Assessing the quality of midwifery care from the woman´s perspective

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Abstract

Background: Midwives provide comprehensive care for women giving birth. The care processes must be tailored to the needs of the women. Hence, woman-centred quality of care requires good process organization as well as high communicative and interactive skills. Furthermore, the woman's perspective is essential to assess the quality of care. For this reason, established assessment scales from health care were adapted to the context of midwifery care for the constructs Shared Decision Making (SDM-Q9-M) , Empathy (CARE-M) , Internal Team Participation (TEAM-M) , and Professional Competence (PC-M) . The aim of this study is to determine the psychometric properties of the assessment instruments in a sample of women.

Methods: N = 201 women, who received midwifery care, completed the questionnaire as part of a cross-sectional survey. The unidimensional structure of the adapted single scales as well as the multidimensional structure of the entire assessment were analysed by means of confirmatory factor analysis (CFA).

Results: Both for the single assessments (CFI ≥ .96; SRMR ≤ .032) and for the multidimensional model (CFI = .96; SRMR = .049) an appropriate to good model fit could be confirmed. Minor model modifications reflecting local item dependencies have to be regarded for the scales SDM-Q9-M , TEAM-M , and PC-M . For the CARE-M scale P articipatory Communication proved to be an independent structural component.

Conclusions: To determine the quality of the midwifery care processes, an assessment is available that captures central components of woman-centred care from the perspective of woman. The assessment provides a validated basis for midwives to receive direct feedback on the quality of care and to evaluate woman-centred care.

1 Background

Midwives accompany and support pregnant women, women in childbirth, and women who have recently given birth in an interdisciplinary care context with the aim of integrated, coordinated, woman-centred care (1, 2). In doing so, they pursue individual and flexible care which is tailored to the respective needs of the woman in order to guarantee the health and rights of women and their newborns at every stage of care (3). This group of professionals is assigned a central role in "providing safe, effective, and efficient high-quality health services" (2). Thus, for the purposes of professional care it is important to make the quality of the midwifery care processes measurable. Hereby deficits in care may be identified, and the care of women and their newborns may be improved purposefully.

Due to legal requirements and medical ethical reasons, quality indicators in midwifery care are routinely collected in clinical obstetrics (4). These objective indicators contribute to the documentation and assurance of quality of outcomes. But they do not reflect the complexity of the care processes by midwives adequately. In order to allow for a comprehensive coverage of woman-centred care, the wide-ranging field of midwifery care outside the hospital has to be regarded (5–7). Existing assessments primarily focus on the measurement of women's satisfaction with midwifery care in clinical birth settings (8, 9). They vary in their construct definition, possess differing psychometric characteristics, and are not comparable to surveys from other health care sectors (8). Accordingly, to the best of our knowledge, there is currently no approved questionnaire available

assessing the woman-centred care process in midwifery care from the perspective of woman in a multidimensional, reliable, and valid manner.

A basic problem arises from the lack of evidence concerning appropriate woman-centred care and its implementation within the care processes (10). In addition, no consistent criteria have been defined for operationalizing the quality of midwifery care processes. The WHO's framework for improving the quality of maternal and newborn care in health facilities aims at eliminating these deficiencies. It identifies the main aspects reflecting adequate quality of care for mother and child. These aspects are defined at the level of structural, process, and outcome quality (11) (see Fig. 1). This model underlines the complexity of the midwifery care processes. Additionally, it highlights the fact that solely evaluating the provided care services is not sufficient to fully assess the quality of midwifery care (also outside the clinic). The woman's perspective on the provided care is defined as a relevant criterion for quality assessment both at the level of the process (experience of care) and the outcomes (women-centred outcomes) (11).

Furthermore, it is known that women receiving care mainly evaluate the quality of the care processes and general satisfaction within the context of quality of care. Indicators of clinical outcome quality are less often used by women to assess the quality of care (5, 12, 13). Results of studies on subjective quality concepts of cared women, as well as surveys of their expectations, substantiate similarities with the aspects of process quality described in the framework (e.g. evidence-based practice, emotional support, respect and dignity, effective communication, competent and motivated human resources) (14–21). Women strongly emphasize the interpersonal, empathic relationship between midwife and women (16, 22), and the opportunity of making participatory decisions (21). Furthermore, women prioritize continuity and coordinated care (15, 16).

Comparing these theoretical access paths with existing models of patient centredness (23–26), commonalities are revealed. These commonalities may prove to be useful and form the basis for the operationalization of woman's perspective for assessing the quality of care processes. Accordingly, the three elements of patient-centred care of Langberg and colleagues (23), can be adopted for the field of woman-centred care by midwives. The core elements are

- **woman** (e.g. consideration of woman's preferences/values and behaviour, emotional support, involvement of family members)
- **midwife-wife relationship** (e.g. trusting, empathic communication, information, shared decision making, perceived expertise of the midwife)
- **coherence of treatment** (e.g. continuity and coordinated care)

The importance of these factors has been proven in various fields of health care science. For example, the predictive value of the constructs Shared Decision Making, Empathy, and Internal Team Participation on the outcomes of patient satisfaction (61% predicted total variance) and treatment acceptance (67% predicted total variance) in medical rehabilitation has been confirmed (27). Furthermore, shared decision making is positively related to patient satisfaction, health outcomes, and cost-effectiveness (28).

