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Developing the Australian Midwifery Workplace Culture Instrument

ABSTRACT (200 words)

Aim: To develop and psychometrically test the Australian Midwifery Workplace Culture instrument.

Background: Workplace culture is critical within midwifery settings. Culture determines not only the well-being and continued retention of maternity staff and managers; it also affects the quality and ultimate safety of the care they provide to women, infants and families. Several studies have identified cultural problems within maternity services. Relatively few instruments take account of the unique aspects of these workplaces and the relationship between midwives and women.

Design: Three-stage instrument development involved item generation (based on the Culture of Care Barometer), expert content validation and a pilot test.

Methods: During 2016, 38 midwifery experts reviewed the initial items and 322 midwives then pilot-tested the draft instrument. We used exploratory factor analysis to identify key domains, and to refine the instrument.

Results: The refined instrument contained 22 items in three distinct domains: relationship with managers, empowerment and collegiality.

Conclusion: The instrument can contribute to understanding important dimensions of the culture in maternity workplaces and thus to examining problematic attitudes and practices. The instrument requires further development and testing with larger and more diverse samples of midwives, and validation in specific midwifery settings and models of care.

Summary Statement

What is already known about this topic

- Previous research reports problems in the organisational culture in maternity services, increasing the stress on midwives and potentially affecting the care they provide to women and infants.
- Negative workplace culture may contribute to attrition in maternity workforce.
- There are few measures that specifically address midwifery workplace culture.

What this paper adds

- This paper presents a new instrument designed to measure dimensions of midwifery workplace culture, detailing item generation and pilot-testing.
- Analysis identified three domains that demonstrated good psychometric properties: relationship with management, empowerment and autonomy, collegiality and relationship with peers.

Implications of this paper

- The exploratory factor analysis suggests the utility of this instrument for assessing workplace culture in midwifery settings.
- The study recommends further testing of this instrument and validation in diverse midwifery workplaces, including large and small hospitals, community services, and rural and remote areas.

Keywords

Childbirth, maternity hospitals, midwifery, midwives, organizational culture, pregnancy, parturition, staff attitude, validation studies

INTRODUCTION

The culture in any workplace is central to productivity, staff morale and job satisfaction. In health organisations, workplace culture affects not only employees but may impact on quality and safety of care with, at worst, potentially life-threatening consequences (Francis, 2015). A positive workplace environment is essential for the growth and wellbeing of organisations, staff members and, ultimately, the individuals they care for (Beardsmore & McSherry, 2017; Braithwaite, Herkes, Ludlow, Testa, & Lamprell, 2017; Bronkhorst, Tummers, Steijn, & Vijverberg, 2015).

Workplace culture (or organisational culture) has been defined as the shared workplace behaviours and norms within an organisation such as values, routines and traditions (Parmelli et al., 2011). Perhaps the simplest definition of workplace culture is ‘the way things are done around here’ (Davies, Nutley, & Mannion, 2000).

Measures of workplace culture assess both qualitative and quantitative aspects, as a means of identifying areas to be developed or improved upon (Jung et al., 2009; Mannion, Konteh, & Davies, 2009). If employees perceive their workplace as having a positive and fulfilling culture, they are more likely to experience job satisfaction and remain in their jobs. Negative cultures can lead to staff attrition. Staff responses to surveys of organisational culture can provide valuable feedback to managers and workforce planners.

Many quantitative instruments have been developed to measure multiple dimensions of organisation culture within healthcare environments, with differing characteristics, purposes and properties (Mannion et al., 2009). More recently, the Culture of Care Barometer (CoCB) (Rafferty, Philippou, Fitzpatrick, Pike, & Ball, 2017) was based on a national strategy to enhance compassionate healthcare in England, and had at its core,

the 6Cs for health professional values: care, compassion, competence, communication, courage and commitment. The authors of this tool argued that there were inseparable links between workplace culture and the quality of care given, and that in order for compassion to thrive in healthcare, positive workplace environments were essential.

Within maternity services, several studies have documented midwifery workplace culture and identified a range of potential problems (Arundell, Mannix, Sheehan, & Peters, 2018; Ball, Curtis, & Kirkham, 2002; Catling, Reid, & Hunter, 2017; Cummins, Catling, Hogan, & Homer, 2014; Curtis, Ball, & Kirkham, 2006; Davis & Homer, 2016; Farrell & Shafiei, 2012; Pezaro, Clyne, Turner, Fulton, & Gerada, 2016). Issues such as low morale and inappropriate workplace behavior, including bullying, may impact on midwives' capacity to care for women and newborn infants. However, relatively few instruments have been designed to explore dimensions of workplace culture specifically in maternity services (Jarosova et al., 2017). More generic measures of healthcare workplaces do not take account of the unique relationship between midwives, women and their families, or of midwives' commitment to working in partnership with women. One recent study included midwives within a survey of Australian nurses that used a variety of more general measures to explore workplace culture and wellbeing (Holland, Tham, & Gill, 2018). Other research focused on midwifery workplaces used the Competing Values Framework within an Australian maternity unit to assess culture and readiness for change (Adams, Dawson, & Foureur, 2017) and the Utrecht Work Engagement Scale to explore concepts of work engagement amongst Irish midwives and the link with self-reported health and quality of care (Freeney & Fellenz, 2013). One midwifery-specific instrument, the Perceptions of Empowerment in Midwifery Scale (PEMS), addresses important elements of professional support, skills and resources, empowerment and autonomy, and manager support (Matthews, Scott, & Gallagher, 2009; Pallant, Dixon, Sidebotham, &

Fenwick, 2015). Researchers have compared perceptions of empowerment among midwives in Australia, New Zealand and Sweden using PEMS (Hildingsson et al., 2016).

