



Contents lists available at ScienceDirect

Asian Nursing Research

journal homepage: [www.asian-nursingresearch.com](http://www.asian-nursingresearch.com)

## Research Article

## Development and Psychometric Validation of the Perinatal Bereavement Care Competence Scale for Midwives

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## ARTICLE INFO

## Article history:

Received 25 February 2022

Received in revised form

7 June 2022

Accepted 9 June 2022

## Keywords:

bereavement care

perinatal death

Swanson's caring theory

scale

midwife

## ABSTRACT

**Purpose:** The aim of this paper is to develop a scale for measuring the perinatal bereavement care competence of midwives and assess its psychometric properties.

**Methods:** The Perinatal Bereavement Care Competence Scale was developed in four phases. (1) Item generation: 75 items were formulated based on a literature review and interviews with midwives. (2) Delphi expert consultation: 15 experts evaluated whether the items were clear/appropriate/relevant to the questionnaire dimensions, and the items were optimized. (3) Pilot test: The comprehensibility, acceptability, and time required to complete the questionnaire by midwives were assessed. (4) Evaluation of reliability and validity: The scale was validated by initial item analysis, exploratory and confirmatory factor analyses, and internal consistency reliability and test–retest reliability.

**Results:** The final scale consisted of six dimensions and 25 items: maintaining belief (three items), knowing (four items), being with (six items), preserving dignity (four items), enabling (five items), and self-adjustment (three items). Exploratory factor analysis yielded a six-factor structure that was consistent with the theoretical framework and explained 70.87% of the total variance. Confirmatory factor analysis indicated a good fit for the six-factor model. Cronbach's  $\alpha$  for the scale was 0.931, and the test–retest reliability coefficient was 0.968.

**Conclusion:** The Perinatal Bereavement Care Competence Scale is a valid and reliable instrument for measuring the competence of midwives in caring for bereaved parents who have experienced perinatal loss.

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## Introduction

Perinatal loss is a highly painful event for parents and families [1]. Most bereaved parents suffer from devastating psychological and emotional symptoms including grief, depression, anxiety, self-blame, and post-traumatic stress, which even cause adverse effects for subsequent pregnancies [2,3]. Appropriate bereavement care provided by hospital staffs is essential for helping parents cope

with perinatal loss and reducing its negative impact [4,5]. Specifically, healthcare professionals should use simple and appropriate language, provide adequate and personalized information, acknowledge grief and parenthood, offer the important choice to parents of seeing and holding their baby, and provide commemorative items such as photographs, footprints, or baby clothes to help parents create meaningful memories and support the grieving process [6].

In China, fetal death that occurs during the second or third trimester of pregnancy is attended by midwives who provide compassionate care and support to the women and are likely to be involved in the bereavement process to help parents make decisions that minimize regret (e.g., over the missed opportunity of seeing their baby) [7]. However, unlike routine nursing tasks, perinatal bereavement care is challenging for many midwives because of the lack of a standardized approach. Midwives often report that supporting bereaved parents is emotionally demanding

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<https://doi.org/10.1016/j.anr.2022.06.002>

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Please cite this article as: Shen Q et al., Development and Psychometric Validation of the Perinatal Bereavement Care Competence Scale for Midwives, Asian Nursing Research, <https://doi.org/10.1016/j.anr.2022.06.002>

and stressful, and in some situations, they may experience a sense of personal failure accompanied by guilt and helplessness if they feel that they are unable to provide adequate assistance [8]. This can have serious consequences such as emotional burnout, self-doubt, and even professional resignation [9,10]. Moreover, the emotional pain of grieving parents can be exacerbated when midwives cannot meet their needs for bereavement services [11]. Therefore, improving midwives' ability to provide perinatal bereavement care is important not only for the psychological well-being of the parents but also for midwives' career development.

Swanson's Caring Theory can serve as a guide for healthcare professionals offering care to parents who have experienced pregnancy loss [12]. The theory encompasses five processes: (1) "maintaining belief," which refers to conveying confidence and faith that the bereaved parents can get through perinatal loss and face a meaningful future; (2) "knowing," which is trying to understand the meaning of perinatal death for the women and assessing their partners' perspective and family support; (3) "being with," which includes simply being there, sharing grief feelings, and conveying ongoing availability without burdening the bereaved parents; (4) "doing for," which is anticipating and meeting bereaved parents' needs, with a focus on protecting them from harm and protecting their dignity; and (5) "enabling," which is facilitating the bereaved parents' capacity to grow using professional knowledge and information and helping them focus on important issues and generating alternatives [13,14].