The aim of the present study is to make the quality of the midwifery care processes measurable from the woman's perspective. A standardized and valid assessment instrument will be developed assessing the quality of the care processes in accordance with the synthesis of theoretical approaches described above. Furthermore, we aim to propose assessment scales which allow a comparison of findings from the field of midwifery care

with the results in the field of medical care. In a first step, established instruments measuring Shared Decision Making (SDM-Q9-M), Empathy (CARE-M), Internal Team Participation (TEAM-M), and Professional Competence (PC-M) are adopted for recording the quality of the care processes of midwifery care. Second, the homogeneity of adapted scales SDM-Q9-M, CARE-M, TEAM-M, and PC-M will be evaluated in scale specific analyses. Third, a comprehensive multidimensional model will be analysed to determine the associations of the constructs characterizing the quality of the midwifery care processes.

2 Methods

2.1 Participants

The cross-sectional survey was carried out from June to July 2019. The inclusion criteria were (1) majority age, (2) giving birth(s) in 2018, (3) use of midwifery services (before, during, or after birth), and (4) valid informed consent. The hyperlink of the digital questionnaire, a letter of invitation, and the information for participants were sent by post to 2,368 families from a district in Germany from the register of residents. The Ethics Committee of the German Society of Psychology classified the project as ethically acceptable (MAW 022019). All participants completed a digital informed consent form.

2.2 Assessment instruments

Theoretically based, empirically tested, and (inter)nationally accepted instruments surveying care process quality were examined. The examination was based on research standards in patient-centred medical care and the three core elements of patient-centred care according to Langberg and colleagues (23). The search was focused on woman´s reported Shared Decision Making, Midwife Empathic Communication and Interaction, Internal Team Participation, and Professional Competence. The identified instruments were adapted for the field of midwifery care. All adaptations are documented in Additional File 1. Scale adaptation was based on the specific characteristics of woman-centred care by midwives. For example, dealing with a disease or coping with the disease is not primarily the focus of midwifery care. Hence, e.g. item 9 of the CARE scale "Did the doctor help you find a way to deal with your illness" was modified into "Did you find the midwife's preparation for birth and parenthood helpful for yourself?" (CARE-9). The development and testing of the changes in the wording was based on qualitative individual interviews (N = 5 women).

2.2.1 9-item Shared Decision Making Questionnaire (SDM-Q-9)

The instrument 9-item Shared Decision Making Questionnaire (SDM-Q-9) (Cronbach´s α = .94) was used to measure the extent to which women receiving care during pregnancy are involved in decision-making processes (29). The generic, one-dimensional scale includes 9 items which are scored on a 6-point Likert scale from 0 = "Does not apply at all" to 5 = "Fully applies". Higher scores are associated with a higher degree of involvement of the woman in decision-making processes, e.g. "My midwife helped me to understand all the information." (SDM-5) (29).

2.2.2 Consultation and Relational Empathy (CARE)

The degree of empathy among midwives from the perspective of the woman was recorded using the German version of the validated instrument Consultation and Relational Empathy (CARE; Cronbach´s α: .92- .94. (30–

33)). Following Mercer and colleagues, the term empathy is understood as a multi-facetted construct which includes emotional, moral, cognitive, and behavioural components. Accordingly, empathy is a trainable, professional ability to communicate; it is not only an emotional experience at a subjective level (30). The one-dimensional CARE scale includes 10 items which relate the perception of the woman in terms of the midwife's understanding and reaction to the concerns and fears of the woman under care, e.g. "Was the midwife interested in you as a whole person?" (CARE-4). The women answered the items on a 5-point scale from 1 = "fully applies" to 5 = "does not apply at all".

2.2.3 Team Scale (TEAM)

The Team Scale (Cronbach´s α = .88) was used to measure interaction and internal participation in the team (midwife and treating physicians during pregnancy) (34). The 6 items represent the areas Internal Communication, Coordination, Cooperation, and Climate in the Team: e.g. "My midwife and my attending physician work hand in hand" (TEAM-1). The convergent validity proved to be medium to high (.40–.60) (35, 36). The 4-point scale (1 = "does not apply at all" to 4 = "applies completely") was adapted to a 6-point Likert scale for the present study (1 = "does not apply at all" to 6 = "fully applies") (37). Extreme scale endpoints were added to minimize expected ceiling/floor effects and to achieve better reliability (37–41).

2.2.4 Facet Professional Competence (PC) of Qualiskope-A Questionnaire

The Qualiskope-A questionnaire is a standardized, patient-centred instrument which enables a differentiated analysis of major aspects of process-related patient satisfaction (42). To operationalize the construct perceived as Professional Competence of the Midwife, the corresponding dimension (Cronbach´s α ≥ .88) was taken from the Qualiskope-A questionnaire, e.g. "The midwife is a specialist on her field". (PC-5). The 6 items comprise a 4-point answer format (1 = "do not agree at all" to 4 = "agree completely") adapted to a 6-point Likert scale (1 = "does not apply at all" to 6 = "fully applies").

