Original Article

Development of Professional Competence and Competency Scale in Midwifery: A Methodological Study from Turkey

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Abstract

Background: The main scope of competence in midwifery is the skills and practices relevant to the profession. Competencies are used to set unique standards within disciplines and specializations, including educators, learners, and practitioners. **Aim:** This study was aimed at developing the Professional Competence and Competency Scale in Midwifery. **Methods:** This was a methodological and validation study. The scale consists of 26 items. The created items were administered to 362 midwives. According to the results of the exploratory and confirmatory factor analysis of the factor pattern for all the items, ideally, the scale has a two-dimensional distribution. Responses given to the items are rated on a five-point Likert-type scale. **Results:** According to the item-total test correlation, all the items were related to each other. The Cronbach's Alpha value was 0.953 for the overall Professional Competence and Competency Scale in Midwifery, 0.917 and 0.932 for its "Professional Responsibilities and Communication Skills" and "Professional Knowledge, Skills and Practices" sub-dimensions, respectively. In addition, the scale has construct validity. **Conclusion:** According to the findings of the validity and reliability study of The Professional Competence and Competency Scale in Midwifery, it is a valid, reliable tool, and it is discriminative in terms of measuring the desired quality.

Keywords: *Competence, competency, competency scale, midwifery, professional competency, Turkey*

Introduction

Competency focuses on one's actual performance in a situation. "Competence" is necessary for a person to have competency. Thus, competence enables the person to fulfil his or her job responsibilities. By reaching competency, the person can expand his or her professional skills and perform his or her responsibilities more.[1-5]

According to the World Health Organization (WHO) (2021), "competency" is one of many determinants of professional performance.[6] According to the International Confederation of Midwifery (ICM) (2024), "competency" is the safe and effective application of knowledge, skills, and attitudes.[5] According to Norman *et al*. (1985), "competence" is more than knowledge. Knowledge includes an understanding of clinical, technical, and communication skills, and the ability to solve problems using clinical judgement. Norman developed a model to describe clinical competency. Competencies described by Norman are as follows: clinical skill, knowledge and understanding, interpersonal characteristics, problem solving, clinical decisions, and technical skills.[7]

Competencies are essential for making safe clinical decisions, setting standards; thus, they contribute to safe care, maintain the credibility of midwives, and increase their competence and independence.[8-11]

The WHO designed the "Self-Assessment Midwifery Competencies Tool" in 2021 to guide the member states'

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midwifery trainers so that they can implement, evaluate, develop, and optimize their midwifery competencies. It also aimed to determine the requirements of the member countries in this regard and to meet them.[6]

According to the ICM, fields of competency in the midwifery clinical practice are classified into the following four categories: basic (key) competencies, pre-pregnancy and antenatal care competencies, competencies specific to labor and birth practices, and competencies related to women's and newborn care. Each category was detailed under the headings of knowledge, skills, and behavior.[4,12,13] Meanwhile, the midwifery workforce exhibited higher competencies in the skills dimension than in the knowledge dimension.[14]

In Turkey, midwifery education was provided at the high school level before 1996, it has continued at the undergraduate level since 1996. Today, postgraduate education in midwifery continues to develop with master's (2003) and doctorate (2013) programs. Thus, midwives who graduate from different education levels can work together in the clinic today. All of these midwives have a "midwifery" diploma and are competent to practice "midwifery".[15] Competencies are determined with the certificates released by the Ministry of Health regarding the working areas of midwives. For example, the intrauterine device (IUD) application certificate shows that the midwife is competent in IUD application.[1]

However, there is no tool or method to measure and evaluate the competence and competency of midwives after graduation. Based on this requirement, it was planned to conduct methodological research to develop a valid and reliable scale to determine midwives' professional competencies and competences. However, since evaluation of professional competency cannot be the sole purpose in professional jobs, the execution of the process, the evaluation of the results, and the planning of what will be done based on the results also gain importance. In addition, the following questions on how the ongoing competence will be assessed in the future have arisen. Who will assess competency? Who will be responsible for ongoing competency assessments, and who will bear the cost? What will the relationship between professional certification, competence, and competency be like? What kind of path will be followed regarding the results of the competency assessment process?; What will be the valid, legal consequences of individuals making their self-assessments and preparing personal professional profiles?; In the case of peer review, who will be selected for assessment, and how will impartiality be ensured?