Up to now, there have been few studies examining Asian midwives' performance when caring for parents suffering pregnancy loss. A qualitative study in China has shown that most midwives experienced negative feelings when supporting bereaved parents, some were able to provide support through empathetic nursing, while others adopted negative coping strategies such as avoiding in-depth communication with the parents [15]. As we know, a cross-sectional survey can effectively identify midwives' shortcomings in perinatal bereavement care and may be useful for developing strategies to increase their competence, which is not addressed by existing instruments. For example, a self-report questionnaire on nurses' attitudes toward perinatal bereavement care was developed [16], but there was no confirmatory factor analysis (CFA) in different samples to validate the factor structure. Recently, an instrument that includes four independent subscales, i.e., bereavement support knowledge, skills, self-awareness, and organizational support, was developed [17]; however, the subscales are difficult to be synthesized to measure midwives' comprehensive competence of perinatal bereavement care due to duplication of some items.

In the present study, we developed Perinatal Bereavement Care Competence Scale (PBCCS) based on Swanson's Caring Theory and evaluated the validity and reliability of this scale in a cohort of midwives from different hospitals in China.

## Methods

This study had four phases: (1) item generation and scale construction; (2) expert panel review; (3) small-scale pilot study; and (4) large-scale reliability and validity testing.

### Phase 1: Item generation

Using Swanson's Caring Theory as a guide, the basic framework of the PBCCS was established through semi-structured interviews with midwives and a literature review. To explore the feelings and perceived competency status of midwives in China providing

bereavement care for parents who have experienced perinatal loss, we interviewed 18 midwives from 11 grade 3A hospitals in Guangdong, China. We found that some midwives had maladaptive negative emotions that caused them to feel overwhelmed, so they distanced themselves from grieving parents [15]. Accordingly, we included "self-adjustment" as a dimension of the PBCCS. At the same time, we extracted specific items from five evidence-based guidelines for perinatal bereavement care through systematic quality appraisal [18]. We generated an initial pool of 75 items. Based on discussions among the authors, some items were removed because they were unclear, repetitive, or did not align with Chinese culture. The remaining 64 items were grouped into six dimensions including "maintaining belief" (four items), "knowing" (eight items), "being with" (13 items), "doing for" (18 items), "enabling" (15 items), and "self-adjustment" (six items).

### Phase 2: Delphi expert consultation

A group of experts including nine midwifery experts, five clinical psychologists, and one hospice care expert was convened by email invitation; all had the title of senior deputy and over 10 years of professional experience. The experts were asked to rate the importance of each item on a 5-point scale ranging from 1 (extremely unimportant) to 5 (extremely important) after discussing whether the item was clear or appropriate and listing the specific reasons and suggestions for revision. After two rounds of expert consultation, items that met any of the following criteria were deleted [19]: (1) average importance score <4; (2) full score ratio <0.2; and (3) variation coefficient >0.2. We also optimized the dimensions and specific items of the scale based on the experts' opinions. For example, the items ("effectively evaluating parents' expectations of pregnancy and parenthood" and "effectively evaluating the level of family support received by bereaved mothers") were added to the "knowing" dimension; and an item ("making bereavement care plans with the parents") in the "doing for" dimension was deleted as recommended by the clinical midwifery experts because there are no specific bereavement care plans and no timeline for midwives to accomplish this work in clinical practice. Two items ("if requested, providing additional resources that are in line with the bereaved parents' religious beliefs" and "if requested, providing additional resources that are in line with the bereaved parents' customs and habits") in the "doing for" dimension were merged into a single item ("if requested, providing additional resources that meet the bereaved parents' religious and social custom needs"). The experts suggested changing the expression of some items to improve their comprehensibility. Ultimately, two items were added, 16 were deleted, and four were merged, yielding 46 items for the questionnaire.

### Phase 3: Pilot study

We invited 16 midwives from grade 3A hospitals to offer their perspectives regarding the ease of completion, comprehensibility, clarity, and acceptability of the questionnaire, with the items adjusted and revised accordingly. The midwives thought five items should be modified because they lacked clarity. For example, they thought that the item "keeping appropriate silence in due course" was ambiguous because it was unclear what was meant by "due course." The item was therefore reworded as "keeping appropriate silence when communicating with bereaved parents." The revised version of the questionnaire was further tested in different midwives until no further problems were identified. In general, the questionnaire was easy to complete and took about 5–10 min.