The aspect "involvement of the partner" must be regarded as an important midwife-specific task. This is confirmed by the results of a Swedish cross-sectional survey from 2009 to 2010. Hildingsson and colleagues were able to show that the currently highest weighted expectations from the current cohort (respectful treatment, concern for the child's health, and partner involvement) were significantly higher than in the sample 10 years ago (15). Accordingly, a newly generated item was added to the scale "The midwife was open to include people who are important to me in the care" (PC-1).

Additionally, sociodemographic data and information on aspects of childbirth were collected.

2.3 Statistical Analysis

Descriptive and inferential statistical calculations were performed using IBM SPSS Statistics 23.0 (43, 44). In order to avoid systematic bias due to missing data missing values were imputed using the expectation-maximization algorithm (45). This process is based on the maximum likelihood method, which estimates statistically maximum plausible values in an iterative process (43, 46).

To verify the theory-based measurement and structural model, confirmatory factor analyses were conducted using the maximum likelihood estimation method implemented in AMOS 23.0 (25, 27). According to the

classical test theory, it is assumed that a single latent construct can predict the variance of the scale items except for the independent error component (47). The fit of the empirical and estimated variance-covariance matrix was checked by measures of the exact and approximate model fit. The χ^2-test represents the most rigorous form of model testing. Non-significant χ^2–values (fit criterion: $p(\chi^2) > .05$) indicate whether the entire information in the empirical variance-covariance matrix is predicted by the model (47). The root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR) and incremental fit measures were determined as measures of approximate model fit. The RMSEA indicates the amount of variance-covariance information which cannot be predicted by the model (< .05 good fit; < .08 acceptable fit (43)). The SRMR indicates the standardized difference between the predicted and the observed correlation (≤ .08 good fit) (48). The Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were calculated as measures of incremental model fit. These represent the proportion of information which can be explained by the assumed model in reference to a global zero model (assuming completely uncorrelated analysis variables). The cut-off value for an acceptable fit for incremental indices is > .95 (43, 44).

To check the local goodness of fit, the indicator reliability of the individual items (IR; criterion: IR ≥ .40), the average variance extracted (AVE; criterion: AVE ≥ .50), and the factor reliability (FR; criterion: FR ≥.60) were determined (29). The Fornell-Larcker criterion served as a measure of discriminant validity (49). The modelled constructs can only be reliably separated if each latent construct is more strongly linked on average to its items than to the other latent constructs (49).

In a two-step procedure, the model fit for the care situation during pregnancy was first determined separately for each construct. Indications of possible model violations were analysed on the basis of the residual matrix of covariances. High negative or high positive values indicate a systematic over- or underestimation of the relationships (47). After ensuring a good data fit, the comprehensive multi-factorial model was estimated.

3 Results

3.1 Demographics

2,368 women received a written invitation to participate in the study. Of these, a total of 209 women (8.8%) completed the survey on the midwifery care processes during pregnancy. 8 cases (3.8%) were excluded from the analysis due to more than 5 missing values in all scales used (> 16% missing values). Cases with less than 6 missing values were imputed using the expectation maximization algorithm (N = 33; 15.8%) (45). In total, N = 201 complete cases (96.2%) were included in the analysis (see Table 1). The majority of the included women were primiparous mothers (N = 116; 57.7%). Most often children were born naturally (N = 148; 73.6%); neither a high-risk pregnancy (N = 154; 76.6%) nor a premature birth was diagnosed (N = 189; 94%). The average age of the mothers was 32.8 years (SD = 3.6, range 24–44). 156 (77.6%) were married and living with their spouse. The number of women with a low to medium educational qualification (N = 99; 49.2%) is similar to the number of women with a high school qualification (N = 99; 49.2%). The majority have a university or college degree (N = 73; 36.3%).

Table 1 Characteristics of the sample (N = 201)

	M	S.D.
Age	32.8	3.6
	Frequencies (n)	**(%)**
Age		
< 30 years	39	19.4
30 – 35 years	111	55.2
>35 years	51	25.4
Nationality		
German	194	96.5
Another nationality	7	3.5
Education		
Secondary (general) & specialized school	99	49.2
Grammar or high school	99	49.2
Other	3	1.6
Completed vocational training, higher education		
Apprenticeship	56	27.9
Vocational school	31	15.4
Technical school	31	15.4
Engineering school	2	1.0
University, college	73	36.3
Other	8	4.0
Marital status		
Married, lives with spouse	156	77.6
Separated/divorced/widowed/single mother	45	22.4
Insurance status		
Statutory insurance	172	85.6
Private insurance	29	14.4
Net-household income (monthly)		
500 to less than 2,000 €/month	27	13.4
2,000 to less than 5, 000 €/month	152	75.7
≥ 5,000 €/month	22	10.9
Birth experience		
Primipara	116	57.7
Two children born	65	32.3
Three or more children born	20	10.0
Premature birth		
Yes	12	6.0
No	189	94.0
High-risk pregnancy		
Yes	44	21.9
No	154	76.6
Mode of childbirth		
Vaginal spontaneous birth	148	73.6
Intended caesarean birth	17	8.5
Unscheduled caesarean section/ emergency caesarean-section	36	17.9

M = mean, S.D. = standard deviation

3.2 Confirmatory analysis of the single assessment scales

SDM-Q9-M-Scale

For the one-dimensional original model of the adapted SDM-Q9-M scale, the global measures indicated no acceptable exact and approximate model fit (see Table 2, line "original model").