We developed the Australian Midwifery Workplace Culture (AMWoC) instrument, based on the British CoCB (Rafferty, Philippou, Fitzpatrick, Pike, & Ball, 2017). The purpose of the AMWoC instrument is to assess multiple dimensions of midwifery workplace culture encompassing not only personal dimensions of engagement, role and empowerment identified in measures such as PEMS, but also broader issues of resources, leadership, values and teamwork. The aim of this paper is to describe the development of the AMWoC instrument and to determine its content validity, factor structure and internal consistency.

METHODS

The initial qualitative stage of the AMWoC study interviewed 23 midwives about workplace issues affecting midwifery practice (Catling, Reid, & Hunter, 2017) to inform the instrument development. The current paper describes the exploratory mixed methods design we used to develop the AMWoC instrument and test its psychometric properties. The pilot test data were used to conduct the exploratory factor analysis.

Instrument development

The development of the AMWoC instrument consisted of three phases: item generation, expert content validation, and pilot testing with midwives across Australia.

Phase 1: Item generation

The AMWoC instrument was substantially based on the Culture of Care Barometer (CoCB), a validated tool developed to assess workplace culture in British healthcare

organisations (Rafferty et al., 2017). The CoCB had 30 items grouped into four subscales (or domains) associated with dimensions of the workplace environment: macro (organisational values), meso (team support relationships and management and development of employees) and two micro level domains (relationships with colleagues and resource issues). Each item included a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. The CoCB development process grouped the items into seven themes: engagement, empowerment, management and leadership, values, roles, resources, and team (Rafferty, Philippou, Fitzpatrick, & Ball, 2015).

The lead researcher of the AMWoC study obtained permission to use and adapt the CoCB from the leader of the CoCB development team. Whereas the CoCB was intended to measure participants' responses about the Primary Care Trust in which they worked, the AMWoC instrument refers to 'the maternity unit'. Instead of the 5-point scale used in the CoCB, the AMWoC instrument uses a 6-point scale, with no neutral (neither agree nor disagree) choice. The authors chose the 6-point scale so that participants could commit to either a positive or negative view. The AMWoC instrument also included a 'not applicable' option for each statement.

Phase 2: Expert content validation

Following item generation, a group of 30 midwifery educators assessed items for content validity. They gave verbal feedback on the wording of statements (items) and their relevance to the culture of maternity workplaces. A panel of eight midwifery academics then reviewed the second draft during March 2016 and graded the items on clarity, importance and relevance to assessing midwifery workplace culture using a 4-point Likert-type scale. They provided written suggestions for re-wording or re-structuring some items, to make them appropriate to midwifery workplaces, and about the suitability of

items within the domains. Given the size of the panel, we analysed these responses by hand.

Following the feedback from experts, we consequently added six items and decided to reverse-score five items; for example, *I do not feel supported by my manager* instead of *I feel supported by my manager* (as indicated in Table 1). The use of reverse-scored items helped to avoid unconsidered or careless responding (Weijters et al., 2013).

We also deleted items that the experts considered overlapped with others and changed 'the organisation' to 'the maternity unit' or 'my workplace', and 'manager' to 'midwifery manager'. We further adapted the CoCB items to a specific midwifery context. For example, on several items, the original phrase '*...to do my job well*' became '*... to care for women and their partners*'.

This phase resulted in 32 items that we grouped into the seven themes identified by the CoCB development team: engagement, empowerment, management and leadership, values, roles, resources, and team (Rafferty et al., 2015) (Table 1).

Phase 3: Pilot test

The third stage pilot-tested the 32-item instrument, between May and July 2016, via an online survey of midwives using Survey Monkey®.

A total of 351 respondents completed the survey. Data cleaning in MS Excel excluded responses from non-midwives, those not currently working in midwifery or who did not respond to any of the AMWoC items. We also removed two superfluous items before analysis: one item erroneously appeared twice in the online survey, and another pair of items were nearly identical.

Participants

In Phase 2, the 30 midwifery educators worked in public and private hospitals across New South Wales (NSW) Australia. They were experienced practising midwives who also supervised the clinical placements of midwifery students. We invited them to contribute to the content validation during an annual meeting at the University of Technology Sydney in April 2016. The expert panel of eight academics had extensive international expertise in midwifery practice, leadership, policy and research.