#### Phase 4: Validity and reliability testing

To assess the validity and reliability of the scale, midwives were recruited from different hospitals by convenience sampling from September to November 2020. Midwives who worked in delivery rooms and consented to participate in the study were included; those who had no experience in perinatal death were excluded. We used Wenjuanxing ([www.wjx.cn](http://www.wjx.cn)), a reliable investigation website used in China, to design and publish our electronic questionnaire. Participants could click on relevant links to access and complete the questionnaire anonymously and could only do so once using their own electronic devices. To evaluate test–retest reliability, 15 of the participants were selected to complete the questionnaire again 2 weeks later. Some questionnaires with less than 3 minutes to complete or obvious irregularities were deleted. Based on the random splitting method, all valid questionnaires were divided into two equally sized groups: Sample 1 was used for exploratory factor analysis (EFA), and Sample 2 was used to confirm the factor structure of the scale by CFA. The internal consistency reliability and test–retest reliability were also evaluated. For factor analysis, the sample size should be least 5–10 times the number of all items [20]; because the PBCCS had 46 items, the minimum sample size for EFA and CFA was 542, considering that 15% of questionnaires would be invalid.

#### Ethics statement

This study was reviewed by the Institutional Review Board of Southern Medical University (Ethics Committee of Southern Medical University [2020] No. 17). The participants were also informed that completing the questionnaire was voluntary. The data were kept anonymous and were used only for study purposes.

**Table 1** Characteristics of Participants Who Completed the Perinatal Bereavement Care Competence Scale Questionnaire ( $n = 507$ ).

| Variable  | n (%)      |
|---|------------|
| Age, years  |            |
| 20–29   | 201 (39.6) |
| 30–39   | 229 (45.2) |
| 40–49   | 66 (13.0)  |
| 50–54   | 11 (2.2)   |
| Sex   |            |
| Male  | 1 (0.2)    |
| Female  | 506 (99.8) |
| Educational background  |            |
| Secondary specialized school  | 6 (1.2)    |
| Junior college  | 93 (18.3)  |
| Undergraduate   | 398 (78.5) |
| Master's  | 10 (2.0)   |
| Professional title  |            |
| Nurse   | 86 (17.0)  |
| Nurse practitioner  | 200 (39.4) |
| Nurse-in-charge   | 192 (37.9) |
| Associate director nurse  | 27 (5.3)   |
| Director nurse  | 2 (0.4)    |
| Certificate of competency in maternal and infant health care        |            |
| Yes   | 453 (89.3) |
| No  | 54 (10.7)  |
| Years working in obstetrics department                              |            |
| <1  | 12 (2.4)   |
| 1–5   | 141 (27.8) |
| 6–10  | 149 (29.4) |
| 11–15   | 78 (15.4)  |
| 16–20   | 75 (14.8)  |
| >20   | 52 (10.3)  |
| Experience of delivery care in perinatal death in the last 3 months |            |
| Yes   | 220 (43.4) |
| No  | 287 (56.6) |

#### Data analysis

Data were analyzed using SPSS v22.0 and AMOS v24.0 software (IBM, Armonk, NY, USA). Descriptive statistics were applied to the demographic characteristics of the participants, which are presented as mean  $\pm$  standard deviations and numbers and percentages. Construct validity was assessed by item analysis, EFA, and CFA. In the item analysis phase, items that met any of the following criteria were deleted [20]: (1) no statistically significant items in a critical ratio; (2) item total correlation (Pearson's correlation coefficient)  $<0.40$ ; (3) factor loading value  $<0.40$ ; and (4) items that reduced the overall Cronbach's  $\alpha$  level. EFA was performed to extract common factors in the items by principal component analysis and varimax rotation. The Kaiser–Meyer–Olkin (KMO) and Bartlett's tests were used to assess sampling adequacy for EFA. Combined with the scree plot, one factor with an eigenvalue  $\geq 1.00$  was extracted [20]. CFA with maximum likelihood estimation method was performed to verify the fit of the factor structure

