of Sphericity supporting factorability of the WDEQ-10. Principal components analysis of the WDEQ-10 revealed 3 factors with eigenvalues exceeding 1, explaining 36.5%, 16.0%, and 10.6% (for a total of 63.1%) of the variance respectively. An inspection of the scree plot revealed a clear break between factors 3 and 4 supporting a final three-factor solution.

Confirmatory factor analysis conducted using a 3-factor solution and the 10 remaining items explained 63.1% of the variance. To aid in interpretation of the factors an oblique (Oblimin) rotation was performed. The 3-factor solution rotated in 4 iterations with 5 items loading on factor one, 2 on the second, and 3 on the third. Most item-to-factor loadings were 0.60 or greater, indicating very good or excellent shared variance.[26] The pattern matrix is presented in Table 4. Most item-to-factor loadings were 0.60 or greater, indicating very good or excellent shared variance.

The 3 factors were named by identifying the theme common to the items. The first factor was made up entirely of items that represented external sources of fear in the theoretical model such as fear of abandonment from social support networks, fear of providers, and fear of birth setting. This factor was named *Fear of environmental factors*. The second factor, identified as *Fear of death and injury*, involved 2 questions asking about fears the pregnant person may have had that they or their baby will die or be critically injured during childbirth. The items loading on the third factor were descriptors about the person's interpretation of their characteristics that would impact fear of childbirth; therefore, it was named *Fear of how they would feel*.

The Correlation Matrix for the 3-factor solution revealed correlations ranging from .109 to .446 indicating an appropriate degree of correlation and confirming correct use of an oblique

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rotation solution.[28] Both an orthogonal and oblique rotation were conducted and analyzed using a 3-factor solution resulting in items loading identically.

Factor to factor correlations and factor to scale correlations were measured by Pearson product-moment correlation for the three factors and ranged from r= .125 to r=.861. Pearson product-moment correlations between all subscales were significant at the *P*=.01 level-indicating that the observed values are not likely to be the result of chance.[28]

**Validity Testing**

To determine validity, scores on the WDEQ-10 were correlated with scores on existing, psychometrically sound instruments.[29] Preliminary analyses were completed to ensure no violation of assumptions of normality, linearity, and homoscedasticity.[30] Normality and linearity were assumed. The assumption of homoscedasticity was assessed by examining scatterplot shape as well as by using a linear regression model and examining the residual plot for rectangular shape and a lack of funneling. No violations were found.

***Concurrent Validity***

Concurrent validity of the WDEQ-10 was supported by a large positive Pearson's product moment correlation (r=.667) between the WDEQ-10 and the original WDEQ. These results indicate that people who had high levels of fear of childbirth on the WDEQ had similarly high scores on the WDEQ-10.

***Discriminant Validity***

Discriminant validity determines whether a scale can discriminate between two distinct concepts by analyzing correlations between existing, psychometrically sound instruments and the scale undergoing psychometric testing.[29] Fear of childbirth includes a component of anxiety. However, the underlying assumption of this research is that, while there may be some overlap between fear of childbirth and generalized anxiety, ultimately, they are conceptually different. Respondents' scores from the WDEQ-10 were compared with scores on a generalized anxiety scale. It was anticipated that people who exhibit higher levels of anxiety, as determined by the GAD-7 would have unrelated levels of fear of childbirth. Preliminary analyses were completed to ensure no violation of assumptions of normality, linearity, and homoscedasticity.[30] Normality and linearity were assumed. The assumption of homoscedasticity was assessed by examining scatterplot shape as well as by using a linear regression model and examining the residual plot for rectangular shape and ~~a~~ lack of funneling. No violations were found.

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Internal consistency reliability coefficient for the GAD-7 scale was examined (α = .88, n = 325). There was a statistically significant correlation between the WDEQ-10 and the GAD-7 (r = .36, *P*<.001, n=300). In order to analyze the significance of these numbers, the construct validity coefficients were accepted as: *r*≥ 0.81–1.0 excellent, 0.61–0.80 very good, 0.41–0.60 good, 0.21–0.40 fair and 0–0.20 poor.[31] This supports the assumption that the WDEQ-10 was accurately measuring fear of childbirth as a concept that is distinct from generalized anxiety.