Table 2 Measures of global fit for all estimated single CFA-models (N = 201)

	df		/df	*p*	CFI	TLI	RMSEA [90%-CI]	SRMR
ceptable fit threshold			3		.95	.95	≤ .08	
od fit threshold			2	.05	. 97	.97	≤ .05	≤ .08
)M-Q9-M(idwifery)								
·iginal model	216.44	27	8.02	.001	.91	.89	.187 [.17; .21]	.045
odified model	74.80	24	3.12	.001	.98	.97	.103 [.08; .13]	.025
ARE-M								
·iginal model	276.01	35	7.89	.001	.88	.84	.186 [.17; .21]	.067
odified model	117.99	33	3.58	.001	.96	.94	.113 [.09; .14]	.032
CAM-M								
·iginal model	16.08	5	3.22	.007	.99	.98	.105 [.05; .17]	.016
C-M*								
·iginal model	196.13	20	9.81	.001	.82	.75	.210 [.18; .24]	.071
odified model	38.59	20	1.93	.008	.98	.97	.068 [.04; .10]	.030
ultidimensional Model*	657.06	363	1.81	.001	.96	.95	.064 [.06; .07]	.049

* Model with parcelled PC-M item pairs; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index, RMSEA = Root Mean Square of Approximation, Standardized Root Mean Square Residual.

The analysis of residual correlations showed violations due to local item dependencies (medium to high local dependence, r > .30). SDM-1 ("has expressly informed that a decision must be taken") and SDM-2 (“desired to participation in decision making”) address aspects of decision making. SDM-3 ("information different options") and SDM-4 ("explanation assets and drawbacks of the options") refer to the available options. Deciding between options is reflected by SDM-7 ("joint consideration of options") and SDM-8 ("joint selection of the option"). Defining these dependencies as model components leads to a satisfactory to good model fit (see Table 2, line "modified model"). Only the RMSEA with a value > .10 indicates differences between data information and model predictions. Because RMSEA is known to be overly sensitive in indicating model misfit in cases of small number of df and sample size (N ≤ 250) (50, 51), the Standardized Root Mean Square Residual (SRMR) was determined additionally. SRMR = .025 indicates an appropriate model-fit (SRMR ≤ .08 (48)). The measures of local fit confirm that the latent construct can be reliably measured by the indicators. More than 40% of the variance of each manifest item is shared with the latent variable Shared Decision Making (52). In addition, factor reliability (.96) and average variance extracted (.74) exceed the critical threshold of .60 and .50, respectively (43) (see Table 3). Thus, after taking into account the local dependencies reflecting the subaspects Decision Making, Considering Options, and Deciding between Options, the structure of the SDM-Q9-M can be described appropriately by the one-dimensional model.

CARE-M-Scale

The adapted one-dimensional CARE-M scale measuring Midwife Empathy also showed an insufficient model fit for the original model (see Table 2, line "original model"). The items CARE-9 ("helpful birth preparation") and CARE-10 ("making a plan of action with you") were significantly weaker associated with the construct (IR = .39 for both items) than the other 8 items. In addition, a high local dependency (r = .72) of the two item contents is evident. On a theoretical level, the items represent the clearly separable information aspect of Participatory Communication. As these two items could not be accepted as reliable indicators of the construct Midwife Empathy, a second latent variable - Participatory Communication - was defined. Moreover, a weak local dependency (r = .29) between the items CARE-7 ("being positive") and CARE-8 ("explaining things clearly") exists, which represents the aspect of communication quality regarding birth preparation. These model modifications yield an acceptable model fit (see Table 2, line "modified model"). Indicator reliabilities ≥ .67 (CARE-8-M) and ≥ .86 (CARE-PM-M), respectively, indicate strong associations of all items with the respective underlying latent constructs (49). Both constructs exhibit high factor reliability (.96, .90) and a high amount of average variance extracted (.73, .82) (see Table 3).

Table 3 Measures of local fit for the CFA of the single and the multidimensional scale structure and relevant item properties (N = 201) *

SDM-Q9-M *(0 = completely disagree all, 5 = completely agree)*					
Item	M	S.D.	$_{it}$	IR	
SDM-1 – has expressly informed that a decision must be taken	3.49	1.60	.73	.50	FR: .96 AVE: .74
SDM-2 – desired participation in decision making	3.59	1.45	.81	.63	α:.96
SDM-3 – information different options	4.03	1.40	.89	.82	
SDM-4 – explanation assets & drawbacks of the options	3.87	1.46	.92	.89	
SDM-5 – helped to understand all information	4.12	1.34	.85	.79	
SDM-6 – asked which option I preferred	3.91	1.50	.91	.89	
SDM-7 – joint consideration of options	3.66	1.58	.88	.80	
SDM-8 – joint selection of the option	3.38	1.66	.80	.65	
SDM-9 – agreement for further care	3.77	1.60	.85	.72	

