**VALIDATION OF THE GREEK CULTURE AND CLIMATE SCALE FOR ASSESSING WORKING CONDITIONS OF MIDWIVES**

**Victoria G. Vivilaki\*1, Christina Athanasiadou1, Eleni Zemperligkou1, Maria Stamatopoulou2, Angeliki M. Ladopoulou1, Vassilis Dafermos3, Pamela J. Springer4, Panagiotis Ε Prezerakos2**

Short Title: Validation of the Greek CCAS for Midwives

1. Department of Midwifery, Technological Educational Institute of Athens, Greece
2. Faculty of Nursing, University of Peloponnese, Sparta, Greece
3. Department of Political Sciences, University of Crete, Rethymno, Greece
4. St. Luke’s Health System, USA

\* Corresponding author: Victoria Vivilaki

Email: Victoria G. Vivilaki\*- v\_vivilaki@yahoo.co.uk; Christina Athanasiadou - christinasmilegr@gmail.com; Eleni Zemperligkou- e.zemperligkou@gmail.com;Angeliki M. Ladopoulou - mariantzela000@hotmail.com;Maria Stamatopoulou - neda-23@hotmail.com;VassilisDafermos - dafermov@uoc.gr; Pamela J. Springerspringep@slhs.org;Panagiotis Elias Prezerakos -prezerpot@gmail.com

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Abstract

Background:The Culture/Climate Assessment Scale (CCAS)included items to measure communication; support for decision making; conflict among faculty, staff and students; teamwork; satisfaction with work environment; levels of personal stress;amount of change and an overall rate of morale.

Methods:100 Midwives completed the CCAS questionnaire during their shift at the hospital.

Results: The exploratory factor analysis on the 38 items of the Greek CCAS revealed seven orthogonal factors (KMO measure of sampling adequacy = 0.717 and Bartlett’s test of sphericity = 1032.491, df=378, p<0.0005; Cronbach’s alpha value: 0.878, p<0.0001; Guttman split-half 0.757, Spearman-Brown 0.819). Our findings confirm the multidimensionality of CCAS, demonstrating a seven-factor structure. Confirmatory Factor Analysis (CFA) demonstrated that the 7 factor model offered a very good fit to our data.

Conclusion: Our data confirmed that the Greek version of the CCAS scale is a reliable and valid screening tool for both clinical practice and research purposes to assess the organizational culture and climate in the work environment of midwifery staff, and identify the factors that determine working conditions and affect job satisfaction of midwives.

Research Article VALIDATION OF THE GREEK CULTURE AND CLIMATE SCALE FOR ASSESSING WORKING CONDITIONS OF MIDWIVES

**Background**

The proper functioning of an organization is the most important goal of the leadership. The main factors contributing to the balanced functioning of an organization is the organizational culture and climate prevailing in the organization. The organizational culture and climate are closely linked to the quality of health services, employee morale, the acceptance of innovations and the effectiveness of the organization (Shim, 2010; Springer et al, 2012; Springer & Clark, 2007).

Studies which have been conducted in the past in hospitals, showed a strong correlation between the quality of the working environment and quality of health care (Clark et al, 2012; Shim, 2010; Springer et al, 2012; Springer & Clark, 2007). The work environment is also associated with a higher sense of empowerment, which, in turn, is related to lower degrees of burnout in nursing staff (Hochwälder, 2007). In addition, it has been demonstrated that the teamwork in the organization is the key to the effectiveness and closely linked to communication and collaboration between health professionals (Glisson, 2007). However, it has been noted that the phenomenon of professional conflict, often leads to negative results. Organizational culture and climate appear to be more critical in areas identified like: communication, decision support, level of conflict, teamwork and general work satisfaction that may be important factors contributing in the level of personal stress (Clark et al, 2012;Lubbert, 1995). Organizational climate has also been found to have a significantly positive relationship with clinical competency (Ying et al, 2007).

The Culture/Climate Assessment Scale (CCAS) (Clark et al, 2012) was developed to measure communication, decision support, level of conflict, teamwork, and general work satisfaction, as well as personal level of stress, perceived level of change, and overall level of morale within the organization. The aim of this study, therefore, was to translate the CCAS instrument into Greek and validate the translated version. More specifically, the study’s objectives were to:

1. Test a Greek version of the CCAS and assess its reliability.
2. Examine the factor structure of the Greek CCAS and assess its validity.

