Validation of the Nurse Managers' Work Content Questionnaire and Factors—A Structural Equation Modeling Study

Anu NURMEKSELA1* • Santtu MIKKONEN2 • Juha KINNUNEN3 • Tarja KVIST4

ABSTRACT

Background: The responsibilities of nurse managers are diverse and occasionally inadequately organized. Moreover, the role of nurse manager often lacks a clear job description. Few methodologies for evaluating the content of nurse managers’ work exist.

Purpose: This study was designed to validate the Nurse Managers’ Work Content Questionnaire (NMWCQ) instrument and to analyze the relationships between NMWCQ factors and background variables using structural equation modeling.

Methods: A multicenter descriptive and cross-sectional study design was used. The NMWCQ, which includes 87 items across 13 components, was developed based on a comprehensive literature review and pilot study. The questionnaire was sent to all of the nurse managers (N = 756) employed at eight Finnish hospitals in 2019. Exploratory and confirmatory factor analyses were used to psychometrically test and validate the NMWCQ, whereas Cronbach’s alpha values were calculated to explore the internal consistency of the instrument. Structural equation modeling was applied to detect the relationships between the constructed factor structure and the background variables.

Results: Two hundred seven nurse managers participated in this study. The final solution for the NMWCQ included 75 items across 12 factors. The NMWCQ factors were as follows: responsibility for new employees, daily management, human resource management, decision making, clinical nursing, development, planning of processes, collaboration, ensuring knowledge, evidence-based management, ensuring care quality, and financial management. The items showed factor loadings that were either positive or negative, with values ranging from .314 to .846. The Cronbach’s alpha values for the factors ranged between .605 and .851. All of the covariances and relationships between background variables and factors were found to be significant (p ≤ .05). The structural equation modeling showed acceptable index results (incremental fit index = .954, comparative fit index = .951, and root mean square error of approximation = .048).

Conclusions: The NMWCQ version assessed in this study shows a more robust structure than the previously published pilot version. Psychometric testing showed the NMWCQ as suitable for describing the diverse work requirements of nurse managers and may offer a framework for concretizing the job description of nurse managers.

Key Words:

nurse manager, management, work content, confirmatory factor analysis, structural equation modeling.

Introduction

The POSDCORB (planning, organizing, staffing, directing, coordinating, reporting, and budgeting) model, first introduced in 1937 by Gulick and Urwick, is still considered highly relevant to organization managers (Mintzberg, 1973) and is widely used to structure managerial work (Chalekian, 2016). The POSDCORB model may also be used to classify nurse managers’ work content. Although management and leadership strategies and their effectiveness (Cummings et al., 2018; McCay et al., 2018) have been widely studied, the reality of the work performed by nurse managers has remained a neglected topic. Recent research into the work of nurse managers has focused mainly on leadership styles (e.g., Boamah et al., 2018; Cummings et al., 2018) and the perspective of roles (e.g., Townsend et al., 2015; Weaver & Lindgren, 2016). However, it is equally important to describe the work content of nurse managers in the clinical setting. In this study, the POSDCORB model is used as the theoretical framework.

The process of planning involves listing and organizing the activities required to achieve an organization’s goals. Nurse managers are responsible for the strategic planning of their unit, which includes both operational and financial planning (Omery et al., 2019). However, strategic activities may also comprise a limited portion of nurse managers’ daily work (Bjerregård Madsen et al., 2016).

In addition, nurse managers must be adept at organizing, that is, allocating certain tasks and resources among departments and employees to achieve goals. Nurse managers must be competent at organizing because their daily work mainly consists of administrative routines and human resources management (Ericsson & Augustinsson, 2015; Rankin et al., 2016; Townsend et al., 2015).

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Staffing describes a process that begins with recruitment and selection and finishes with orientation and integration into an organization. Nurse managers influence the quality of care by recruiting competent staff (Aiken et al., 2017; Gunawan et al., 2019) and ensuring their unit is adequately staffed (Squires et al., 2017).