For Phase 3, we recruited midwives for the pilot test via the Australian College of Midwives (ACM), who emailed all registered members (n=4029) during May 2016 with a link to the survey, followed by a reminder email three weeks later.

For the pilot test, the clean dataset comprised 322 midwives, representing 8% of the ACM membership. They worked in a variety of workplaces and models of care, and came from all Australian states and territories, although respondents from NSW and the Australian Capital Territory predominated (44.8% of respondents compared with 29.3% of ACM members). There was also over-representation of academic or research midwives. Half the respondents (49.9%) were aged 50 or over (Catling & Rossiter, under review).

The survey

The online survey used in the pilot test consisted of demographic characteristics; questions about respondents' qualifications, education and employment; the 32-item AMWoC instrument resulting from Phases 1 and 2 (see Table 1); and a final open-ended question.

Data analysis

We analysed responses to the Phase 3 pilot test using IBM SPSS Statistics version 24. We conducted an exploratory factor analysis (EFA) to determine the underlying factor

structure of the 32 items and reduce the number of items to achieve a parsimonious instrument. After removing all cases that responded 'not applicable' to any items, 227 cases were retained, which is considered an adequate sample size for factor analysis (de Winter, Dodou, & Wieringa, 2009; Hair, Black, Babin, & Andreson, 2014). To ensure the data met the statistical assumptions for an EFA, we screened the data and found no unengaged respondents.

Inter-correlations were assessed using a correlation matrix to determine the suitability of the data for factor analysis (i.e., the factorability of R). A successful EFA requires that the majority of items have correlations above .30 (Tabachnick & Fidell, 2013; Hair et al., 2014). Variables with correlations less than .30 were excluded from the EFA unless theoretically important. The EFA used maximum likelihood extraction (Gaskin & Happell, 2014). Common factor analysis was used as we aimed to identify the latent structures (Hair et al., 2014). Because we expected the factors to correlate with each other, we used oblique (promax) rotation (Preacher & MacCallum, 2003). To ensure collinearity of the items, we assessed communality values with items greater than .50 considered acceptable (Hair et al., 2014).

As the instrument is conceptualized as a multidimensional construct, Cronbach's alpha coefficient was used to assess the internal consistency of each factor identified from the EFA (Taber, 2017).

Ethical considerations

Phase 3 of the study (pilot test) was approved by the University research ethics committee [ETH16-0399]. Participation was voluntary and anonymous. The link contained a participant information page; commencing the online questionnaire constituted informed consent.

RESULTS

Expert content validation (Phase 2)

The expert panel of eight midwifery academics and leaders rated the majority of items as being relevant, important and clear (Supplementary Table S1). They identified items which required further clarification. These items were reworded prior to the pilot test in Phase 3.

Pilot test (Phase 3)

Table 1 indicates the numbers of pilot-test respondents who rated each item between 1 (strongly disagree) and 6 (strongly agree) and the mean scores and standard deviations from those who responded. It indicates the new (*) and reverse-scored (**) items, and the original domains. Results from the pilot-test about midwives' ratings on elements of workplace culture are published elsewhere (Catling & Rossiter, under review).

TABLE 1 HERE

EFA of pilot test responses (Phase 3)

Data was screened for outliers, normality, linearity and multicollinearity. We removed one item (Q29) as we considered its wording too ambiguous. Items 11 and 17 had high kurtosis values. All items were within acceptable limits for skewness (between -2.3 and 2.3) except item 11, which was slightly outside this (-2.397) suggesting a possible floor effect. Items 11 and 17 were initially retained as they were considered theoretically important. Supplementary Table 2 indicates skewness, and kurtosis values for all items included in the EFA.

The initial EFA was forced to seven factors based on the original CoCB themes. The KMO statistic (.95) indicated that the adequacy of the model was marvellous, and Bartlett's Test of Sphericity was significant ($p < .0001$), meaning that the items correlated with each other and were suitable for factor analysis (Tabachnick & Fidell, 2013). However, using this model, nine items had communality values less than .50, nine items cross-loaded, and one had a loading less than .35. Consequently, we re-ran successive EFAs using an iterative process to evaluate each EFA, with consideration of the theoretical importance of each item and their relation to the domains, cross-loadings and strength of loadings to determine the final factor structure. Items were systematically removed if they continued to perform badly within the analysis according to the criteria above, and there was theoretical justification to do so.

Item 23 was removed as the communality value was $< .20$ and loading $< .35$ in each of the models tested. A three-factor model provided the best statistical and theoretical fit for the data. Items 28, 12 and 16 were removed as they were not loading on any factor. The loading for item 32 remained low, but it was retained as theoretically important. The final model explained 64.1% of the total variance. We termed the three factors 'relationship with manager', 'empowerment' and 'collegiality'. Table 2 indicates the factor loadings of the final model.

TABLE 2 HERE Exploratory factor analysis final factor structure and loadings

Reliability and scale characteristics

The items were summed for each of the factors identified in the final EFA to determine the scale characteristics (Table 3). Chronbach's alpha reliability coefficient was between .80 and .94 for the sub-scales, suggesting adequate internal consistency and construct validity (Taber, 2017).