**Methods**

***Instruments***

**Culture and Climate Assessment Scale(CCAS) (Springer et al, 2011; Clark et al, 2012):** CCAS is a 37-item self administered scale, designed to measure key psychosocial dimensions related to the organizational culture and climate(Springer et al,2012). Response options range from 0 (poor or never) to 5 (excellent or always), and a total score is calculated. Responses were scored according to author‘s directions. The most positive response option was scored as five points and the least positive was scored as one. Higher scores thus reflect higher levels of organizational culture and climate or more positive attitudes to work climate whilst conversely, a lower score indicates more negative attitudes toward workplace culture and climate.

The 37-item scale includes the following core subscales measured by the questions numbers indicated here:

1. Communication Scale: four items
2. Decision Support Scale: twelve items
3. Level of Conflict Scale: four items
4. Teamwork Scale: fifteen items
5. General Work Satisfaction Scale: two items

***Translation and cultural adaptation***

The 37 items of CCAS were translated by two independent bilingual translators and one item was added so as to include in item 5 one more category for the medical staff of the units. One other native English speaker who did not have knowledge of the original instrument then back translated the re-conciliated Greek version. The backward translation was sent to anEnglish speaking expert for comments (academic with specific interest in clinical education). Subsequently, a cognitive debriefing process was used to identify any problems with language and to assess the degree to which a respondent’s understanding of each item matched the content thatwas meant tobe elicited. As part of this process, the reconciled Greek version of the CCAS was pilot tested with a group of midwives. A convenience sample of 8 midwives was selected who fulfilled the following criteria: ≥18 years old, Greek speaking, willingness to participate. Little consensus exists about what is the most appropriate size for a successful focus group. Smaller groups are easier to manage (McLafferty, 2004), and fewer participants promote interaction (Carey &Smith, 1994).The Greek version of CCAS included 38 items and was completed in approximately 7 minutes by each midwife in the pilot test. Most questions appeared to be relevant, unambiguous and clear. Following to participants’ suggestion rephrasing of some questions (5, 6)took place. The data gathered from this focus group were incorporated in final form of the Greek version of CCAS.

**Validation**

***Recruitment of Participants***

The study was conducted in the two largest maternity public hospitals in Greece, which serve the population of Athens as well as women from the rural areas of Greece. Midwives employed in the hospitals or students midwives practicingin the hospitals were eligible for participation if they were: (1) aged between 22 and 60 years, (2) able to be interviewed away from chief midwife and other midwives of the same department(3) fluent in spoken and written Greek, and (4) able to provide informed consent.

***Data Collection***

In addition to standard demographic questions (Vivilaki et al, 2009), midwives completed the CCAS questionnaire in the presence of a researcher midwife during their shift at the hospital. Midwives and student midwives were encouraged to discuss any concerns they might have related to the culture or climate in the organization and were told that manager midwife of the hospital would be informed of midwives concerns. All participants were informed verbally about the results of culture and climate conditions of organization.

***Ethics***

The study protocol was approved by the research ethics boards of both public hospitals. All participants provided oral informed consent prior to enrollment. Along with the questionnaires, a cover letter explained the purpose of the study, providing the researchers’ affiliation and contact information, and clearly stating that answers would be confidential and anonymity would be guaranteed in the final data reports.

***Data analysis***

Statistical analysis was performed using IBM SPSS Statistics version 20 for Windows. Descriptive characteristics (including means, standard deviations, frequencies and percentages) were calculated for the sociodemographic variables. Differences between participants and non-participants were assessed by chi-square tests for categorical variables. The assumptions of normality, homogeneity and independent cases of the sample were checked. Items with open answers and qualitative data were not included in the analysis (7,13,17,18,20,22,24,28). However the questions (2, 4,5,6,9,19) were calculated independently for each answer. Finally, the number of the items were included in the analysis was38.