This study was therefore aimed at developing the Professional Competence and Competency Scale in Midwifery.

The research questions were: Is the Professional Competence and Competency Scale in Midwifery a valid tool to measure midwifery competence and competency?; Is the Professional Competence and Competency Scale in Midwifery a reliable tool to measure midwifery competence and competency?

Materials and Methods

In the present methodological study, the PCCSM was developed using quantitative methods.[16]

Study design, population, and sample

We conducted the present study between October 2021 and February 2022. The population of the study consisted of all midwives in Turkey. Of them, those who volunteered to participate in the study, whether or not they worked in Obstetrics and Gynecology clinics, were included in the study. Of them, those who could not fill in the data collection forms online were excluded from the study.

The midwives who were pilot tested twice were not included in the sample.

Since the PCCSM consisted of 36 items, it was planned to collect data from at least 360 midwives, which corresponds to the 10 fold the total number of the items, and the study was completed with 362 midwives using the snowball sampling method.

The scale development process

The scale development process is summarized in Figure 1.

Data collection

The data was collected by using the "Google Forms" system. Then, a shareable link called "pre-test pilot study" was created. E-mail addresses were obtained from the midwives who were pilot tested, they were asked to use a pseudonym to avoid confusion. Thirty days later, a new link called "post-test pilot study" for retest was created, and the PCCSM was sent to them to reply to it online again. To collect the data after the pilot study, a new link called "scale study" for the final draft version of the scale was created, and it was sent to the midwives on WhatsApp and Instagram to fill it in using the snowball sampling method. The midwives included in the study were evaluated with the data collection tools they filled in online.

The data of the study were collected using the following two forms:

***Midwife Introduction and Socio- demographic Form*:** The form prepared in line with the literature consists of nine items questioning the participants' socio-demographic characteristics such as age, marital status, educational status, and professional characteristics such as education taken besides midwifery, the unit they work in, length of service in the profession and unit, working as a permanent or contract employee, weekly working hours, working schedule and whether they preferred the profession of their own free will.

***Professional Competence and Competency Scale in Midwifery (PCCSM)**:* The PCCSM was developed based on the competence and competency areas determined by the International Confederation of Midwives (2018) and Council of Higher Education Midwifery National Core Education Program (2016).[5,17] The PCCSM consists of 36 items and the following 2 sub-dimensions: "Professional Responsibilities and Communication Skills" and "Professional Knowledge, Skills and Practices". Responses given to the items are rated on a five-point Likert scale ranging from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree). No items are reverse-scored, and there is no cut-off point. The Cronbach's Alpha coefficient was 0.953 for the overall PCCSM, 0.917 for the Professional Responsibilities and Communication Skills, and 0.932 for the Professional Knowledge, Skills, and Practices sub-dimension.

Ethical and legal aspects

Before the study was conducted, ethical approval to carry out the study was obtained from Ege University Scientific Research and Publication Ethics Board (Decision date: August 26, 2021; Decision number: 21-8T/71 with decision). Necessary guiding and informative explanations were made for the participants on "Google Forms," and those who wanted to participate in the study ticked the checkbox. The study was conducted in line with the Principles of the Declaration of Helsinki and Publication Ethics.

Statistical analysis

The study data were analyzed using the SPSS (Statistical Package for Social Sciences) for Windows 25.0 and AMOS program. Descriptive statistics (number, percentage, arithmetic mean, standard deviation) were used in the analysis of the data, and the independent samples *t*-test and the Chi-Square test to find out whether the data were normally distributed.

Reliability analysis is performed to test whether the items in a scale are consistent with each other and whether all the items measure the same subject.[18-21] In order for the tests and results to be reliable, the measurements must be reliable. In this context, the reliability of the scale was checked with Cronbach's Alpha.[22] In addition, the split-half method, the Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis were performed for the construct validity of the scale. To determine the discrimination of the items in the scale, the raw scores obtained from the scale are ranked from largest to smallest, and the mean scores of the groups in the lower and upper 27% slices are compared using the independent samples *t*-test.[16,23]

In order to test the suitability of the sample size for factorization, the Kaiser-Meyer-Olkin (KMO) test was performed, and it was concluded that the sample size and items were "sufficient" to perform factor analysis. In addition, when the Bartlett Sphericity test results were examined, it was accepted that the Chi-square value obtained was significant and the data came from a multivariate normal distribution.