**Table 2** Analysis of the 46 Items of the Perinatal Bereavement Care Competence Scale.

| Item | t value | Corrected item total correlation coefficient* | Cronbach's $\alpha$ if item deleted | Factor loading |
|------|---------|---|-------------------------------------|----------------|
| 1    | -3.902  | 0.243   | ↑                                   | 0.209          |
| 2    | -5.279  | 0.421   | Unchanged                           | 0.407          |
| 3    | -4.422  | 0.411   | Unchanged                           | 0.405          |
| 4    | -6.267  | 0.465   | ↓                                   | 0.470          |
| 5    | -10.086 | 0.586   | ↓                                   | 0.594          |
| 6    | -9.967  | 0.592   | ↓                                   | 0.603          |
| 7    | -10.289 | 0.577   | ↓                                   | 0.589          |
| 8    | -7.927  | 0.521   | ↓                                   | 0.520          |
| 9    | -11.160 | 0.665   | ↓                                   | 0.686          |
| 10   | -11.523 | 0.666   | ↓                                   | 0.690          |
| 11   | -11.874 | 0.657   | ↓                                   | 0.683          |
| 12   | -8.623  | 0.645   | ↓                                   | 0.686          |
| 13   | -10.036 | 0.666   | ↓                                   | 0.688          |
| 14   | -9.617  | 0.679   | ↓                                   | 0.723          |
| 15   | -10.563 | 0.687   | ↓                                   | 0.723          |
| 16   | -7.500  | 0.618   | ↓                                   | 0.627          |
| 17   | -6.366  | 0.562   | ↓                                   | 0.575          |
| 18   | -9.933  | 0.656   | ↓                                   | 0.686          |
| 19   | -7.766  | 0.558   | ↓                                   | 0.551          |
| 20   | -6.666  | 0.446   | Unchanged                           | 0.379          |
| 21   | -6.334  | 0.448   | Unchanged                           | 0.392          |
| 22   | -7.181  | 0.489   | Unchanged                           | 0.421          |
| 23   | -6.866  | 0.546   | ↓                                   | 0.518          |
| 24   | -8.770  | 0.576   | ↓                                   | 0.557          |
| 25   | -8.186  | 0.485   | ↓                                   | 0.451          |
| 26   | -8.483  | 0.651   | ↓                                   | 0.652          |
| 27   | -10.468 | 0.725   | ↓                                   | 0.727          |
| 28   | -10.513 | 0.697   | ↓                                   | 0.706          |
| 29   | -10.681 | 0.653   | ↓                                   | 0.656          |
| 30   | -10.642 | 0.678   | ↓                                   | 0.693          |
| 31   | -10.041 | 0.643   | ↓                                   | 0.656          |
| 32   | -8.364  | 0.646   | ↓                                   | 0.646          |
| 33   | -11.310 | 0.710   | ↓                                   | 0.721          |
| 34   | -8.067  | 0.605   | ↓                                   | 0.594          |
| 35   | -9.704  | 0.585   | ↓                                   | 0.564          |
| 36   | -7.953  | 0.520   | Unchanged                           | 0.488          |
| 37   | -11.847 | 0.731   | ↓                                   | 0.738          |
| 38   | -12.590 | 0.706   | ↓                                   | 0.708          |
| 39   | -13.204 | 0.766   | ↓                                   | 0.787          |
| 40   | -7.507  | 0.571   | ↓                                   | 0.565          |
| 41   | -9.184  | 0.683   | ↓                                   | 0.701          |
| 42   | -10.632 | 0.696   | ↓                                   | 0.711          |
| 43   | -9.959  | 0.700   | ↓                                   | 0.710          |
| 44   | -10.461 | 0.595   | ↓                                   | 0.585          |
| 45   | -10.230 | 0.594   | ↓                                   | 0.585          |
| 46   | -10.672 | 0.584   | ↓                                   | 0.579          |

Note: \*All values were significant at  $p < 0.001$ ; ↓/↑ decrease/increase in Cronbach's  $\alpha$  upon deletion of the item.

derived from the EFA based on the following indices:  $\chi^2/df$ , goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), Tucker–Lewis index (TLI), incremental fit index (IFI), root mean square error of approximation (RMSEA), and root mean square residual (RMR). The  $\chi^2/df$  between 1 and 3, GFI, AGFI, CFI, TLI, and IFI values 0.90 or above, and RMSEA values less than 0.08 with RMR less than 0.05 suggested a good model fit [21]. After CFA, convergent validity was assessed based on the average variance extracted and composite reliability. Reliability analysis was performed by calculating the internal consistency reliability (Cronbach's  $\alpha$  coefficient) and the test–retest reliability (intraclass correlation coefficient) for the total scale and its dimensions, respectively.