TABLE 3 HERE – reliability scores

DISCUSSION

This study aimed to examine the content validity, factor structure, and internal reliability of a newly developed instrument to measure workplace culture amongst midwives in Australian maternity settings. The revised instrument consists of three domains.

Basing the questions on the established CoCB instrument (Rafferty et al., 2017) provided a robust foundation for the development of the AMWoC instrument, as the CoCB items were content valid and reliable measures of workplace culture. However, as nurses predominated in the CoCB development and testing process, and the instrument aimed at a more generic health workforce (Rafferty et al., 2015), it was necessary to re-word some original items to ensure they were applicable to midwifery contexts.

The EFA confirmed that midwifery workplace culture is a multidimensional construct consisting of three distinct domains: manager relationship, empowerment, and collegiality (Table 2). These domains differed from those we originally hypothesized, based on the seven themes identified in the CoCB development process (Rafferty et al., 2015). Neither did they match the domains in the CoCB final version (addressing macro, meso and micro levels of workplace culture) (Rafferty et al., 2017). The AMWoC instrument also varies in scope from the Perceptions of Empowerment in Midwifery Scale, having a greater emphasis on teamwork and relationships with peers. Earlier versions of PEMS addressed three domains of autonomous practice, effective management, and women-centred practice (Matthews et al, 2009) and the revised PEMS consisted of four dimensions: autonomy/empowerment, manager support, professional support, skills and resources (Pallant et al., 2015).

The EFA of the AMWoC instrument highlighted the importance of relationships with colleagues as a distinct feature of workplace culture. Interestingly, participants in the pilot test were more likely to agree with the statements in the four items which constitute this domain than with most other items in the instrument (Table 1). This suggests the need to further explore how elements of 'collegiality' interact with other aspects of workplace culture and whether positive relationships with peers can ameliorate the impact of more negative experiences. Future research could also consider modification of the AMWoC instrument for use in different midwifery workplace settings (e.g. large maternity hospitals, community settings, rural and remote health services), which would increase the content validity and external validity of the instrument in multiple settings.

As noted, the final model of the AMWoC instrument explained 64% of the variance in the construct being measured. The factors appeared to be practically significant as most factor loadings were over .50 (three items between .354 and .489) (Hair et al., 2014). The final model consisted of 22 items that had practical significance and were theoretically important to the measurement construct (Hair et al., 2014).

Strengths and Limitations

One strength of this study was that respondents in the pilot test were broadly representative of Australian midwives in general (Catling & Rossiter, under review), with a diversity of ages, roles, employment, educational qualifications, and state or territory of residence, suggesting this sample is appropriate for pilot testing the instrument.

However, response bias is possible, as the midwives who chose to participate in the pilot test may differ from those who did not respond. Potentially, disgruntled midwives may have been over-represented. It is possible that the absence of a neutral option in the rating scale may have increased the non-response rates on some items (Rattray & Jones, 2007); although, the non-response rates were relatively low (Table 1). A larger sample

and one derived from a broader base than ACM members may have provided more robust results for the EFA and allowed us to use confirmatory factor analysis. Consequently, future research and instrument development should aim to engage larger and potentially more diverse samples (Hair et al., 2014).

Basing the item development on a previously validated workplace culture instrument (CoCB) provided a robust starting point to ensure we captured the general domains of workplace culture. Another strength of this study was the high level of engagement with midwifery practitioners and experts in the development of the AMWoC items, which further contributed to the content validity. However, other aspects of the instrument's validity (e.g. criterion, convergent and predictive validity) need to be determined. Further research aims to explore the relationship between scores on AMWoC domains and participants' intentions to stay or leave the workplace, and whether results vary between midwives working in different areas of the profession or different regions.

The internal consistency of the factors within the instrument were acceptable ($<.70$). However, the very high internal consistency ($\alpha = .94$) of the Manager Relationship construct suggests there may be redundancy of some items; alternatively, this could be a reflection of the sample characteristics (Taber, 2017). Further evaluation using different larger cohorts is needed.

CONCLUSIONS

The AMWoC instrument has the potential to measure the workplace culture of maternity units and other settings where midwives work, recognising the particular relationship between midwives and the women they care for. It can provide a simple tool for midwifery managers and researchers to use in maternity units and wider health systems, to highlight actual or potential problem areas, or to explore staff responses to practice

innovation or other changes in the workplace. Although developed and pilot-tested in Australia, this instrument could also be used to assess the culture of midwifery workplaces in other (high-resource) countries and a range of settings, including public and private hospitals, and models of midwifery care.

These preliminary findings have resulted in a revised version of the instrument with good psychometric properties. This should be further tested with larger samples to confirm the factor structure and to examine the validity of the instrument against midwives' career intentions. In particular, future testing should explore its applicability to midwives working in diverse midwifery settings and in different models of maternity care.