CARE-8-M *(1 = fully applies, 5 = does not apply at all)*					
Item	M	S.D.	$_{it}$	IR	
CARE-1 – making you feel at ease	1.26	0.68	.81	.71	FR: .96 AVE: .73 α:.96
CARE-2 – letting you tell your “story“	1.27	0.65	.82	.71	
CARE-3 – really listening	1.35	0.65	.83	.71	
CARE-4 – being interested in you as whole person	1.33	0.68	.87	.80	
CARE-5 – fully understanding your concerns	1.43	0.76	.80	.67	
CARE-6 – showing care and compassion	1.34	0.72	.92	.88	
CARE-7 – being positive	1.32	0.71	.83	.73	
CARE-8 – explaining things clearly	1.41	0.80	.80	.68	

CARE-PM-M *(1 = fully applies, 5 = does not apply at all)*					
Item	M	S.D.	$_{it}$	IR	
CARE-9 – helpful birth preparation	1.61	1.02	.82	.86	FR: .90
CARE-10 – making a plan of action with you	1.86	1.13	.82	.78	AVE: .82 α:.90

TEAM-M *(1 = does not apply at all, 6 = fully applies)*					
Item	M	S.D.	$_{it}$	IR	
TEAM-1 – work hand in hand	2.87	1.88	.90	.73	FR: .96 AVE: .85 α:.97
TEAM-2 – good agreements among themselves	2.95	1.89	.95	.93	
TEAM-3 – coordinated information	3.31	1.84	.87	.76	
TEAM-4 – good communication between each other	2.86	1.89	.94	.95	
TEAM-5 – deferential interaction	3.55	2.00	.85	.86	

PC-M** *(1 = does not apply at all, 6 = fully applies)*				
Item	M	S.D.	$_{it}$	IR

PC-1 – involves important persons in care	5.38	1.11	.61	.47	FR: .87
PC-2 – has taken thorough care of my health	5.28	1.02	.77	.63	AVE: .57
PC-3 – cooperates well with other professions	4.48	1.49	.66	.55	α:.86
PC-4 – pays attention to whether other professionals need to be involved	4.83	1.37			
PC-5 – she´s a specialist	5.56	0.79	.74	.66	
PC-6 – is at the current state of knowledge	5.58	0.81			
PC-7 – physical birth preparation	5.31	1.10	.71	.61	
PC-8 – psychological birth preparation	5.27	1.15			

* Critical Ratio (C. R.) for all items ≥ 9; ** Model with parcelled PC-M item pairs
M = mean; S.D. = standard deviation; $_{it}$ = corrected item-total correlation; IR = indicator reliability; FR = factor reliability; AVE = average variance extracted

TEAM-M-Scale

The confirmatory analysis of the adapted one-dimensional measurement model of the TEAM-M scale measuring Internal Team Participation showed a very good model fit with CFI = .99, TLI = .98, and SRMR = .016 in the original model (see Table 2, line "original model"). For each manifest indicator, at least 73% of the information was associated with the underlying latent construct (IR ≥ .40 (52)). Furthermore, the scale homogeneity is reflected by high factor reliability (FR = .95) and high average variance extracted (AVE = .87) (see Table 3).

PC-M-Scale

The adapted one-dimensional PC-M scale measuring Professional Competence showed a lack of data compatibility in the original model (see Table 2, line "original model"). The analysis of significant residual correlations (r > .30) indicated that the latent construct Professional Competence reflects a second order factor underlying 3 additional facets (first order factors). These facets are represented by two items each. The item PC-3 ("cooperates well with other professions") and PC-4 ("pays attention to whether other professionals need to be involved") represents the subfacet Cooperation, the items PC-5 ("she´s a specialist") and PC-6 ("is at the current state of knowledge") represent the subfacet Evidence-based Expertise. Finally, the midwife's efforts to provide holistic preparation for birth are measured by the items CP-7 ("physical birth preparation") and CP-8 ("psychological birth preparation"). This model modification led to a substantial improvement, and a good model fit could be ensured (see Table 2, line "modified model"). Good local fit level is indicated by indicator reliabilities (IR ≥. 45 on all 8 items), as well as factor reliability (FR = .87) and average variance extracted (AVE = .57) (see Table 3).

3.3 Confirmatory analysis of the multi-dimensional scale structure

To analyse the multidimensional structure of the adopted assessment scales, a comprehensive multifactorial measurement and structural model was defined and analysed. Each scale was defined according to the results of the single scale analyses described above. The measurement and structural model are reported in detail in

Additional File 2. The database consists of the correlation matrix of the 32 items of the four constructs (see Additional file 3). The only substantial unexplained residual component prevailed between item PC-3 (“cooperates well with other professions”) and the latent construct TEAM-M (r = .41). Cooperation between health professions measured by PC-3 is an essential component of team work. This aspect was regarded as an additional model aspect. For this overall model, both measures of the global fit (CFI = .96, TLI = .95, RMSEA = .064, SRMR = .049) and the measures of the local fit (IR ≥ .50; FR = .96, .96, .90, .96, .87; AVE: .74, .73, .82, .85, .57) indicate a good model fit (see Table 2, line “multidimensional model” and Additional File 2). The data in Table 4 indicate that the individual constructs can be satisfactorily separated in the multivariate model. Except for the intercorrelation of the latent constructs PC-M and CARE-PM-M, the latent constructs exhibit a higher variance score with the respective manifest indicators than with the other latent constructs within the structural model (Fornell-Larcker criterion (49)). The high correlation of the latent constructs PC-M and CARE-PM-M (r = .80) is also reflected in the high manifest correlation of the scales (r = .72).