While directing, managers instruct, guide, and counsel their staff in a way that will help achieve organizational goals. Nurse managers must be visible and accessible, provide regular feedback to their staff (Omery et al., 2019; Stevanin et al., 2020), and lead by example (Pegram et al., 2015) to improve care.

Through good coordination, managers guarantee that available resources are efficiently used to meet specific goals. In recent years, nurse managers have taken on more administrative tasks in terms of being increasingly responsible for the hiring of temporary staff, participating in administrative meetings, and following financial, sick leave, and quality indicators (Kristiansen et al., 2016).

Clear reporting maintains effective and transparent communication throughout the entire organization. Therefore, nurse managers must be competent at communicating, as they need to discuss difficult issues, listen to different opinions, provide constructive feedback, and share and explain new information to their staff (Rouse & Al-Maqbali, 2014).

Today’s nurse managers are increasingly responsible for the management, expenditure, and control of their unit’s budget (Townsend et al., 2015). According to Gunawan et al. (2019), competence-based human resource management practices are directly and significantly related to financial outcomes.

The work of nurse managers has been found to be reactive and to consist of fragmented activities because of numerous unplanned disruptions (Bjerregård Madsen et al., 2016; Mintzberg, 1973). Nurse managers also experience time constraints, excessive workloads, and necessary involvement in staffing issues (Rankin et al., 2016). Furthermore, nurse managers in various settings have reported lacking a clear job description (Bjerregård Madsen et al., 2016; Rankin et al., 2016; Sveinsdóttir et al., 2018). Therefore, nurse managers should have a clear, up-to-date job description that includes relevant key performance indicators. The presented POSDCORB theoretical framework is highly compatible with the developed Nurse Managers’ Work Content Questionnaire (NMWCQ) instrument, which was tested previously in a pilot study (Nurmeksela et al., 2019). In this article, we describe the further development and testing of this instrument. This study was designed to validate the NMWCQ instrument and analyze the relationships between NMWCQ factors and background variables using structural equation modeling (SEM).

Methods

Sample Description and Data Collection

This research employed a descriptive and cross-sectional study design. A convenience sample of nurse managers (N = 756) was recruited from five Finnish university hospitals and three central hospitals located throughout the country. The study hospitals were 390–2,069 beds in size and employed between 1,285 and 10,170 nursing personnel. In Finland, there are five university hospitals and 16 central hospitals. Both types provide specialized medical care. However, university hospitals offer the most specialized medical care and the special competences required to treat difficult and rare illnesses. Data were collected between May and November 2019 using an electronic questionnaire (NMWCQ). The questionnaire was first sent to a contact person at each healthcare organization, who then forwarded the email to nurse directors at the hospital. These nurse directors were responsible for sending the link to the questionnaire to the nurse managers.

The Instrument

The authors of this article started the instrument development process in 2016 with a comprehensive literature review. Next, the instrument was pretested and assessed by a panel of professionals to evaluate the accuracy of the items, the comprehensive suitability of the response options, the usability of the questionnaire, and the amount of time required to complete (Boateng et al., 2018). Thereafter, the questionnaire was validated in a pilot study in 2017. Principal component analysis was used in the pilot study to test the construct validity, with the Cronbach’s alpha values for NMWCQ factors ranging from .534 to .890 (Nurmeksela et al., 2019). After the pilot study, the questionnaire was revised to include 87 items across 13 subscales. The subscales were as follows: recruitment (five items), organizing (seven items), work well-being (five items), work atmosphere (three items), communication (five items), clinical nursing (nine items), development of the unit (12 items), personnel development (eight items), development of nursing (four items), financial management (seven items), planning and evaluation of activities (six items), collaboration (10 items), and development with collaborating partners (six items). The original questionnaire was created in Finnish and was later forward–backward translated into English for ease of use in future studies.