REFERENCES

- Adams, C., Dawson, A., & Foureur, M. (2017). Competing Values Framework: A useful tool to define the predominant culture in a maternity setting in Australia. *Women and Birth, 30*(2), 107-113.
- Arundell, F., Mannix, J., Sheehan, A., & Peters, K. (2018). Workplace culture and the practice experience of midwifery students: A meta-synthesis. *Journal of Nursing Management, 26*(3), 302-313.
- Ball, L., Curtis, P., & Kirkham, M. (2002). Why do midwives leave. *Royal College of Midwives, London, 7*.
- Beardsmore, E., & McSherry, R. (2017). Healthcare workers' perceptions of organisational culture and the impact on the delivery of compassionate quality care. *Journal of Research in Nursing, 22*(1-2), 42-56.
- Braithwaite, J., Herkes, J., Ludlow, K., Testa, L., & Lamprell, G. (2017). Association between organisational and workplace cultures, and patient outcomes: systematic review. *BMJ Open, 7*(11), e017708.
- Bronkhorst, B., Tummers, L., Steijn, B., & Vijverberg, D. (2015). Organizational climate and employee mental health outcomes: A systematic review of studies in health care organizations. *Health Care Management Review, 40*(3), 254-271.
- Catling, C.J., Reid, F., & Hunter, B. (2017). Australian midwives' experiences of their workplace culture. *Women and Birth, 30*(2), 137-145.
- Catling, C.J., & Rossiter, C. (in press). Midwifery workplace culture in Australia: a national study of midwives. *Women and Birth*, accepted 25 September 2019.
- Cummins, A. M., Catling, C., Hogan, R., & Homer, C. S. (2014). Addressing culture shock in first year midwifery students: Maximising the initial clinical experience. *Women and Birth, 27*(4), 271-275.

- Curtis, P., Ball, L., & Kirkham, M. (2006). Why do midwives leave?(Not) being the kind of midwife you want to be. *British Journal of Midwifery*, *14*(1), 27-31.
- Davies, H. T., Nutley, S. M., & Mannion, R. (2000). Organisational culture and quality of health care. *BMJ Quality & Safety*, *9*(2), 111-119.
- Davis, D. L., & Homer, C. S. E. (2016). Birthplace as the midwife's work place: How does place of birth impact on midwives? *Women & Birth*, *29*(5), 407-415.
doi:10.1016/j.wombi.2016.02.004
- de Winter, J. C. F., Dodou, D., & Wieringa, P. A. (2009). Exploratory factor analysis with small sample sizes. *Multivariate Behavioral Research*, *44*(2), 147-181.
doi:10.1080/00273170902794206
- Farrell, G. A., & Shafiei, T. (2012). Workplace aggression, including bullying in nursing and midwifery: a descriptive survey (the SWAB study). *International Journal of Nursing Studies*, *49*(11), 1423-1431.
- Francis, R. (2015). Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry.
Retrieved from
<http://webarchive.nationalarchives.gov.uk/20150407084231/http://www.midstaffpublicinquiry.com/report>
- Freeney, Y., & Fellenz, M. R. (2013). Work engagement as a key driver of quality of care: a study with midwives. *Journal of Health Organization & Management*, *27*(3), 330-349.
- Gaskin, C. J., & Happell, B. (2014). On exploratory factor analysis: A review of recent evidence, an assessment of current practice, and recommendations for future use. *International Journal of Nursing Studies*, *51*(3), 511-521.
doi:https://doi.org/10.1016/j.ijnurstu.2013.10.005
- Hair, J. F., Black, W. C., Babin, B. J., & Andreson, R. E. (Eds.). (2014). *Multivariate Data Analysis* (7th ed.): Harlow (England), Pearson Education Limited.

- Hildingsson, I., Gamble, J., Sidebotham, M., Creedy, D. K., Guilliland, K., Dixon, L., . . . Fenwick, J. (2016). Midwifery empowerment: National surveys of midwives from Australia, New Zealand and Sweden. *Midwifery*, 40, 62-69.
- Holland, P. J., Tham, T. L., & Gill, F. J. (2018). What nurses and midwives want: Findings from the national survey on workplace climate and well-being. *International Journal of Nursing Practice*, e12630.
- Jarosova, D., Gurkova, E., Ziakova, K., Nedvedova, D., Palese, A., Godeas, G., . . . Cordeiro, R. (2017). Job Satisfaction and Subjective Well-Being Among Midwives: Analysis of a Multinational Cross-Sectional Survey. *Journal of Midwifery & Women's Health*, 62(2), 180-189.
- Jung, T., Scott, T., Davies, H. T., Bower, P., Whalley, D., McNally, R., & Mannion, R. (2009). Instruments for exploring organizational culture: A review of the literature. *Public administration review*, 69(6), 1087-1096.
- Mannion, R., Konteh, F. H., & Davies, H. T. O. (2009). Assessing organisational culture for quality and safety improvement: a national survey of tools and tool use. *Quality and safety in health care*, 18(2), 153-156. doi:10.1136/qshc.2007.024075
- Matthews, A., Scott, P. A., & Gallagher, P. (2009). The development and psychometric evaluation of the Perceptions of Empowerment in Midwifery Scale. *Midwifery*, 25(3), 327-335.
- Pallant, J., Dixon, L., Sidebotham, M., & Fenwick, J. (2015). Further validation of the perceptions of empowerment in midwifery scale. *Midwifery*, 31(10), 941-945.
- Parmelli, E., Flodgren, G., Beyer, F., Baillie, N., Schaafsma, M. E., & Eccles, M. P. (2011). The effectiveness of strategies to change organisational culture to improve healthcare performance: a systematic review. *Implementation Science*, 6(1), 33. doi:10.1186/1748-5908-6-33