*Convergent Validity*

Previous studies have reported a relationship between fear of childbirth and PTSD symptoms.[32–34] Internal consistency reliability coefficient for the PTSD scale was examined (α = .83, n = 328). There was a statistically significant, moderate positive correlation between the WDEQ-10 and the PTSD scale (r = .58, *P*<.001, n=300) indicating that people with higher fear of childbirth also had higher levels of PTSD.

**Internal Reliability of the WDEQ-10**

The internal reliability of the WDEQ-10 was determined using Cronbach's alpha coefficient. The revised WDEQ-10 yielded a Cronbach's alpha coefficient of .80 indicating the WDEQ-10 also has good internal consistency among participants.

**DISCUSSION**

These results show that the WDEQ-10 demonstrates good reliability and validity and confirmed the multidimensionality of fear of childbirth through a 3-factor solution. Acceptable reliability of all 3 factors was demonstrated by internal consistency analyses. The Cronbach's alpha was in the acceptable range, and the instrument produced a total score with a normal distribution.

The validity analyses confirmed that the WDEQ-10 supports concurrent validity with the original WDEQ while using language that is more relatable to people in the United States. Additionally, as seen through the analysis of divergent validity of the WDEQ-10, fear of childbirth remains a related but different and independent construct from generalized anxiety or PTSD. The exploratory factor analysis suggests that there may be 3 different constructs for people experiencing fear of childbirth rather than a single fear construct. This confirms the study assumption that fear of childbirth is a more complex phenomenon than individual psychopathology and is instead grounded in culture and interactions with care providers and the health care system.

The resulting WDEQ-10 instrument was informed by qualitative focus group data[20] followed by the psychometric assessment presented here. Using this approach to conceptualize and quantify

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the phenomenon has many benefits. The first is that triangulation allows for greater validity by seeking corroborations between quantitative and qualitative data. Generation of these items was informed by a racially, ethnically, and socioeconomically diverse sample of pregnant people who are often excluded when examining fear of childbirth.[8]

A decision was made a priori to explore the value of the WDEQ for use in a US population. The WDEQ includes 33 items and tends toward repetition. In practice, simpler instruments such as the PTSD checklist and the GAD-7 have lower levels of missing data and fewer comments about repetitiveness of questions.[35] Length and layout of the original survey increased participant burden making the instrument cumbersome to complete in a clinical encounter. The WDEQ-10 includes 10 items which is more conducive for use in clinical settings and research.

The qualitative component of this process had a diverse pool of participants.[8] However, it took place in 2015, prior to the increased appearance of anti-racist language in discourse related to perinatal care. The theme of "fear of how others will behave" contains generic language that relates to oppressive treatment, without naming it directly. The decision was made to proceed with this generic language in order to capture various forms of oppression and to encourage health care providers to engage in follow up discussions if pregnant people endorse fear in this subscale. The authors reviewed the ACNM Midwives of Color Committee Anti-Racism Toolkit[36] to ensure the language used in the survey and the constructs it was measuring were in keeping with the most current language addressing structural, systemic, and institutional racism.

A limitation of this study is the use of a convenience sample. Due to the method of recruitment, the number of potential participants that opted to not complete the survey and if they differed from the participants is unknown. Results from studies using convenience sampling are not as generalizable to other settings.[29] However, our sample included a relatively diverse sample with respect to pregnancy gestation, race, income, and education. Test-retest reliability was not performed due to time and resource constraints.

**Implications for Practice and Research**

The current state of the science regarding fear of childbirth for people within the US perinatal care system is limited. Investigations of fear of childbirth and associated perinatal complications have been measured inconsistently without a systematic look at overall impact on maternal or fetal or newborn well-being.[36] Hence, potential connections between fear of childbirth and health disparities are missed.

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The WDEQ-10 scale is designed for several intended uses. It was deliberately written in a readable and accessible manner to allow for utilization among different people in a variety of perinatal care settings. The WDEQ-10 scale can be used in the clinical setting as a screening tool. On a practical level, the scale is a shorter, easy to administer instrument giving health care providers a sense of a person's perception of childbirth and how fear may affect that perception. An essential goal is to not merely focus on individual expression of fear of childbirth, but instead give health care providers insight into how fear of childbirth may be situated in larger social structures and experiences of the health care system. Information gleaned from the instrument on a clinical level may allow health care providers to alter care approaches to promote a better experience. For example, so much of care surrounding fear of childbirth is focused on education and reassurance. However, if the fear the pregnant person is experiencing is related to how they will be treated by providers, education on the process of birth will provide little relief. Instead, the provider could focus on alliance building that would reassure the pregnant person that they have a supportive and attentive provider that will listen to their specific, individualized needs.