***Reliability***

Reliability coefficients as measured by Cronbach’s alpha were calculated for the CCAS to assess reproducibility and consistency of the instrument; a minimum value of 0.70 for group comparisons is acceptable (Cormarck, 2000). The internal consistency of the Greek CCAS was also tested using Guttman split-half coefficients.

***Factor structure***

The underlying dimensions of the scale were checked with an explanatory factor analysis using a Varimax rotation and Principal Components Method for analyzing grouped data (Tabachnick&Fidell, 2007) to determine the dimensional structure of CCAS using the following criteria: (a) eigenvalue >1 (Kaiser et al, 1960); (b) variables loaded > 0.50 on only one factor and on other factors less than 0.40; (c) the interpretation of the factor structure was meaningful; (d) the Screeplot was accurate when means of Communalities were above 0.60 (Hakstian et al, 1982). Computations were based on a covariance matrix, as all variables were receiving values from the same measurement scale (Morrison et al, 1976);During factor analysis, a Bartlett’s test of sphericity (p<0.05) and a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.717 were also implemented. A factor was considered as important if its eigenvalue exceeded 1.0 (Joreskog&Sorbom, 1986). Additionally, a confirmatory analysis –also called Structural Equation Modelling- of principal components was conducted by STATA 13.1 to confirm the scale items principally load on to that factor and correlate weakly with other factors, to assess tests for significance of factor loadings and orthogonality of factors (Tabachnick& Fidel, 2007;Hastakian et al, 1982;Joreskog&Sorbom, 1986) a model -based on a priori information of exploratory factor analysis- was built in order to specify latent factors, their component variables and the intercorrelations of the response variables; maximum likelihood estimates, t-values, error terms, correlation of independent variables and goodness of fit-test for the specified model were performed.

**Results**

During the recruitment period (May 2013 to February 2014), all eligible midwives were invited to participate. A total of 123midwives met eligibility criteria and were invited to take part in the study. Twenty-three midwives did not participate for a range of reasons. This resulted in a final sample of 100 midwives, which was adequate for exploratory and confirmatory factor analysis (Anderson &Gerbing, 1984;Bentler& Chou, 1987; Marsh et al, 1988). The questionnaire response rate was 81.3%.

***Sample Characteristics***

According to the answers to questions, 96 of the 100 respondents are women. The age of the midwivesranged from 22 to 58 years (mean 36,82). Most of them (68%) were graduates from direct entry midwifery school (TEI), while fewer (19%) had postgraduate studies, none had a PhD; 13% were student midwives practicing in the public hospitals; 52% of midwives were married (Table 1).

**Psychometric characteristics of Greek CCAS**

***Reliability***

Descriptive Statistics for Greek CCAS 38 items are presented in Table 2 (Mean 0.05-4.39 SD 0.219-0.549). The Greek CCAS showed an overall high internal consistency. Cronbach’s alpha was 0.878CI 95%:0.834-0.915, p<0.0001) for the total scale (Items 1-38) and Guttman split-half=0.757.

***Factor Structure***

*Exploratory Factor Analysis*

The exploratory factor analysis on the 38 items of the CCAS revealed seven orthogonal factors(KMO measure of sampling adequacy = 0.717 and Bartlett’s test of sphericity = 1032.491, df=388, p<0.0005). The Screeplot (Figure 1) indicates that there are 7 factors in the model, with these factors explaining 68.234% of the data (Table 3). The first factor (teamwork) includes the following items: 6, 7, 21, 22, 27, 31, 35, 36, the eigenvalue was 7.140 and accounted for 28,362% of the variance. The second factor (leadership and administration) is composed of items: 5, 8, 23, 30, 34, the eigenvalue was 2.528and accounted for an additional 10,042% of the variance. The third factor (conflicts) includes the following items: 17, 18, 19, 20, had an eigenvalue of 2.163 and accounted for an additional 8.593% of the variance. The fourth factor (communication) is composed of items 1, 3, 4, 24 had an eigenvalue of 1.565 and accounted for an additional 6.218% of the variance. The fifth factor (stress and education) consists of items: 28, 31, 32, had an eigenvalue of 1.412 and accounted for an additional 5.611% of the variance. The sixth factor (workload) includes the following items: 25, 26, had an eigenvalue of 1.236 and accounted for an additional 4.910% of the variance. Finally, the seventh factor (changes in department) is composed of item 29, had an eigenvalue of 1.133 and accounted for an additional 4.499% of the variance. According to the Greek-CCAS validation study, 11 of 38 items were excluded from the analysis, which were not important for Greek Midwives (items: 2,9,10,11,12,13,14,15,16, 37,38).