- Pezaro, S., Clyne, W., Turner, A., Fulton, E. A., & Gerada, C. (2016). 'Midwives Overboard!' Inside their hearts are breaking, their makeup may be flaking but their smile still stays on. *Women and Birth*, 29(3), e59-e66.
- Preacher, K. J., & MacCallum, R. C. (2003). Repairing Tom Swift's Electric Factor Analysis Machine. *Understanding Statistics*, 2(1), 13-43.
- Rafferty, A. M., Philippou, J., Fitzpatrick, J., & Ball, J. (2015). 'Culture of Care Barometer' Report to NHS England on the development and validation of an instrument to measure 'Culture of Care' in NHS Trusts. In. London: National Nursing Research Unit.
- Rafferty, A. M., Philippou, J., Fitzpatrick, J. M., Pike, G., & Ball, J. (2017). Development and testing of the 'Culture of Care Barometer' (CoCB) in healthcare organisations: a mixed methods study. *BMJ Open*, 7(8).
- Rattray, J., & Jones, M. C. (2007). Essential elements of questionnaire design and development. *Journal of Clinical Nursing*, 16(2), 234-243.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). NJ: Pearson.
- Taber, K. S. (2017). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*. doi:10.1007/s11165-016-9602-2.
- Weijters, B., Baumgartner, H., & Schillewaert, N. (2013). Reversed item bias: An integrative model. *Psychological Methods*, 18(3), 320-334.

Table 1: Version of AMWoC instrument used in the pilot test, including items, domains and numbers of participants who rated items between 1 (strongly disagree) and 6 (strongly agree), n=322.

Item	Statement	Domain	N gave rating 1 – 6	Mean score (standard deviation)
1	I have sufficient resources that I need to care for women and their families well (eg space, adequate rooms, equipment, supplies)	Resources	318	3.66 (1.52)
21*	When we are short staffed, we are given adequate support	Resources	317	2.55 (1.29)
3	I have sufficient time to care for women and their partners	Resources	316	3.16 (1.59)
26	Our workplace celebrates when midwives achieve success (eg completes a course, uses innovation to improve practice)	Values	309	3.33 (1.44)
2	I feel respected by my co-workers	Values	320	4.64 (1.19)
4	I feel good about working in this maternity unit	Values	314	4.13 (1.43)
5	My manager treats me with respect	Values	318	4.30 (1.49)
19	I feel I work in a place with a positive culture (eg collaborative peers, innovative, high morale, supportive management)	Values	319	3.15 (1.58)
22*	My philosophy of care is shared by the midwives in my workplace	Values	314	4.15

Item	Statement	Domain	N gave rating 1 - 6	Mean score (standard deviation)
				(1.29)
6	The maternity unit values the service I provide	Values	316	4.04 (1.41)
7	I would recommend this maternity unit as a good place to work	Values	309	3.98 (1.44)
25	My manager gives me constructive feedback	Management / Leadership	308	3.64 (1.49)
29*	I would like to have more access to resources, training or leadership	Management / Leadership	317	4.71 (1.09)
33	There are positive role models where I work	Management / Leadership	317	4.54 (1.22)
8**	I do not feel supported by my manager	Management / Leadership	318	3.06 (1.63)
10	We are a well-managed team	Management / Leadership	319	3.41 (1.47)
11	I know who my senior midwifery manager is	Management / Leadership	306	5.27 (0.90)
12	Unacceptable behaviour is addressed appropriately	Management / Leadership	312	3.53 (1.49)
13	There is strong leadership at the highest level in the maternity unit	Management / Leadership	310	3.14 (1.54)

Item	Statement	Domain	N gave rating 1 - 6	Mean score (standard deviation)
32**	I do not feel well informed about what is going on in our maternity unit	Engagement	315	3.48 (1.32)
15	My managers understand how things really are	Engagement	319	3.23 (1.66)
14	When things get difficult, I can rely on my colleagues	Team	319	4.61 (1.13)
16	I feel able to ask for help when I need it	Team	321	4.35 (1.31)
20	The people I work with are friendly	Team	319	4.96 (0.93)
17	I know exactly what is expected of me in my job	Role	318	4.93 (0.96)
28	I get the training and development I need	Role	317	3.90 (1.43)
18**	I do not feel supported to develop my potential	Role	318	3.63 (1.57)
9	I am able to influence the way things are done in my workplace	Empowerment	316	3.34 (1.31)
23*/**	I cannot change my working hours/shifts easily	Empowerment	303	3.59 (1.52)
34	My concerns are taken seriously by my midwifery manager	Empowerment	304	3.72