## Results

### Sample characteristics

A total of 585 questionnaires were distributed, and 507 valid questionnaires were recovered, for a response rate of 86.67%. The

507 participants were from 142 different hospitals across China and ranged in age from 20 to 54 years. The participants had worked in the obstetrics department for a mean ( $\pm$ SD) of 10.63 ( $\pm$ 7.61) years, and 43.4% had experience in providing care for perinatal death in the previous 3 months. The characteristics of the participants are shown in Table 1.

### Construct validity

#### Item analysis

Data from Sample 1 were used to analyze and select the items. Three items (Items 1, 20, and 21) were deleted according to the exclusion criteria of item analysis, and a trial scale containing 43 items was created (Table 2).

#### Exploratory factor analysis

To identify the common factors in the items, we conducted seven rounds of EFA. Items with a lower theoretical correlation and factor loading  $\leq 0.4$  were removed from item selection. In the final round of EFA, the KMO value was 0.903, and the result of Bartlett's

**Table 3** Factor Loading of the Perinatal Bereavement Care Competence Scale with the Maximum Variance Rotation Method (25 Items).

| Item  | Factor loading |              |              |              |              |              |
|---|----------------|--------------|--------------|--------------|--------------|--------------|
|   | Factor 1       | Factor 2     | Factor 3     | Factor 4     | Factor 5     | Factor 6     |
| Item 2: Believing that the grief response of each mother is unique  | <b>0.784</b>   | 0.158        | 0.027        | 0.211        | 0.118        | 0.062        |
| Item 3: Believing that the needs of each bereaved mother are different                                      | <b>0.841</b>   | −0.007       | 0.148        | 0.172        | 0.093        | 0.028        |
| Item 4: Believing that bereaved mothers require support from midwives                                       | <b>0.692</b>   | 0.236        | 0.231        | −0.025       | 0.122        | 0.134        |
| Item 5: Effectively evaluating parents' expectations of pregnancy and parenthood                            | 0.138          | <b>0.766</b> | 0.250        | 0.035        | 0.280        | 0.100        |
| Item 6: Effectively evaluating the mood changes of bereaved parents   | 0.180          | <b>0.777</b> | 0.276        | 0.039        | 0.240        | 0.090        |
| Item 7: Identifying abnormal behavior in bereaved mothers   | 0.113          | <b>0.772</b> | 0.269        | 0.104        | 0.108        | 0.119        |
| Item 8: Effectively evaluating the level of family support received by bereaved mothers                     | 0.038          | <b>0.680</b> | 0.146        | 0.217        | −0.030       | 0.311        |
| Item 11: Easily empathizing with bereaved mothers   | 0.058          | 0.386        | <b>0.610</b> | 0.238        | 0.145        | 0.128        |
| Item 12: Accepting different emotional displays by bereaved mothers (e.g., crying and anger)                | 0.143          | 0.172        | <b>0.797</b> | 0.156        | 0.092        | 0.221        |
| Item 13: Patiently listening to bereaved mothers  | 0.143          | 0.228        | <b>0.835</b> | 0.141        | 0.151        | 0.075        |
| Item 14: Effectively comforting bereaved mothers using appropriate language                                 | 0.079          | 0.241        | <b>0.816</b> | 0.170        | 0.252        | 0.068        |
| Item 15: Effectively comforting bereaved mothers using appropriate body language (e.g., hugs and back pats) | 0.087          | 0.268        | <b>0.812</b> | 0.184        | 0.176        | 0.105        |
| Item 16: If necessary, leaving bereaved mothers alone under the precondition of guaranteed safety           | 0.238          | −0.044       | <b>0.496</b> | 0.268        | 0.245        | 0.275        |
| Item 23: Acknowledging parenthood   | 0.209          | 0.002        | 0.173        | <b>0.580</b> | 0.170        | 0.107        |
| Item 27: Asking bereaved parents whether they wish to see their baby after birth                            | 0.118          | 0.076        | 0.239        | <b>0.739</b> | 0.335        | 0.143        |
| Item 24: Referring to the baby with the appropriate terms   | 0.007          | 0.414        | 0.076        | <b>0.651</b> | 0.055        | 0.167        |
| Item 26: Treating dead babies with sufficient love and respect  | 0.108          | 0.068        | 0.268        | <b>0.773</b> | 0.231        | 0.041        |
| Item 32: If necessary, informing parents of the possible cause of the baby's death                          | 0.083          | 0.085        | 0.194        | 0.241        | <b>0.781</b> | 0.137        |
| Item 34: If necessary, providing information about the autopsy to the parents                               | 0.050          | 0.129        | 0.102        | 0.088        | <b>0.816</b> | 0.168        |
| Item 33: If necessary, providing supportive suggestions about future pregnancies                            | 0.166          | 0.207        | 0.234        | 0.282        | <b>0.722</b> | 0.140        |
| Item 30: Providing information about maternal recovery (e.g., wound care and lactation suppression)         | 0.225          | 0.206        | 0.304        | 0.300        | <b>0.528</b> | 0.142        |
| Item 39: Encouraging parents to be involved in communication and decision-making regarding nursing          | 0.212          | 0.207        | 0.348        | 0.390        | <b>0.461</b> | 0.212        |
| Item 44: Acknowledging my own negative emotions in perinatal bereavement care work                          | 0.085          | 0.091        | 0.201        | 0.093        | 0.168        | <b>0.841</b> |
| Item 45: Understanding my own negative emotions in perinatal bereavement care work                          | 0.094          | 0.168        | 0.146        | 0.128        | 0.139        | <b>0.784</b> |
| Item 46: Effectively coping with my own negative emotions in perinatal bereavement care work                | 0.051          | 0.270        | 0.107        | 0.150        | 0.199        | <b>0.692</b> |