Results

Content validity

Literature review: The relevant literature on the competence and competency areas determined by the ICM (2018) and Council of Higher Education Midwifery National Core Education Program (2016) was scanned.

Creating an item pool: An item pool including 55 items was created. Responses given to the items are rated on a five-point Likert-type scale ranging from 1 to 5 [Never (1), Rarely (2), Sometimes (3), Often (4), and Always (5)]. Sub-dimensions, namely "Professional Knowledge, Interpersonal Skills, Midwifery Skills and Practices, and Professional Rights and Responsibilities in Midwifery," were determined based on these items. After eliminating similar items, a 48-item form was created.

Obtaining expert opinion: The scale items created were sent to 10 health professionals specialized in midwifery to obtain expert opinion to establish content validity, and they were asked to evaluate each item as "Appropriate", "Appropriate but should be corrected" and "Should be *removed".*

***Giving the test its initial form**:* The item total correlation was conducted to evaluate the content validity of the scale based on the expert opinion by using the Lawshe technique, and the scale took its 36-item initial form. The content validity criterion (CVC) was 0.62, and the content validity index (CVI) was 0.75. The content validity of the overall scale was statistically significant because the CVI value was greater than the CVC value ($P < 0.05$). Responses given to the items were rated on a five-point Likert-type scale ranging from 1 to

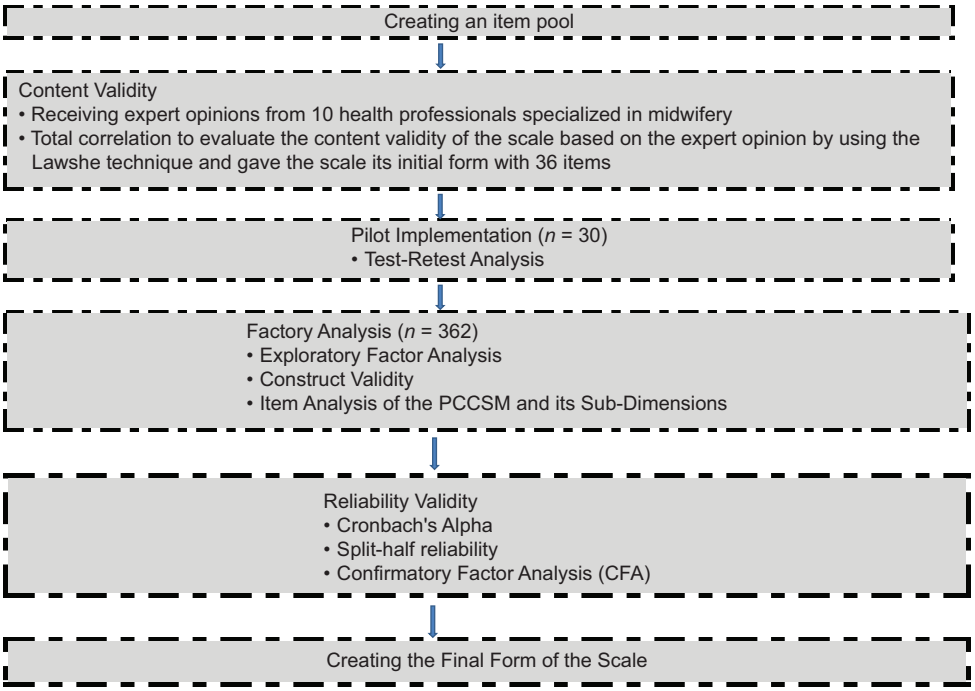

Figure 1: Scale Development Process and evaluation of validity and psychometric properties