The WDEQ-10 has utility as an instrument to measure fear of childbirth in research settings with potential to elicit considerable knowledge about the experience of fear of childbirth and how that experience could impact perinatal outcomes. This data can be used to improve perinatal care on a larger scale by providing insight into how structural factors may increase fear and worry among birthing people.

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**Table 1.** Demographic characteristics (N=329)

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| Characteristics | Value n (%) |
|---|---|
| **Race** | |
| Black | 108 (33.5) |
| White | 192 (59.6) |
| Latina or Hispanic | 15 (4.7) |
| Middle Eastern | 2 (0.6) |
| Asian/Pacific Islander | 2(0.6) |
| Other | 3(0.9) |
| **Age** | |
| 18-22 | 47(14.6) |
| 23-27 | 104(32.2) |
| 28-32 | 86(26.1) |
| 33-37 | 68(21.1) |
| 38-44 | 17(5.2) |
| 45+ | 1(0.3) |
| **Marital Status** | |
| Single | 85(25.8) |
| Partnered | 45(13.9) |
| Married | 183(56.5) |
| Widowed | 1(0.3) |
| Divorced | 8(2.4) |
| Separated | 2(0.6) |
| **Education** | |
| Some high school | 26(8.1) |
| High school diploma | 42(13.0 |
| Some college | 77(23.9) |

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| | |
|---|---|
| Associates/Trade school | 45(13.9) |
| Bachelors | 47(14.6) |
| Masters+/Professional | 85(26.4) |
| **Income** | |
| <$30,000 | 131(42.8) |
| $30,000-$49,000 | 57(18.6) |
| $50,000-$99,000 | 61(19.9) |
| >$100,000 | 57(18.6) |

**Table 2. Perinatal Characteristics (N=329)**

| **Characteristics** | **Value n(%)** |
|---|---|
| **Parity** | |
| Primaparous | 96(30.3) |
| Multiparous | 221(69.7) |
| **Trimester** | |
| First | 84(25.8) |
| Second | 118(36.3) |
| Third | 123(37.4) |
| **Care Provider** | |
| Midwife | 108(36.7) |
| Physician | 186(63.3) |

**Table 3.** Item Descriptors

| WDEQ | Revised WDEQ | WDEQ-10 |
|---|---|---|

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| | | |
|---|---|---|
| Fantastic | Fantastic | Confident |
| Strong | Scary | Out of control |
| Confident | Painful | Panicked |
| Afraid | Strong | Baby death or injury |
| Safe | Confident | Parent death or injury |
| Abandoned | Afraid | Alone |
| Fantasies of child dying | Out of control | Supported |
| Frightful | Panicked | Abandoned |
| Lonely | Excited | Respected |
| Deserted | Baby death or injury | Safe |
| Pain | Maternal death or injury | |
| Happy | Alone | |
| Panic | Supported | |
| Totally lose control of myself | Abandoned | |
| Longing for the child | Respected | |
| Dangerous | Understood | |
| Weak | Unhappy | |
| Independent | Safe | |
| Desolate | | |
| Tense | | |
| Glad | | |
| Proud | | |
| Composed | | |

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| | | |
|---|---|---|
| Relaxed | | |
| Hopelessness | | |
| Self-confidence | | |
| Trust | | |
| Behave extremely badly | | |
| Dare to totally surrender control of my body | | |
| Funny | | |
| Natural | | |
| Self-evident | | |

**Table 4.** Pattern Matrix

| Item | Factor 1: Fear of how others would behave | Factor 2: Fear of death/injury | Factor 3: Fear of how they would feel | Commonality |
|---|---|---|---|---|
| Confident | | | -.569 | .384 |
| Out of control[a] | | | -.878 | .736 |
| Panicked[a] | | | -.857 | .724 |
| Baby death/injury[a] | | .883 | | .776 |
| Maternal death/ injury[a] | | .830 | | .692 |
| Alone[a] | .818 | | | .656 |
| Supported | .874 | | | .683 |
| Abandoned[a] | .749 | | | .616 |
| Respected | .625 | | | .514 |
| Safe | .603 | | | .530 |

[a] reverse coded items

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