Item	Statement	Domain	N gave rating 1 - 6	Mean score (standard deviation)
				(1.53)
27*	The maternity unit acts on midwives' concerns	Empowerment	310	3.32 (1.35)
24*	I am supported to make my own decisions about caring for women and babies	Empowerment	315	3.96 (1.25)
30	I am able to influence how things are done in my workplace ¹			
31	The maternity unit has a positive culture ¹			

*New items added to CoCB items after expert content validation

** Reverse scored items

¹ The original items 30 and 31 duplicated other items in the AMWoC instrument – responses not included in EFA.

Table 2. Exploratory factor analysis final factor structure and loadings and original hypothesised domain.

Item number	Statement	Manager relationship (Factor 1)	Empowerment (Factor 2)	Collegiality (Factor 3)	Original domain
2	I feel respected by my co-workers			.848	Values
3	I have sufficient time to care for women and their partners		.641		Resources
4	I feel good about working in this maternity unit		.589		Values
5	My manager treats me with respect	.946			Values
8	I do not feel supported by my manager (R)	.924			Management / Leadership
9	I am able to influence the way things are done in my workplace		.596		Empowerment
11	I know who my senior midwifery manager is	.571			Management / Leadership
13	There is strong leadership at the highest level in the maternity unit		.679		Management / Leadership

Item number	Statement	Manager relationship (Factor 1)	Empowerment (Factor 2)	Collegiality (Factor 3)	Original domain
14	When things get difficult, I can rely on my colleagues			.716	Team
15	My managers understand how things really are	.731			Engagement
18	I do not feel supported to develop my potential (R)	.582			Role
19	I feel I work in a place with a positive culture (eg collaborative peers, innovative, high morale, supportive management)		.718		Values
20	The people I work with are friendly			.716	Team
21	When we are short staffed, we are given adequate support		.602		Resources
22	My philosophy of care is shared by the midwives in my workplace			.489	Values
24	I am supported to make my own decisions about caring for women and babies		.578		Empowerment
25	My manager gives me constructive feedback	.759			Management / Leadership

Item number	Statement	Manager relationship (Factor 1)	Empowerment (Factor 2)	Collegiality (Factor 3)	Original domain
26	Our workplace celebrates when midwives achieve success (eg completes a course, uses innovation to improve practice)		.586		Values
27	The maternity unit acts on midwives' concerns		.707		Empowerment
32	I do not feel well informed about what is going on in our maternity unit (R)		.354		Engagement
33	There are positive role models where I work		.438		Management / Leadership
34	My concerns are taken seriously by my midwifery manager	.831			Empowerment

(R) = reverse scored items.

Table 3. Summed factor score correlations, [95% confidence intervals], mean, standard deviation, and internal consistency for each factor

Factor correlations						
Factor	Manager relationship	Empowerment	Collegiality	No. of items	M (SD)	α
Manager relationship	1			7	25.61 (9.40)	.94
Empowerment	.83** [0.75, 0.90]	1		11	38.11 (9.77)	.85
Collegiality	.48** [0.37, 0.60]	.55** [0.44, 0.66]	1	4	18.36 (3.60)	.80

SD = standard deviation, M = mean

**p < 0.01

α = Cronbach alpha

Supplementary Table 1. Content validation of original CoCB items: responses from expert panel, n=8

Item	CoCB Statement	N rated relevant or highly relevant	N rated important or very important	N rated clear or very clear	Comments
1	I have the resources I need to do a good job	7*	7*	7*	<i>Clarify what resources – examples</i> <i>Not sure about this as Q1</i>
2	I feel respected by my co-workers	8	8	7	-
3	I have sufficient time to do my job well	7	8	7	
4	I am proud to work in this organisation	8	8	7	<i>'Proud' is fairly subjective. Same as Q7?</i>
5	My manager treats me with respect	8	8	8	
6	The organisation values the service we provide	8	8	5	<i>Who is 'we' – service I provide?</i> <i>Which organisation: hospital? LHD? Or women's health department?</i>
7	I would recommend this organisation as a good place to work	7	7	7	<i>Which organisation?</i>

8	I feel well supported by my manager	8	8	8	<i>Combine with Q5?</i>
9	I am able to influence the way things are done in my team	7*	7*	6*	<i>Define team: practice partners? Hospital co-workers on a given day? Different relevance to different levels of expertise</i>
10	I feel part of a well-managed team	7	8	7	<i>Are you trying to assess sense of inclusion or the quality of management?</i>
11	I know who my manager is	4*	5*	6	-
12	Unacceptable behaviour is consistently tackled	8	8	7	<i>Define 'tackled' Unacceptable behaviour 'is addressed appropriately'</i>
13	There is strong leadership at the highest level in the organisation	7	7	7	<i>'Do you feel there is adequate leadership within the organisation?' Strong leadership closer to clinical area is more relevant</i>
14	When things get difficult, I can rely on my colleagues	7*	7*	7*	