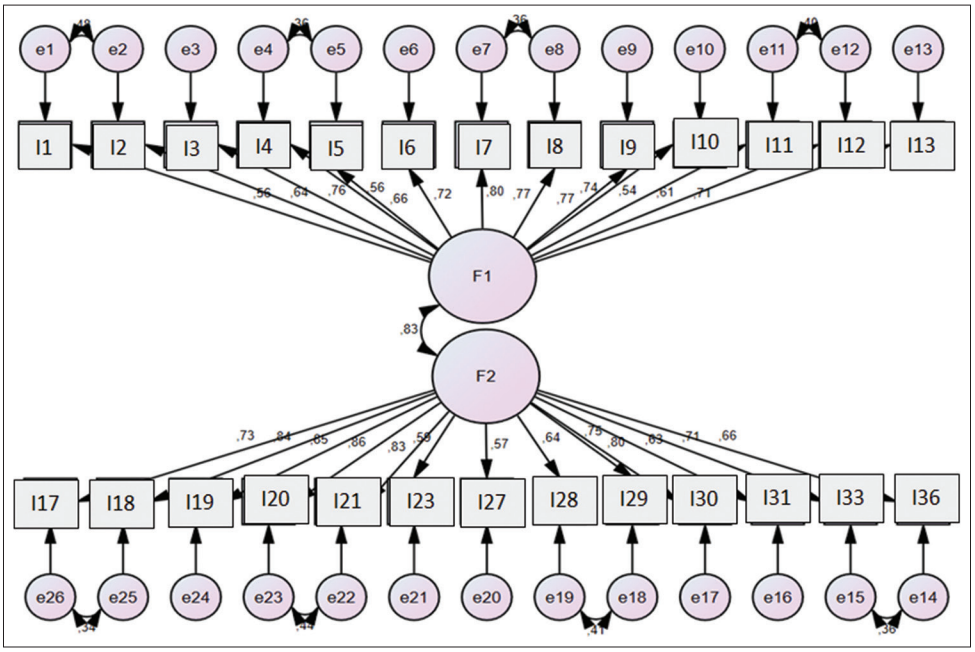

Figure 2: First-Level Multi-Factor Model Confirmatory Factor Analysis of the Professional Competence and Competency Scale in Midwifery. I: Item, F; Factor e: error

5 (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree), and did not include any reverse-scored items.

Pilot implementation for item selection: To reveal the internal validity of the scale and the compatibility of each item with the overall scale, the scale was pilot tested with 30 midwives twice. There was a one-month interval between the two tests (Test-Retest Analysis). Then, because there was no problem in terms of the intelligibility of the scale items, the validity and reliability analysis of the draft scale was conducted and as a result, the scale took its final form. No items were removed.

Demographic variables

The mean age of the midwives was 34.60 ± 7.62 (Min: 22- Max: 58) years. Of them, 63.8% (*n* = 231) had

Table 1: Results of the Exploratory Factor Analysis (EFA) of the Professional Competence and Competency Scale in Midwifery (PCCSM)

Items (I)	Factors (F)	
	F1 Professional Responsibilities and communication skills	F2 Professional Knowledge, Skills and Practices
Item 1	0.518	
Item 2	0.662	
Item 3	0.710	
Item 4	0.587	
Item 5	0.606	
Item 6	0.658	
Item 7	0.751	
Item 8	0.764	
Item 9	0.660	
Item 10	0.657	
Item 11	0.662	
Item 12	0.671	
Item 13	0.605	
Item 17		0.806
Item 18		0.781
Item 19		0.694
Item 20		0.701
Item 21		0.672
Item 23		0.535
Item 27		0.696
Item 28		0.772
Item 29		0.763
Item 30		0.672
Item 31		0.543
Item 33		0.591
Item 36		0.581
Eigen value	12.605	1.938
Explained Variance	28.158	27.777

Chi-square=0.951; χ^2 (325)=6624.927; Bartlett's Test of Sphericity (*P*)=0.000. Total explained variance=55.935

a bachelor's degree, 35.9% (n = 130) had another education in addition midwifery, and 26.8% had a length of service ranging between 11 and 15 years in the profession.

Factor analysis and reliability validity

In this section, the findings related to the data obtained were interpreted. The statistical information of the sub-problems related to quantitative data was given through tables. The EFA was conducted using the varimax rotation and principal component analysis in order to reveal the construct validity of the scale and to determine the factor loadings of the items.