Data Analysis

The demographic variables are presented using descriptive statistics. After the pilot study, the developed instrument was revalidated using a larger data set, starting with exploratory factor analysis (EFA) with direct oblimin rotation and followed by modeling to find the optimal factor structure for the instrument (Rencher & Christensen, 2012). The original scale of the instrument (1 = daily, 2 = weekly, 3 = monthly, 4 = 2–4 times a year, 5 = annual, and 6 = never) was reversed (6 = daily, 5 = weekly, 4 = monthly, 3 = 2–4 times a year, 2 = annual, and 1 = never) at the beginning of the analysis to make the results easier to interpret. Because the data included an insignificant number of missing values (i.e., 0–3 missing values per variable), no imputation methods were needed. The Kaiser–Meyer–Olkin measure (> .6) and Bartlett’s test of sphericity (p < .001) were used to test sampling adequacy. Those items
with communality < .3 and loading < .3 were removed (Watson & Thompson, 2006). The EFA results were used to create a new, 12-factor version of the NMWCQ, which was then validated using confirmatory factor analysis (CFA; Tabachnick & Fidell, 2014). Variables and factors with regression weights below statistical significance ($p \geq .05$) were deleted. Several goodness-of-fit measures provided by AMOS were used to confirm model fit. In the SEM, incremental fit index (IFI > 0.90) and comparative fit index (CFI > .95) were used as goodness-of-fit indices to assess model adequacy. Furthermore, the root mean square error of approximation (RMSEA < .05) test was used to estimate the approximation error attributable to model simplification (Musil et al., 1998). The standardized regression weight ($\beta$) estimates and standardized total effect values were compared to assess the significance of relationships between variables (Kline, 2016). The statistical analyses were performed in SPSS Statistics Version 27.0 and AMOS Version 27.0 (IBM Inc., Armonk, NY, USA).

### Table 1

**Background Variables of Nurse Managers (N = 207)**

| Variable                                      | n   | %     | M      | Median | SD     |
|-----------------------------------------------|-----|-------|--------|--------|--------|
| **Hospital**                                  |     |       |        |        |        |
| Hospital 1 (UH)                               | 65  | 31.4  |        |        |        |
| Hospital 2 (UH)                               | 36  | 17.4  |        |        |        |
| Hospital 3 (UH)                               | 44  | 21.3  |        |        |        |
| Hospital 4 (UH)                               | 17  | 8.2   |        |        |        |
| Hospital 5 (UH)                               | 23  | 11.1  |        |        |        |
| Hospital 6 (CH)                               | 8   | 3.9   |        |        |        |
| Hospital 7 (CH)                               | 6   | 2.9   |        |        |        |
| Hospital 8 (CH)                               | 8   | 3.9   |        |        |        |
| **Number of nurses per nurse manager**        | 43.52 | 33.00 | 31.76  |        |        |
| < 30                                          | 83  | 40.1  |        |        |        |
| 30–49                                         | 72  | 34.8  |        |        |        |
| 50–99                                         | 40  | 19.3  |        |        |        |
| ≥ 100                                         | 12  | 5.8   |        |        |        |
| **Age (years)**                               | 50.87 | 53.00 | 8.54   |        |        |
| < 40                                          | 26  | 12.6  |        |        |        |
| 40–49                                         | 63  | 30.4  |        |        |        |
| 50–59                                         | 82  | 39.6  |        |        |        |
| ≥ 60                                          | 36  | 17.4  |        |        |        |
| **Gender**                                    |     |       |        |        |        |
| Female                                        | 190 | 91.8  |        |        |        |
| Male                                          | 17  | 8.2   |        |        |        |
| **Total work experience (years)**             |     |       | 26.26  | 27.00  | 8.96   |
| < 10                                          | 3   | 1.5   |        |        |        |
| 10–19                                         | 51  | 24.6  |        |        |        |
| 20–29                                         | 60  | 29.0  |        |        |        |
| ≥ 30                                          | 93  | 44.9  |        |        |        |
| **Work experience as a nurse manager (years)**|     |       | 9.41   | 8.50   | 7.13   |
| < 10                                          | 83  | 40.1  |        |        |        |
| 10–19                                         | 72  | 34.8  |        |        |        |
| 20–29                                         | 40  | 19.3  |        |        |        |
| ≥ 30                                          | 12  | 5.8   |        |        |        |
| **Job satisfaction**                          |     |       | 8.96   | 8.00   | 1.61   |
| < 7                                          | 32  | 15.5  |        |        |        |
| 7–8                                          | 123 | 59.4  |        |        |        |
| 9–10                                         | 52  | 25.1  |        |        |        |
| **Quality of care**                           |     |       | 8.15   | 8.00   | 0.99   |
| < 7                                          | 9   | 4.4   |        |        |        |
| 7–8                                          | 118 | 57.0  |        |        |        |
| 9–10                                         | 80  | 38.6  |        |        |        |

Note. UH = university hospital; CH = central hospital.