Table 4 Intercorrelations[1)] of the scales and relevant scale properties used in the CFA of the multi-dimensional scale structure (N = 201)

Scales	SDM-Q9-M	CARE-8-M	CARE-PM-M	TEAM-M*	PC-M	MW	SD	Skewness	
SDM-Q9-M	*.86*[2)]	.51[3)]	.54[3)]	.41[3)]	.62[3)]	.96	3.75	1.33	-1.20
CARE-8-M	.54[4)]	*.85*[2)]	.63[3)]	.36[3)]	.69[3)]	.96	1.34	0.62	2.57
CARE-PM-M	.59[4)]	.67[4)]	*.75*[2)]	.42[3)]	.72[3)]	.90	1.74	1.02	1.72
TEAM-M*	.37[4)]	.34[4)]	.38[4)]	*.92*[2)]	.50[3)]	.97	3.11	1.78	0.30
PC-M	.68[4)]	.75[4)]	.80[4)]	.44[4)]	.91[2)]	.86	5.24	0.86	-1.73

l results are significant with p >.001;

alues in the diagonal: square root of average variance extracted (AVE);
alues above the diagonal: Bivariate correlation of the scales;
alues below the diagonal: Bivariate correlation of the latent constructs;
odel with parcelled PC-M item pairs;
= mean; S.D. = standard deviation.

4 Discussion

The aim of the present study was to examine the construct validity of the adapted assessment scales SDM-Q9-M (Shared Decision Making), CARE-M (Midwife Empathy), TEAM-M (Internal Team Participation), and PC-M (Professional Competence). These constructs are central components of woman-centred care by midwives.

The CFAs of the single assessments (CFI ≥ .96; SRMR ≤ .032) as well as the CFA of the multidimensional model (CFI = .96; SRMR = .049) indicate a satisfactory to good model fit after consideration of local dependencies. Accordingly, an appropriate global model fit of all analysed assessment scales could be proven. Only RMSEA exceeds the limit for sufficient model fit in the CFA for the single scales SDM-Q9-M, CARE-M, and TEAM-M. For the RMSEA, Kenny and colleagues (50) proved that the rejection rate (RMSEA > .05) increases with a decreasing number of degrees of freedom and a small sample size. The problem of this effect is also reflected in the estimated 90% confidence interval (CI). With decreasing degrees of freedom, the variability and thus the range of the confidence interval increases systematically. Hence, a valid interpretation of the interval is compromised (50). In our study, for example, the 90% CI of the RMSEA of the TEAM-M scale was [.05; .17]. The interval width indicates the high uncertainty of estimation for the RMSEA. But, the RMSEA falls below the critical threshold of .08 in the more complex multidimensional overall model. This supports the assumption that the validity of RMSEA as global fit measure is affected by model complexity and sample size in the present study.

For the CARE-M scale, the construct Participatory Communication proved to be an independent additional structural component which must be considered separately from the main construct Midwife Empathy. This is not consistent with existing study results, which demonstrate the unidimensionality of the CARE scale assessing general practitioners empathy in the care of patients with oncological diseases (33, 53). However, in the studies by Neumann et al. (36) and Wirtz et al. (53), moderate local dependency between item CARE-9 ("helping you take control") and CARE-10 ("making a plan of action with you") had to be taken into account in the structural model to ensure an appropriate model fit. But, in these studies defining a separate latent variable was not data-compatible due to the high item-construct associations (indicator reliabilities ≥ .58). Thus, it seems reasonable to assume that the empathy of midwives in the care of pregnant woman is perceived differently from the empathy of general practitioners in the care of cancer patients (33, 53).

Empathy plays a special role in the care of oncological patients. General practitioners prepare the patients for a long-term, potentially recurrent disease process, which is associated with high psychological and physical distress. Communication aspects addressed by the items CARE-9 and CARE-10 have a different meaning in antenatal care (54, 55). The focus is on the need for participatory communication, in which the midwife discusses possible changes in the course of the pregnancy with the woman, encourages the woman as well as involves her in decisions. Women may perceive Participatory Communication (CARE-PM-M) concerning the preparation of the birth process as more distinct from Midwife Empathy (CARE-8-M) than it is the case for the supply of cancer patients. In contrast to the other CARE items, their content does not refer to a general care situation, but is more explicitly directed at birth preparation. The necessity of separating the CARE-8-M and CARE-PM-M constructs is further supported by the different strength of association with the construct Professional Competence of the midwife. The latent factor Participative Communication (CARE-PM-M) is more strongly associated with the latent factor Professional Competence of the midwife (r = .80) than with the construct Midwife Empathy (r = .67).