The PCCSM, based on the six dimensions, was developed. EFA was conducted to reveal the factor pattern of the instrument for the adaptation study. Before the EFA was performed, the Kaiser-Meyer-Olkin (KMO) test was implemented to find out whether the sample size was suitable for factorization. According to the result of the analysis, the KMO value was 0.951. In line with this finding, it was concluded that the sample size and items were "adequate" for factor analysis. In addition, the analysis of the results of the Bartlett's test of Sphericity revealed that the obtained Chi-square value was significant (χ^2 (325) =6624,927, $P < 0.01$). Therefore, it was assumed that the data had a multivariate normal distribution.

After the suitability of the data for factor analysis was confirmed, EFA was performed using the Principal Components Analysis and Varimax rotation method to check the factor structure of the scale. After the analysis, when the factor pattern for all the items was checked, it was determined that the PCCSM had an ideal distribution in two dimensions. Therefore, it was decided that the PCCSM was a two-dimensional scale and that the factor design was acceptable. After the factor analysis, items 14, 15, 16, 22, 24, 25, 26, 32, 34, and 35 that overlapped and dispersed outside the theoretical dimensions were excluded from the analysis. Thus, there were 26 times in the final form.

After repeating the analysis, the remaining items were considered significant in the two-factor form. These sub-factors were as follows: Professional Responsibilities and Communication Skills, and Professional Knowledge, Skills, and Practices. The PCCSM, developed according to the EFA results, accounted for 55.935% of the total variance. In addition, while the first factor explained 28.158% of the total variance, the second factor explained 27.777% of the total variance [Table 1].

In Table 2, the results of the independent samples *t*-test, which indicated the discriminative power of all the items, and item-total correlation were presented. The minimum value required for the item-total test correlation to be sufficient should be 0.30. Therefore, the items whose item-total correlations were below 0.30 were not included in the analysis. The item-total test correlation values of the responses given by the midwives to the remaining 26 items in the scale were checked, and it was determined that there were no items below 0.30. The item-total test correlation values of all the remaining 26 items varied between 0.529 and 0.787. As is seen in the item-total test correlation table, all the items were related to each other.

In order to determine the discriminative power of the items in the scale, the raw scores obtained from the scale were ranked from the greatest to the smallest, and the mean scores of the groups in the lower and upper 27% were compared with the independent samples *t*-test.

Table 2: Results of the item analysis regarding the items in the professional competence and competency scale in midwifery (PCCSM)

Factors (F) and Items (I)	*r*	*t* (Bottom 27% Top 27%)	*P* (Bottom 27% Top 27%)
F1- Professional Responsibilities and Communication Skills			
Item 1: I accept my decisions and responsibilities in my professional practice in midwifery.	0.529	−7.055	0.000*
Item 2: I support practices related to the active role of midwifery within the scope of public health.	0.621	−7.642	0.000*
Item 3: I respect women's personal rights in care.	0.714	−5.303	0.000*
Item 4: I assume the leadership role for my colleagues.	0.571	−15.392	0.000*
Item 5: I assume the leadership role for midwifery students.	0.661	−13.280	0.000*
Item 6: I assume on the advocacy role for women.	0.695	−11.372	0.000*
Item 7: I effectively communicate with women to share information.	0.764	−10.106	0.000*
Item 8: I effectively communicate with families to share information.	0.741	−11.797	0.000*
Item 9: I effectively communicate with other health professionals.	0.704	−10.693	0.000*
Item 10: In professional practice, I make my decisions in line with evidence-based practices.	0.700	−11.595	0.000*
Item 11: I carry out the necessary practices to protect women's health (vaccination, cancer screening, etc.).	0.567	−9.769	0.000*
Item 12: I provide counseling on sexual and reproductive health.	0.620	−10.911	0.000*
Item 13: I notice the psychological changes likely to occur during pregnancy.	0.665	−10.944	0.000*
F2- Professional Knowledge, Skills and Practices			
Item 17: I can identify risky situations during the labor process.	0.735	−16.507	0.000*
Item 18: I can identify risky situations in the postpartum period.	0.787	−14.403	0.000*
Item 19: I provide safe and effective midwifery care for the baby during the postpartum period.	0.765	−14.491	0.000*
Item 20: I provide safe and effective midwifery care for the woman during the postpartum period.	0.787	−13.092	0.000*
Item 21: I can notice the psychological changes that may occur in the postpartum period.	0.768	−12.802	0.000*
Item 23: I know whom and when to consult for a problem I encounter during my professional practice.	0.561	−12.142	0.000*
Item 27: When necessary, I administer life-saving drugs that I am authorized to administer.	0.608	−16.476	0.000*
Item 28: I use a partograph when necessary.	0.684	−15.001	0.000*
Item 29: I plan appropriate care with available resources.	0.760	−12.445	0.000*
Item 30: I make decisions in line with professional ethical principles in midwifery practices.	0.758	−10.091	0.000*
Item 31: I express my ideas in policy making regarding midwifery.	0.629	−15.679	0.000*
Item 33: I continue my education activities to be informed about midwifery practices.	0.707	−14.479	0.000*
Item 36: I know the importance of local policies, guidelines, and protocols.	0.673	−14.097	0.000*