*Confirmatory Factor Analysis*

Confirmatory factor analysis was conducted to determine whether data are consistent with the apriori specified model that has been suggested by exploratory factor analysis in order to evaluate whether the data fit the model adequately. The seven factor-model was based on correlated factors that derived from the factor analysis using principal component analysis with varimax rotation by SPSS 20. The seven latent variables Teamwork (Questions 6, 7, 21, 22, 27, 33, 35, 36), Leadership and Supervision (Questions 5, 8, 23, 30, 34), Level of Conflict (Questions 17, 18, 19, 20), Communication (Questions 1, 3, 4, 24), Stress and Education (Questions 28, 31, 32), Workload (Questions 25, 26) and Change Policy (Questions 29) were strongly correlate with method Maximum Likelihood. Estimates, standard error, t-values, error terms and r2 for all the questions that consisted each latent variables are presented at Figure2. The error terms correlated significantly and Goodness of Fit Statistics were also estimated; Discrepancy Chi-Square= 135.196, p=1.000; Standardized Root Mean Square Residual (SRMR)=0.565; CD=1.000 (Fig. 2).

***Validity***

*Construct validity*

Cronbach’s alpha was calculated for each of the following subscales of the Greek version of CCAS, with the questions indicated constituting the items for each subscale:

1. Teamwork(6,7,21,22,27,33,35,36): 0.853
2. Leadership and administration(5,8,23,30,34): 0.771
3. Conflicts (17,18,19,20):0.804
4. Communication (1,3,4,24):0.674
5. Stress and Education (28,31,32):0.526
6. Work Load(25,26): 0.716

**Discussion**

*Main findings*

The CCAS is a scale for identifying climate and culture of organization. It has already been validated in other countries, such as Canada (Springer et al,2012), and has shown remarkable stability and comparability. The CCAS was first used to identify problems within Midwifery Department of the Technological Educational Institute of Athens. According to previous research, the CCAS includes five scales (communication, decision support, level of conflict, teamwork and general work satisfaction), three context items (level of stress, amount of change and overall morale rating) and eight open-ended items help administrations better understand responses to the other items and amplify the quantitative results. Cronbach’s alpha was used to measure internal consistency reliability of the scales. Results indicated that all of the scales except the "level of conflict" had adequate levels of reliability (Springer et al,2012).

Cronbach’s standardized alpha and Guttman Split-half for the Greek translated and culturally compatible CCAS were similar to those reported in the first validation study (0.88) and in the Canadian validation study was (0.70).

Our findings confirm the multidimensionality of the CCAS, demonstrating a seven-factor structure, while the sub-scales of the Greek CCAS showed very good values for Cronbach’s alpha. Significant differences in item-factor loadings characteristics may be explained by the varied cultural backgrounds of the midwives’ population samples studied.The confirmatory factor analysis demonstrated that the seven factor model based on the exploratory factor analysis offered a very good fit to the our data. All goodness of fit statistics found to be very good.

The results of this research showed that the major factors forming the organizational culture and climate and therefore the working conditions of the midwifery staff are: 1) teamwork, 2) leadership- supervision, 3) conflicts, 4) communication, 5) stress and education, 6) the workload and 7) changes in the department. In research of Clark et al.(2011) these factors are: 1) communication, 2) to support decision making, 3) conflicts, 4) teamwork and 5) job satisfaction. Featured similarities between surveys on three factors: communication, teamwork and conflict. It seems, however, that the population of this research (midwifery staff) has many more factors that influence organizational culture and climate, while the population of previous research (nursing staff) has fewer, five factors. Comparing the cronbach alpha of the two surveys (in present study alpha = 0,888, while in Springer et al 2011alpha = 0,70), we observe that the internal consistency of this study is slightly greater than that of foreign study. Other studies have concluded that organizational culture and climate is well correlated with similar factors like the ones indicated in our study:‘ teamwork’ (Raftopoulos et al, 2011), ’job satisfaction’ (Pugh et al, 2013; Papoutsis et al, 2014), ‘communication or interpersonal relations’ (Raftopoulos et al, 2011;Hendel et al, 2007; Papoutsis et al, 2014), ‘supervision- leadership’ (Raftopoulos et al, 2011;Begat et al, 2005; Papoutsis et al, 2014), ‘workload’ (Kontodimopoulos et al, 2009) and ‘recognition’ (Krogstad et al, 2006;Labiris et al, 2008; Papoutsis et al, 2014).