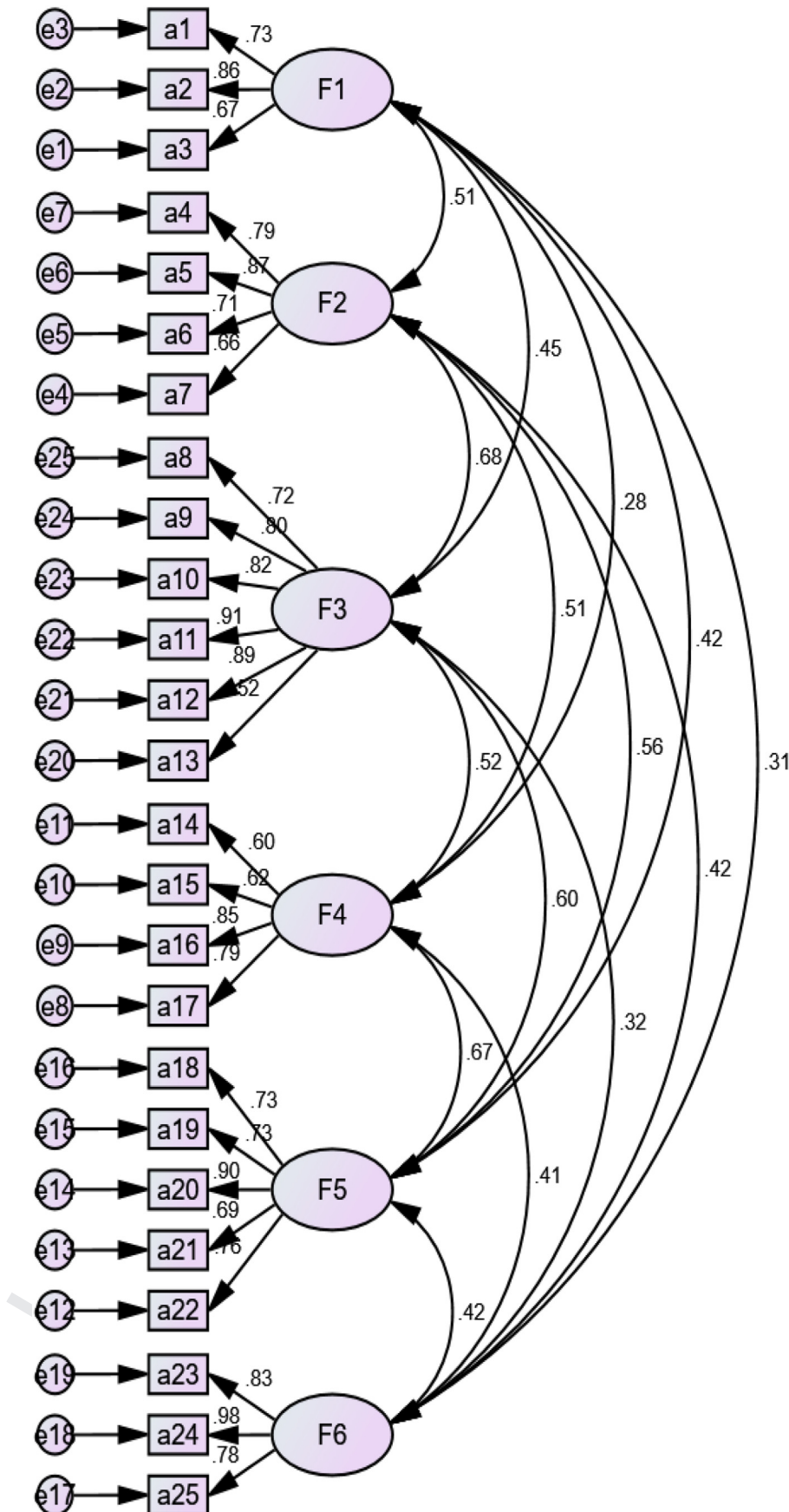


Figure 1. Confirmatory factor analysis of the perinatal bereavement care competence scale.

**Table 4** Reliability of the Perinatal Bereavement Care Competence Scale (25 Items).

| Dimension          | Number of items | Cronbach's $\alpha$ | Test–retest reliability |
|--------------------|-----------------|---------------------|-------------------------|
| Maintaining belief | 3               | 0.771               | 0.954                   |
| Knowing            | 4               | 0.851               | 0.922                   |
| Being with         | 6               | 0.900               | 0.895                   |
| Preserving dignity | 4               | 0.701               | 0.909                   |
| Enabling           | 5               | 0.865               | 0.953                   |
| Self-adjustment    | 3               | 0.881               | 0.906                   |

test of sphericity was adequate ( $\chi^2 = 4021.419$ ,  $p < 0.001$ ), indicating that the data were appropriate for EFA. Consequently, we removed 18 items (Items 9, 10, 17, 18, 19, 22, 25, 28, 29, 31, 35, 36, 37, 38, 40, 41, 42, and 43), and the principal component analysis identified six factors that accounted for 70.87% of the total variance in the 25 items; these factors were named “maintaining belief,” “knowing,” “being with,” “preserving dignity,” “enabling,” and “self-adjustment.” The factor loading of each item was  $>0.4$  (Table 3).

#### Confirmatory factor analysis

After EFA, a CFA of Sample 2 was conducted based on the six-factor model, and the results confirmed a structure with a good model fit ( $\chi^2/df = 1.848$ , RMSEA = 0.058, GFI = 0.868, AGFI = 0.835, TLI = 0.932, RMR = 0.035, IFI = 0.942, and CFI = 0.941). Each item loaded significantly on its corresponding factor, with standardized factor loadings ranging from 0.523 to 0.975; average variance