n=362, *n*1=*n*2=98; *r*=Item Total Score Correlation* values significant for $P<0.05$

Table 3: Descriptive statistics and reliability analysis of the professional competence and proficiency scale in midwifery

PCCSM and its sub-dimensions	*n*	Min.	Max.	Mean	SD	The number of the items	Cronbach's Alfa
F1 (Professional Responsibilities and communication Skills)	362	1.00	5.00	4.57	0.55	13	0.917
F2 (Professional Knowledge, Skills and Practices)	362	1.00	5.00	4.51	0.59	13	0.932
Professional Competence and Competency Scale	362	1.00	5.00	4.54	0.53	26	0.953

After the comparison, it was observed that there was a statistically significant difference between the averages of the lower and upper group item scores. Thus, it can be said that the scale is discriminative in terms of measuring the desired quality.

According to the descriptive statistics of the PCCSM, the mean value was 4.54 ± 0.53 for the overall scale; 4.57 ± 0.55 for the F1 sub-dimension and 4.51 ± 0.59 for the F2 sub-dimension [Table 3].

Reliability analysis is carried out to test whether the items in a scale are related to each other and whether all the statements measure the same issue.

According to the analysis of the results, the Cronbach's Alpha value was 0.953 for the PCCSM, which indicates that it is a reliable tool. The Cronbach's Alpha value was 0.917 and 0.932 for its "Professional Responsibilities and Communication Skills" and "Professional Knowledge, Skills and Practices" sub-dimensions, respectively [Table 3].

Table 4: Split-half reliability

Items (I)	value
Cronbach's Alpha	
Part 1: I1, I3, I5, I7, I9, I11, I13, I17, I19, I21, I23, I27, I29	0.905
Part 2: I31, I33, I2, I4, I6, I8, I10, I12, I18, I20, I28, I30, I36	0.911
Split half correlation	0.925
Spearman-Brown coefficient	0.961
Guttman Split-Half coefficient	0.959

According to the results, split half correlation was 0.925, Spearman Brown Coefficient was 0.961 and the Gutman Split Half Coefficient was 0.959, which indicated that the PCCSM was a reliable tool [Table 4].

According to the results of the CFA, the Structural Equation Modeling Result of the scale was significant at the $P = 0.000$ level, and was related to the 26 items that made up the scale and to the two-factor structure of the scale. Improvement has been made to the model. While making the improvement, covariance has been created between the errors with high MI values (e1-e2; e4-e5; e7-e8; e11-e12; e14-e15; e18-e19; e22-e23; e25-e26). According to the results of the first level multi-factor analysis, the goodness of fit indexes of the Professional Competence and Competency Scale in Midwifery indicated that its fit was acceptable fit (RMSEA 0.078; χ^2 (Cmin/df) 3.180; and CFI 0.902; GFI 0.822), which suggests that the construct validity of the scale was established [Figure 2].