According to the Greek-CCAS validation study, 11 of 38 items were excluded from the analysis, which were not important for Greek Midwives. These specific questions where about: the effectiveness of e-mail communication; by whom they are supported when they make decisions; the understanding by the core leadership of department and finally whether to recommend the unit to other midwives as a place to work.

Moreover, a Bartlett’s test of sphericity with (p<0.05) and a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.717 were used in performing this factor analysis. A factor was considered important if its eigenvalue exceeded 1 (Kaiser et al, 1960). As factor analysis found 7 independent subscales, subsequent Cronbach’s alpha’s were separately carried out for each subscale, to highlight how the items group together. According to factor analysis 7 subscales have been revealed within the Greek-CCAS. Cronbach’s alpha was 0.853 for the first subscale, 0.771 for the second, 0.804 for the third, 0.674 for the fourth, 0.526 for the fifth, and 0.716 for the sixth.

*Limitations*

This study was not without limitations. First, the culture and climate were assessed with screening tools (i.e. CCAS) with no other examination used as a gold standard. Second, the CCAS was pilot-tested and validated using samples of midwives and student midwives from the two largest public maternity hospitals in Greece and fewer midwives who work in the private sector where included and independent midwives were not included at all. This sample may not be representative of all the population of midwives in Greece. A major limitation of the research concerns the fact that midwives work in a hospital (public, private) and so it was difficult to find free time to complete the questionnaire because of the workload. Also, due to the increased stress of the job, it was difficult to approach the midwifery staff and asked to participate in research, especially in departments like Central Delivery Unit.

**Conclusion**

The Greek version of the CCAS showed satisfactory reliability and factor analysis, indicated by seven components similar to those of the original version. Therefore, we assert that this validated version of CCAS may be used for identifying problematic working conditions of midwives and to show the necessity of effective communication and collaboration in the workplace of midwives, and the existence of organizational culture and organizational climate, for the successful organization and development of each department to provide better care to women, who visiting hospital.

The authors declare that they have no competing interests.

**List of abbreviations used**

CCAS: Culture and Climate Assessment Scale

AUC: Area Under Curve

KMO: Kaiser-Meyer-Olkin

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**Table 1. Characteristics of the Study Sample**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **All midwives No (%)** | **Student Midwives** **No (%)** | **Employed Midwives****No (%)** |
| **Sex** |  |  |  |
| Male | 4(4%) |  | 4(4%) |
| Female | 96(96%) | 13(13%) | 83(83%) |
| **Hospital** |  |  |  |
| Public | 87(87%) | 13(13%) | 74(74%) |
| Private | 13(13%) |  | 13(13%) |
| **Marital Status** |  |  |  |
| Single | 40(40%) | 13(13%) | 27(27%) |
| Married | 52(52%) |  | 52(52%) |
| Divorced | 7(7%) |  | 7(7%) |
| Widow | 1(1%) |  | 1(1%) |
| **Education** |  |  |  |
| Student | 13(13%) | 13(13%) |  |
| TEI | 68(68%) |  | 68(68%) |
| Postgraduate | 19(19%) |  | 19(19%) |
| Doctoral | 0% |  |  |