*Job satisfaction and quality of care were scored using a 0–10 scale, with 0 and 10 reflecting the lowest and highest possible ratings, respectively.*
Ethical Considerations
Ethics committee approval was obtained from a university (decision date: February 7, 2017, No. 6/2017), and each hospital provided permission for data collection before the research was started. In addition, the questionnaire was supplemented by an information letter that provided information about the study, and the respondents were asked to sign an electronic consent form. Participation in the study and completing the questionnaire were voluntary and anonymous (Finnish National Board on Research Integrity TENK, 2019). The General Data Protection Regulation was followed during all stages of the study (European Commission, 2016).

Results
Two hundred seven nurse managers responded to the study questionnaire (response rate: 27.38%). The participating nurse managers averaged 50.87 years old and worked in five university hospitals and three central hospitals. Most (91.8%) were female and had an average of 26.26 years of total work experience, with an average of 9.41 years of experience as a nurse manager. The participating nurse managers were in charge of 43.52 nurses on average, with 40.1% in charge of < 30 nurses and 5.8% in charge of > 100 nurses. The participating nurse managers reported mean values of 8.96 and 8.15 (on a scale of 0–10) for job satisfaction and quality of care, respectively (Table 1).

Psychometric Characteristics of the Nurse Managers’ Work Content Questionnaire
The factor structure of the NMWCQ was first tested using EFA. The Kaiser–Meyer–Olkin measure of sampling adequacy was .711, whereas Bartlett’s test of sphericity was < .001. After the EFAs, 10 items were deleted from the instrument (Table 2). The deleted items were as follows: I collaborate in nurse managers’ common meetings (communality < .3), I perform statistics related to patient care, I collaborate with other organizations, I organize student orientation, I monitor and evaluate the quality of nursing care, I collaborate with the charge nurse/team leader, I organize and promote coherent practices in my unit, I complete performance appraisals with employees, and I ensure that the organization’s instructions are being followed in the unit (all earned Cronbach’s α values < .6). Next, the NMWCQ was assessed using CFA, which was conducted separately for each factor because there were a high number of variables relative to the number of respondents. After the CFA, two items were deleted from the instrument: I coordinate beds and I take care of ordering supplies for the unit (both earned regression weight values of $p < .05$). Notably, the contents of these two variables are not particularly relevant to the work of nurse managers in Finland. After these analyses, the new revised version of the NMWCQ included 75 items across 12 factors. After the deletion of these items and new factor loadings, the factors were renamed to better reflect their content: responsibility for new employees (five items), daily management (six items), human resource management (nine items), decision-making (five items), clinical nursing (eight items), development (eight items), planning of processes (six items), collaboration (six items), ensuring knowledge (six items), evidence-based management (five items), ensuring care quality (four items), and financial management (five items). The Cronbach’s α values for these factors ranged from .605 to .851 (Table 2). The items showed factor loadings that were either positive or negative and ranged from .314 to .846.

Table 2
Managers’ Work Content Questionnaire Factors, Including Corresponding Cronbach’s Alpha Values

| Factor                          | Cronbach’s Alpha |
|--------------------------------|------------------|
| Responsibility for new employees| .811             |
| Daily management                | .621             |
| Human resource management       | .805             |
| Decision making                 | .687             |
| Clinical nursing                | .789             |
| Development                     | .851             |
| Planning of processes           | .694             |
| Collaboration                   | .696             |
| Ensuring knowledge              | .727             |
| Evidence-based management       | .644             |
| Ensuring care quality           | .605             |
| Financial management            | .608             |

Relationships Between Background Variables and Nurse Managers’ Work Content Questionnaire Factors
The SEM results for the NMWCQ factors and background variables of nurse managers are represented in Figure 1. The overall modeling showed acceptable index results (IFI = .954, CFI = .951, and RMSEA = .048).