Discussion

As the health care system has become increasingly complex, it has become imperative to provide safe, quality care, and to minimize undesirable negative practices. Therefore, professional measurement and evaluation are important in evaluating performance of the individual and institution. Evaluation of competency is as important as its development. It is very difficult to evaluate competency directly. Evaluations performed for competence also contribute to the revealing of competency.[24] Professional competencies are classified into three groups as basic, managerial and skill-related. Basic competencies refer to the characteristics such as communication, flexibility, teamwork that every member of a profession is expected to have. Managerial competencies refer to the characteristics such as planning, organization and leadership. The skill-related competency refers to one's possessing profession-specific skills. Competency can also be classified as professional, clinical and specialized competencies.[25]

Since the professional qualification evaluation system in the clinical field has not yet been established, midwives gain qualifications by being certified according to their very limited field of work. In the present study, the aim was to develop a measurement tool to assess professional competency at the basic quality and skill-related in midwifery. It was considered that the scale developed was a valid and reliable scale in determining the professional competence and competency of midwives. Thus, it was revealed that the sub-dimensions of the scale; "Professional Responsibilities and Communication Skills and Professional Knowledge, Skills and Practices" could assess the basic competencies stated in the literature such as being aware of professional responsibilities, communication skills, professional knowledge, and skill practices which are among the basic competencies stated in the literature. The results of the statistical analyses performed suggest that PCCSM is a valid and reliable tool in measuring midwifery competence and competency.

After the scale development stages, a scale consisting of 2 sub-dimensions and 26 items was developed. The Cronbach's Alpha coefficient was 0.953 for the overall PCCSM, 0.917 for the Professional Responsibilities and Communication Skills, and 0.932 for the Professional Knowledge, Skills and Practices sub-dimension, which indicates that the scale was quite reliable. All factors such as misspelling of items, insufficient number of items, incomprehensible items, in homogeneous items, errors in the application process and in the scoring phase can affect the reliability of a scale.[16,25]

Values for the split-half correlation (0.925), the Spearman-Brown Coefficient (0.961) and the Guttman Split-Half Coefficient (0.959) also indicate that the scale is reliable.

There are studies in the literature on the adequacy of midwifery students' practices and designing professional competency exams. It has been reported that these developed tools are useful in terms of professional development for midwifery students.[26,27] In this study, it is thought that the midwifery professional competency and competency scale developed in the study will make a unique contribution to the literature on the evaluation of midwives' knowledge and skills in equal, holistic, specific standards and comprehensively in all fields of work after graduation.

Limitations

It is thought that the fact that the study data were collected online is an advantage in terms of reaching midwives working in different geographies and units. In addition, the scale is limited by the fact that it does not

measure the competence and proficiency of midwives in every field they work in. In this respect, it is assumed that the scale is a general professional assessment tool.

Conclusion and Recommendation

Competencies are used in making safe clinical decisions and are very important for setting standards. Therefore, it protects the reliability of midwives and increases their competence and independence by contributing to safe care. In conclusion, it can be said that the PCCSM is a valid and reliable tool and can be used to determine the competence and competency levels of midwives.

In addition, due to the limited number of measurement tools for the assessment of competencies and qualifications, this scale will also form the basis for conducting studies which are more comprehensive. It is expected that the present study will form the basis for future studies for the development of new measurement tools to assess competency in midwifery according to its different fields. In order to generalize the reliability and validity of the scale, it is recommended that similar studies should be conducted with different sample groups by taking different areas of midwifery into account.

In this context, although the scale is not the only purpose of evaluating the professional competence and qualification of midwives, it is important to create awareness in the knowledge and skill levels, especially for the managers of administrative units to evaluate the results and plan what needs to be done (in-service training, etc.). In addition, the establishment of professional certification programs by policy makers and their repetition at certain periods will contribute to continuity in education and provide evidence for all these practices to be implemented.

Author's contributions

MBC and HOC were involved in the study design, conceived the study, data collection/acquisition, revising the manuscript for intellectual content, and giving final approval for publication.

Ethical approval

ethical approval to carry out the study was obtained from Ege University Scientific Research and Publication Ethics Board (Decision date: August 26, 2021; Decision number: 21-8T/71 with decision).

Informed consent

Necessary guiding and informative explanations were made for the participants on "Google Forms" and those who wanted to participate in the study ticked the checkbox.

Declaration of participants's consent

The authors certify that they have obtained all appropriate participants consent forms. The participants understands that their names and initials will not be published and due efforts will be made to conceal their identity.

Declaration of Helsinki; The study was conducted according to the ethical principles of the Helsinki Declaration.

Availability of research data

Authors are available and ready to supply the research data upon any request through the corresponding author.

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Conflicts of interest

There are no conflicts of interest.

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