extracted in the six domains ranged from 0.500 to 0.742 and composite reliability ranged from 0.799 to 0.895, indicating good convergent validity. The minimum square root of average variance extracted corresponding to the six factors (0.707) was greater than the maximum correlation coefficient between factors (0.633), indicating good discriminant validity. Figure 1 shows the CFA model of PBCCS.

#### Reliability

The Cronbach's  $\alpha$  for the whole scale was 0.931, and the Cronbach's  $\alpha$  of the subscales ranged from 0.771 to 0.881 (Table 4). The maximum value for test–retest reliability was 0.968.

#### Discussion

The aim of this study was to develop a new scale for assessing the perinatal bereavement care competence of midwives and confirm its validity and reliability. Based on Swanson's Caring Theory, we developed an item pool through semi-structured interviews with midwives [15] and a review of relevant guidelines [18]. Items from instruments that measure perinatal bereavement care knowledge [17], attitudes [16], and skills [17] were selected and adjusted according to specific clinical circumstances. Unexpectedly, some items could be categorized in more than one dimension of Swanson's Caring Theory in the initial phase of item generation, which was also the major problem encountered in other studies, given that the five caring processes are interrelated [22]. For example, the item “accepting different emotional displays by bereaved mothers (e.g., crying and anger)” could be classified under “being with” and “enabling.” Furthermore, some items in “enabling” such as “if necessary, informing parents of the possible cause of the baby's death” were found to be appropriate in the “doing for” dimension when reworded as “help grieving parents understand the cause of their baby's death.” Therefore, the definitions of the five caring processes were refined according to basic