The established model showed 23 direct relationships between the background variables and NMWCQ factors that cover both positive and negative impacts. The number of nurses ($β = .17, p = .008$) was positively related to the “responsibility for new employees” factor. Furthermore, an increase in the number of nurses that a nurse manager supervised was linked to an increase in human resource management ($β = .15, p = .023$), decision-making ($β = .16, p = .019$), collaboration ($β = .15, p = .030$), ensuring knowledge ($β = .17, p < .001$), and financial management ($β = .16, p = .007$) duties. Moreover, this background variable was shown to relate negatively to “daily management” activities ($β = -.14, p = .044$; Table 3).
Level of job satisfaction was found to positively affect the amount of time dedicated to evidence-based management ($\beta = .12, p = .050$) and development ($\beta = .13, p = .013$) activities (Table 3).

Furthermore, the results revealed interhospital differences between central hospitals and university hospitals in terms of how nurse managers responded to the work content subscales. For example, nurse managers from central hospitals spent more time on financial management ($\beta = .45, p < .001$), ensuring knowledge ($\beta = .34, p < .001$), and clinical nursing ($\beta = .22, p < .001$) tasks and less time on human resource management ($\beta = -.35, p < .001$) and development ($\beta = -.39, p < .001$) duties than their counterparts from university hospitals. In addition, nurse managers who evaluated the quality of care in their units positively spent less time on "ensuring care quality" ($\beta = .12, p = .047$) duties than those who gave a negative evaluation. Furthermore, a nurse manager’s age, work experience in healthcare, and work experience as a nurse manager were either significantly positively or negatively correlated to the amount of time they spent on some work content subareas. However, of all the background variables, gender was the only predictor found to have no significant relationship with the NMWCQ factors. Therefore, gender was not included in the final model (Table 3).

Several instances of covariance between factors, all of which were statistically significant, were detected in the new NMWCQ model. For example, significant covariance was observed between financial management and daily management ($p < .001$), ensuring knowledge ($p < .001$), clinical nursing ($p < .001$), human resource management ($p < .001$), decision making ($p < .001$), and evidence-based management ($p < .001$). In addition, the human resource management factor covaried with decision making ($p < .001$), development ($p = .005$), collaboration ($p < .001$), responsibility of new employees ($p = .04$), financial management ($p < .001$), and daily management ($p < .001$; Table 4).

Furthermore, six of the factors were found to be positively related. An increase in a nurse manager’s “daily management” ($p < .001$) and “financial management” ($p < .001$) duties increased the amount of time spent on “responsibility for...
new employees” activities, whereas an increase in time spent on “planning of processes” ($p < .001$) and “collaboration” ($p < .001$) tasks was found to positively influence a nurse manager’s share of “development” activities. Nurse managers who allotted substantial time to “responsibility for new employees” ($p < .001$) activities also spent a fair share of their day on ensuring knowledge duties. Furthermore, an increase in the time spent on “development” ($p < .001$) activities was found to be positively related to time spent on “ensuring care quality” duties (Table 4, Figure 1).