For the construct Shared Decision Making significant local dependencies of the items were found, which were similarly observed in the study by Quaschning et al. (27). The local dependencies reflect special information aspects which overlay the main construct Shared Decision Making. Thus, the local dependent items SDM-1 and SDM-2 capture the additional aspect of decision making. The item pair SDM-3 and SDM-4 reflects the communication regarding selectable options. The dependency of the items SDM-7 and SDM-8 results from the focus of the communication regarding the selection of an alternative. This is because, after including local dependencies in the model indicator, reliabilities of all items remained very high (IR ≥ .50). The construct Shared Decision Making proved to be the dominant information sources reflected by all SDM-Q9-M items.

For all adopted assessment scales, Cronbach's α coefficients (≥ .86) in the present study are higher than Cronbach’s α of the original scales reported in existing studies. This result suggests that pregnant women perceive the constructs for assessing the quality of care more homogeneously than the samples from previous studies with chronic diseases or patients from medical rehabilitation.

Limitations of the study

The scale analyses are based on retrospective self-reports of the women (6 to 18 months after birth) who were enrolled in the study as voluntary participants (self-selection). Therefore, biasing effects due to general perception (e.g. Halo effects), recall, and selection biases cannot be excluded (56, 57). This may contribute to

the enhanced homogeneity of scales (Cronbachs α). Positive birth characteristics (e.g. positive birth outcome) can lead to spillover effects with regard to the retrospective evaluation, and thus to a more positive assessment of the care processes. In addition, women may be hesitant to openly criticize the caregiver (58–60). In order to minimize expected ceiling or floor effects, at least five-point Likert scales with extreme endpoints were used. Nevertheless, ceiling effects could not be avoided completely. For example, the skewness of CARE-8-M was significantly negative (skewness = -2.75). Similar values are reported in the study by Neumann and colleagues (33).

Furthermore, the results only apply to the time of care during pregnancy. In order to be able to implement the assessment in everyday care, an additional check of the factorial stability of the overall assessment for the different care situations (before, during, and after birth) is required. Additionally, the sensitivity to change should be determined, in order to improve the problems of previous instruments for measuring woman's satisfaction with care (8). These are mainly used after birth or after inpatient discharge. This reduces the woman's perspective on an outcome aspect, but does not take into account that the values and views of women can vary depending on the care process (pregnancy, birth, puerperium) (61).

Future research should also take into account the perspective and expectations of the male partners. With regard to the discussion of the role of the modern father, there is evidence that fathers are not adequately involved in the lives of their children, especially during pregnancy and birth (62, 63). Studies from Africa are increasingly focusing on this research desideratum (64–66). In general, men are willing to become aware of their role during the birth process and men are more willing to support their partner in the best possible way (64). For example, obstacles are seen in the health care system. The health care system has an unwelcome, intimidating, and unsupportive effect on partners, which leads to a reduction in the partner's involvement (66). For this purpose, the item PC-1 ("involves important persons in care") was added and could be confirmed as a homogeneous scale item of the Professional Competence scale (r_{it} = .61; IR = .47). This reflects the relevance of the fact that the inclusion of the direct environment of the woman receiving care is becoming more important, and thus the perception of these persons with regard to the quality of midwifery care should also be surveyed in future (15).

Conclusion

Instruments assessing *Shared Decision Making*, *Midwife Empathy*, *Internal Team Participation, and Professional Competency* in medical care from the patient's perspective could be adopted successfully to the field of midwifery care. The developed and confirmatory tested assessment scales show good to satisfactory psychometric characteristics at item and scale level. The assessment comprises 32 items, and is a time-economical feedback instrument for midwives to identify strengths and weaknesses in woman-centred care processes. Thus, it can be used to enable midwives to evaluate and optimize their own caring practice within a framework of quality management. The instrument reflects the quality of care perceived by woman, and should be included alongside professional quality standards in order to develop structures and processes of midwifery care (12). Furthermore, the questionnaire may be used in the context of midwifery education and training to identify the views and needs of women.

Abbreviations

AVE – average variance extracted

CARE-8-M – Scale for measuring the midwife's empathy

CARE-PM-M – Independent structural component for measuring participatory communication

CFA – confirmatory factor analysis

CFI – Comparative Fit Index

CI – confidence interval

FR – factor reliability

IR – indicator reliability

PC-M – professional competence

r_{it} – corrected item-total correlation

RMSEA – Root Mean Square of Approximation

SDM-Q9-M – Scale for measuring shared decision making

SRMR – Standardized Root Mean Square Residual

TEAM-M - Scale for measuring internal team participation

TLI – Tucker-Lewis Index

WHO – World Health Organization

Declarations

Ethics approval and consent to participate

The Ethics Committee of the German Society of Psychology classified the project as ethically acceptable (MAW 022019). All participants completed a digital informed consent form.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding authors on reasonable request (Anja Schulz at anja.schulz@ph-freiburg.de).

Competing interests

The authors declare that they have no competing interests.