principles of perinatal bereavement care as follows: “maintaining belief,” which refers to having confidence and faith that the bereaved parents can get through perinatal loss; “knowing,” which is striving to understand the meaning of the perinatal loss experience for the couple and assessing the level of support provided by their family; “being with,” which includes sharing feelings of grief and conveying ongoing availability without burdening the bereaved parents; “preserving dignity,” which focuses on the recognition of parenthood; and “enabling,” which involves explaining important information and involving bereaved parents in communication and decision-making regarding nursing [13,14]. These changes were approved by experts through two rounds of consultation. The PBCCS required just 5–10 min to complete and can thus be easily adopted in clinical settings.

Although most items were highly sensitive and differentiated, three items (“believing that the bereaved parents can get through perinatal loss,” “supporting parents in creating memories through the collection of mementoes such as photographs, handprints, and footprints,” and “supporting parenting activities such as holding, bathing, and dressing the baby”) were deleted according to the exclusion criteria [20] during the item analysis phase. These changes may raise some professionals' worries about the comprehensiveness of the scale; however, they are more in line with the clinical reality under the Chinese cultural background and may improve the broad applicability of PBCCS. In order to identify meaningful variables, EFA was conducted with the principal component analysis method of extraction and varimax rotation [20]. On the one hand, this yielded a six-factor model were consistent with Swanson's theoretical framework and our previous findings, demonstrating that the PBCCS has good content validity [23]. On the other hand, our findings provide empirical validation of Swanson's five caring processes and further promote the development of caring theory in the field of perinatal loss [12]. The factor structure of the scale was evaluated by CFA using Sample 2 ( $n = 254$ ). Most of the indices met the statistical requirements except for GFI (0.868) and AGFI (0.835) although these could be considered as acceptable ( $>0.80$ ) [24]. The results of the convergent and discriminant validity tests also confirmed that the scale has good construct validity. It is worth noting that two of the dimensions, “maintaining belief” and “self-adjustment,” each had just three items. However, this is a sufficient number to test the characteristics of a specific factor [25]. The Cronbach's  $\alpha$  and test–retest reliability of the whole scale were both  $>0.9$ , indicating that the scale has excellent reliability [26].

The results of our analyses demonstrate that the 25-item PBCCS is reliable and valid for assessing perinatal bereavement care competence among midwives. The PBCCS can provide guidance for midwives in their care of bereaved parents and a means for midwives to assess their own level of competence in this aspect of their work. The scale can also be used as a tool to evaluate the effectiveness of perinatal bereavement care education and training. The PBCCS should be validated for other medical professionals who engage in perinatal bereavement care such as obstetricians,

neonatologists, perinatal psychiatrists, nurses, and community medical workers; it would be interesting to compare the level of competence among these groups and explore the possible reasons for any differences.

There are several limitations of our study. First, although we recruited participants from 142 hospitals in China, our study sample is not sufficiently representative via convenience sampling. Second, the sample size of 15 participants for test–retest reliability is relatively small. Therefore, a larger sample is recommended to further validate the stability reliability of the PBCCS. Third, the scale is a self-reported instrument, and social desirability bias may have influenced reporting of self-capability. In order to reduce the reporting bias, the midwives were asked to fill out questionnaires anonymously. Finally, the PBCCS was developed based on the Chinese culture, and its validity and reliability study was conducted in China. Accordingly, further testing of this scale is still needed with more diverse samples from other cultures and countries.

## Conclusions

The 25-item PBCCS is a valid and reliable tool for measuring midwives' competence in providing bereavement care to parents who have experienced perinatal death. The scale can also serve as a practical framework for midwives to assess their own feelings when providing support to bereaved parents. Additional studies are needed to determine whether the PBCCS can be applied to other healthcare professionals who participate in bereavement care.

## Declaration of interest

None.

## Funding

This work was supported by the 2020 Medical Education Research Project of the Medical Education Branch of the Chinese Medical Association and Medical Education Professional Committee of the Chinese Society of Higher Education [grant number 20B0327]. This funding source had no role in the design of this study or its execution and analysis nor the interpretation of the data or the decision to submit results.

## Acknowledgments

The authors thank all of the midwives who participated in the study.

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