15	My managers know how things really are	5***	5***	5**	<i>Needs to be more specific</i> <i>Not sure what this means x 2</i>
16	I feel able to ask for help when I need it	7*	7*	7*	
17	I know exactly what is expected of me in my job	7*	7*	7*	
18	I feel supported to develop my potential	7*	7*	6*	<i>'develop my professional goals'</i>
19	A positive culture is visible where I work	7*	7*	6*	<i>Maybe use another word for 'visible' x 2</i> <i>Maybe give an example of positive culture</i>
20	The people I work with are friendly	7*	7*	7*	
21	My manager gives me constructive feedback	7*	7*	7*	
22	Staff successes are celebrated by the organisation	7*	7*	7*	<i>Successes? Organisation? Staff?</i>
23	The organisation listens to staff views	7*	7*	7*	<i>'Concerns/feedback' rather than 'views'</i> <i>But do they act on staff views?</i>
24	I get the training and development I need	7*	7*	7*	
25	I am able to influence how things are done in the organisation	7*	7*	7*	
26	The organisation has a positive culture	7*	6*	6*	<i>Define 'positive culture'</i>

27	I am kept well informed about what is going on in our team	7*	7*	7*	
28	I have positive role models where I work	7*	7*	7*	
29	I feel well informed about what is going on in the organisation	7*	7*	7*	
30	My concerns are taken seriously by my manager	7*	7*	7*	

*N=7; **N=6; ***N=5.

Supplement Table 2: Assessment of normality for all items included in analysis

Item number	Statement	Mean	SD	Skewness	Kurtosis	SE
1	I have sufficient resources that I need to care for women and their families well (eg space, adequate rooms, equipment, supplies)	3.66	1.515	-0.288	-1.096	0.322
2	I feel respected by my co-workers	4.64	1.186	-1.011	0.521	0.322
3	I have sufficient time to care for women and their partners	3.16	1.591	0.183	-1.21	0.322
4	I feel good about working in this maternity unit	4.13	1.43	-0.647	-0.425	0.322
5	My manager treats me with respect	4.3	1.489	-0.785	-0.362	0.322
6	The maternity unit values the service I provide	4.04	1.406	-0.563	-0.743	0.322
7	I would recommend this maternity unit as a good place to work	3.98	1.442	-0.541	-0.657	0.322
8	I do not feel supported by my manager	3.06	1.634	0.355	-1.065	0.322

9	I am able to influence the way things are done in my workplace	3.34	1.312	-0.088	-0.825	0.322
10	We are a well-managed team	3.41	1.474	-0.056	-1.019	0.322
11	I know who my senior midwifery manager is	5.27	0.895	-2.397	8.146	0.322
12	Unacceptable behaviour is addressed appropriately	3.53	1.485	-0.232	-1.013	0.322
13	There is strong leadership at the highest level in the maternity unit	3.14	1.542	0.2	-1.092	0.322
14	When things get difficult, I can rely on my colleagues	4.61	1.133	-0.89	0.518	0.322
15	My managers understand how things really are	3.23	1.657	0.07	-1.376	0.322
16	I feel able to ask for help when I need it	4.35	1.313	-0.796	-0.018	0.322
17	I know exactly what is expected of me in my job	4.93	0.964	-1.392	2.389	0.322
18	I do not feel supported to develop my potential	3.63	1.569	-0.002	-1.16	0.322
19	I feel I work in a place with a positive culture (eg collaborative peers, innovative, high morale, supportive management)	3.15	1.578	0.187	-1.135	0.322

20	The people I work with are friendly	4.96	0.93	-1.01	1.072	0.322
21	When we are short staffed, we are given adequate support	2.55	1.396	0.584	-0.839	0.322
22	My philosophy of care is shared by the midwives in my workplace	4.15	1.29	-0.76	-0.236	0.322
23	I cannot change my working hours/shifts easily	3.59	1.516	0.058	-1.235	0.322
24	I am supported to make my own decisions about caring for women and babies	3.96	1.251	-0.546	-0.508	0.322
25	My manager gives me constructive feedback	3.64	1.491	-0.301	-1.069	0.322
26	Our workplace celebrates when midwives achieve success (eg completes a course, uses innovation to improve practice)	3.33	1.44	-0.029	-1	0.322
27	The maternity unit acts on midwives' concerns	3.32	1.349	-0.134	-0.908	0.322
28	I get the training and development I need	3.9	1.434	-0.511	-0.756	0.322
29	I would like to have more access to resources, training or leadership	4.71	1.091	-0.888	0.486	0.322

32	I do not feel well informed about what is going on in our maternity unit	3.48	1.315	0.04	-0.799	0.322
33	There are positive role models where I work	4.54	1.22	-1.105	0.968	0.322
34	My concerns are taken seriously by my midwifery manager	3.72	1.528	-0.297	-0.938	0.322

SD=standard deviation; SE=standard error.