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Author´s contribution

AS carried out the data collection, analysed and interpreted the data set using confirmatory factor analysis. AS was major contributed in all steps of the study and in editing the mansucript; MAW contributed to the planning of the study, was involved in all steps of the data analysis and editing and revising the manuscript. All authors read and approved the final manuscript.

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Additional Files

Additional file 1

File name: Additional file 1_adapted assessment scales (.docx)

Title of data: Adapted assessment scales

Description of data: The table documents and justifies all adaptations of the original scale item concerned to the midwife context. Scale items which do not appear in this illustration have not been changed.

Additional file 2

File name: Additional file 2_multi-dimensional CFA model_N=201 (.pdf)

Title of data: Confirmatory analysis of the multidimensional model

Description of data: The supplement shows the graphical representation of the confirmatory factor analysis of the multidimensional model and measures of the local model fit.

Additional file 3

File name: Additional file 3_correlation matrix (.docx)

Title of data: Correlation matrix

Descirption of data: The file contains the empirical correlation matrix of the 32 items of the multidimensional model.

Figures

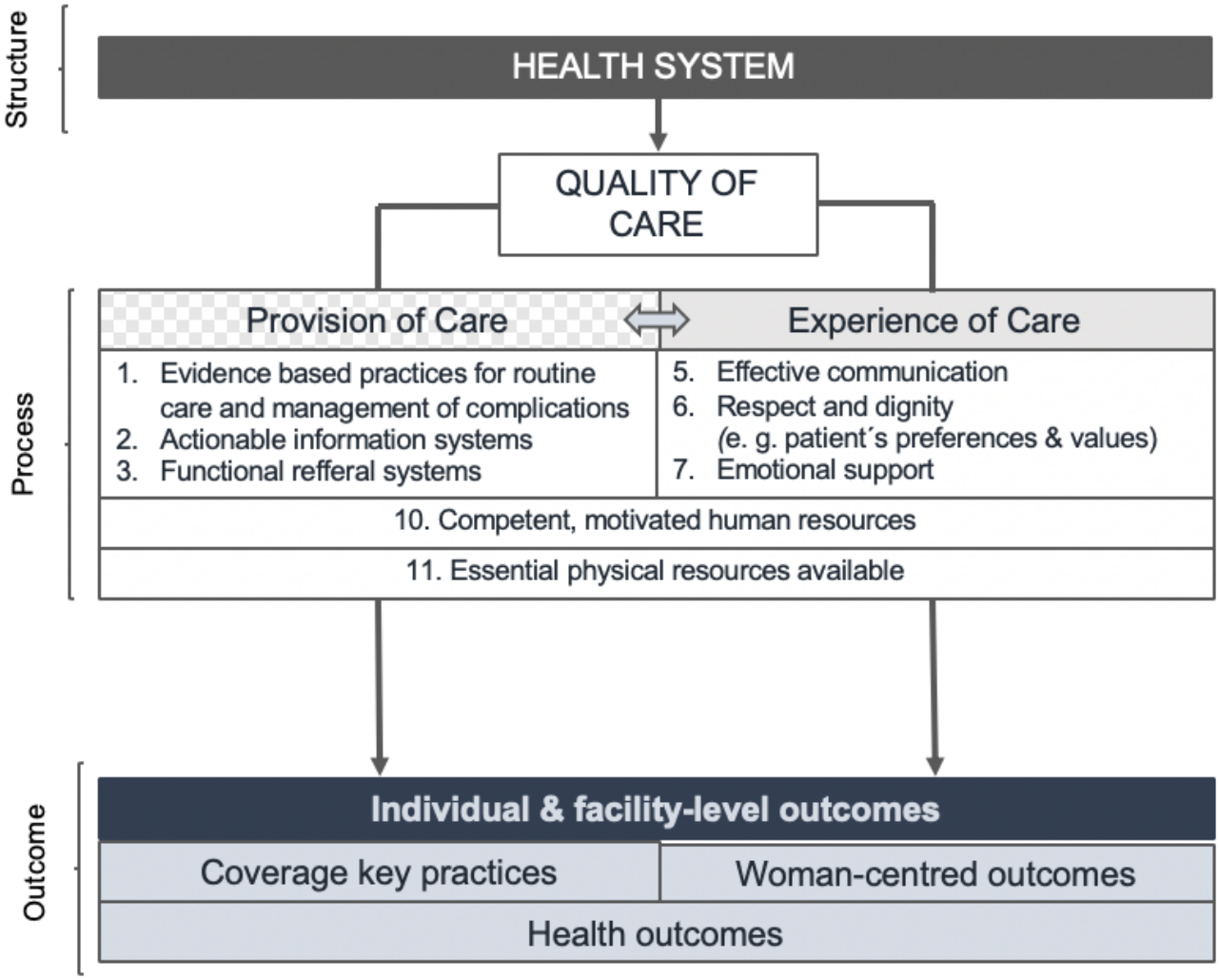

Figure 1

The WHO Quality of Care Framework for maternal and newborn health (2)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile3correlationmatrix.docx
- Additionalfile2multidimensionalCFAmodelN201.pptx
- Additionalfile1adaptedassessmentscales.docx