**Table 2. Descriptive Statistics of items of the Greek CCAS**

|  |  |  |
| --- | --- | --- |
| **Item** | **Mean**  | **St.Deviation** |
| 1 | 3,74 | 0,774 |
| 2 | 1,93 | 1,305 |
| 3 | 3,02 | 1,287 |
| 4 | 3,89 | 0,815 |
| 5 | 3,49 | 0,870 |
| 6 | 3,96 | 0,887 |
| 7 | 3,90 | 0,937 |
| 8 | 3,36 | 1,164 |
| 9 | 0,05 | 0,219 |
| 10 | 0,12 | 0,327 |
| 11 | 0,74 | 0,441 |
| 12 | 0,71 | 0,456 |
| 13 | 0,25 | 0,435 |
| 14 | 0,21 | 0,409 |
| 15 | 0,05 | 0,219 |
| 16 | 0,05 | 0,219 |
| 17 | 2,80 | 0,804 |
| 18 | 3,10 | 0,859 |
| 19 | 3,29 | 0,842 |
| 20 | 3,55 | 0,657 |
| 21 | 4,01 | 0,810 |
| 22 | 4,10 | 0,772 |
| 23 | 4,03 | 0,915 |
| 24 | 4,39 | 0,549 |
| 25 | 3,77 | 0,874 |
| 26 | 3,50 | 1,087 |
| 27 | 4,04 | 0,777 |
| 28 | 2,12 | 0,967 |
| 29 | 2,63 | 1,051 |
| 30 | 4,02 | 0,885 |
| 31 | 3,40 | 1,142 |
| 32 | 3,78 | 0,929 |
| 33 | 3,96 | 0,772 |
| 34 | 3,43 | 0,924 |
| 35 | 3,72 | 1,155 |
| 36 | 3,80 | 0,865 |
| 37 | 2,51 | 0,745 |
| 38 | 1,93 | 0,435 |

**Table 3. Exploratory factors and explained variance after rotation for the Greek CCAS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factors** | **Rescaled****Loadings** | **Eigen****values** | **Rotation Sums of Squared Loadings** | **Extraction Sums of Squared Loadings** |
| **% of Variance** | **Total** | **% of Variance** | **Commulative %** | **Total** | **% of Variance** | **Commulative %** |
| Factor 1**(Teamwork)** | 6 | 0,669 | 7,140 | 7,1402,5282,1631,5651,4121,2361,133 | 28,36210,0428,5936,2185,6114,9104,499 | 28,36238,40446,99753,21558,82563,73568,234 | 0,862 | 7,140 | 28,362 | 28,362 |
| 7 | 0,794 |
| 21 | 0,524 |
| 22 | 0,463 |
| 27 | 0,514 |
| 33 | 0,433 |
| 35 | 0,870 |
| 36 | 0,416 |
| Factor 2**(Leadership and Supervision)** | 5 | 0,418 | 2,528 | 10,042 | 38,404 | 0,771 | 0,777 | 2,528 | 10,042 | 38,404 |
| 8 | 0,826 |
| 23 | 0,666 |
| 30 | 0,643 |
| 34 | 0,596 |
| Factor 3**(The level of conflict)** | 17 | 0,552 | 2,163 | 8,593 | 46,997 | 0,804 | 0,807 | 2,163 | 8,593 | 46,997 |
| 18 | 0,684 |
| 19 | 0,713 |
| 20 | 0,473 |
| Factor 4**(Communication)** | 1 | 0,412 | 1,565 | 6,218 | 53,215 | 0,674 | 0,627 | 1,565 | 6,218 | 53,215 |
| 3 | 1,083 |
| 4 | 0,619 |
| 24 | 0,190 |
| Factor 5**(Stress and Education)** | 28 | 0,444 | 1,412 | 5,611 | 58,825 | 0,526 | 0,596 | 1,412 | 5,611 | 58,825 |
| 31 | 0,807 |
| 32 | 0,761 |
| Factor 6**(Work Load)** | 25 | 0,484 | 1,236 | 4,910 | 63,735 | 0,705 | 0,716 | 1,236 | 4,910 | 63,735 |
| 26 | 0,946 |
| Factor 7**(Change Policy)** | 29 | 0,893 | 1,133 | 4,499 | 68,234 |  |  | 1,133 | 4,499 | 68,234 |



**Figure 1. Screeplot**



**Figure 2. Confirmatory Factor Analysis for the Greek CCAS**