Table 3

| Factor Variable | Background Variable | $\beta$ | STE | Est. | SE | CR | $p$ |
|-----------------|---------------------|--------|-----|-----|----|-----|-----|
| Factor 1 | Responsibility for new employees ← Number of nurses | 0.17 | 0.17 | 0.16 | 0.06 | 2.67 | .008*** |
| | Responsibility for new employees ← Age | -0.25 | -0.25 | -0.23 | 0.09 | -2.40 | .016* |
| Factor 2 | Daily management ← Number of nurses | -0.14 | -0.14 | -0.12 | 0.06 | -2.02 | .044* |
| Factor 3 | Human resource management ← Hospital | -0.35 | -0.35 | -0.10 | 0.02 | -6.38 | < .001*** |
| | Human resource management ← Number of nurses | 0.15 | 0.15 | 0.09 | 0.04 | 2.27 | .023* |
| Factor 4 | Decision making ← Number of nurses | 0.16 | 0.16 | 0.17 | 0.07 | 2.35 | .019* |
| | Decision making ← Total work experience | 0.31 | 0.31 | 0.36 | 0.08 | 4.53 | < .001*** |
| | Decision making ← Work experience | -0.15 | -0.15 | -0.22 | 0.10 | -2.15 | .031* |
| Factor 5 | Clinical nursing ← Hospital | 0.22 | 0.22 | 0.11 | 0.03 | 3.51 | < .001*** |
| | Clinical nursing ← Total work experience | -0.16 | -0.16 | -0.17 | 0.06 | -2.69 | .007*** |
| Factor 6 | Development ← Age | -0.16 | -0.22 | -0.14 | 0.05 | -3.12 | .002** |
| | Development ← Hospital | -0.39 | -0.35 | -0.16 | 0.02 | -7.80 | < .001*** |
| | Development ← Job satisfaction | 0.13 | 0.13 | 0.16 | 0.06 | 2.49 | .013* |
| Factor 7 | Planning of processes ← Age | -0.16 | -0.21 | -0.16 | 0.05 | -3.29 | .001*** |
| Factor 8 | Collaboration ← Number of nurses | 0.15 | 0.15 | 0.10 | 0.04 | 2.17 | .030* |
| Factor 9 | Ensuring knowledge ← Hospital | 0.34 | 0.37 | 0.12 | 0.02 | 6.01 | < .001*** |
| | Ensuring knowledge ← Number of nurses | 0.17 | 0.22 | 0.12 | 0.04 | 3.08 | .002** |
| Factor 10 | Evidence-based management ← Job satisfaction | 0.12 | 0.12 | 0.13 | 0.07 | 1.96 | .050* |
| | Evidence-based management ← Total work experience | -0.23 | -0.23 | -0.19 | 0.05 | -3.71 | < .001*** |
| Factor 11 | Ensuring care quality ← Quality of care | -0.12 | -0.12 | -0.14 | 0.07 | -1.99 | .047* |
| Factor 12 | Financial management ← Number of nurses | 0.16 | 0.16 | 0.13 | 0.05 | 2.71 | .007** |
| | Financial management ← Hospital | 0.45 | 0.45 | 0.17 | 0.02 | 8.09 | < .001*** |
| Factor 6 | Development ← Planning of processes | 0.24 | 0.28 | 0.32 | 0.06 | 5.27 | < .001*** |
| | Development ← Collaboration | 0.22 | 0.32 | 0.43 | 0.07 | 6.29 | < .001*** |
| Factor 9 | Ensuring knowledge ← Responsibility for new employees | 0.29 | 0.29 | 0.23 | 0.04 | 5.29 | < .001*** |
| Factor 11 | Ensuring care quality ← Development | 0.33 | 0.33 | 0.26 | 0.05 | 5.01 | < .001*** |

Note. $\beta$ = standardized regression weight; STE = standardized total effect; Est. = regression weight; SE = standard error; CR = critical ratio; $p$ = probability value. *$p \leq .05$. **$p < .01$. ***$p < .001$. 

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In addition to direct relationships, the identified model included instances of statistically significant ($p < .05$) covariance between certain background variables and factors (shown in Table 4). The correlations between the 12 NMWCQ factors are shown in Table 5.

### Discussion

Two hundred seven nurse managers responded to the questionnaire, reflecting a response rate of 27.38%. Several reasons may explain why many nurse managers declined to participate. First, modern nurse managers are continuously being asked to answer various surveys and inquiries, so it may be difficult for them to discern which are the most important. Thus, the link to the questionnaire may have been lost in the busy email inbox of some nurse managers. The length of the questionnaire may have also deterred certain nurse managers from participating. The questionnaire included 87 items, and length was one reason motivating the validation of this questionnaire in this study. Although the response rate in this study was rather low, reports in the literature indicate that a response rate of around 30% is average for online surveys (Nulty, 2008). According to Nulty, offering the option to answer questionnaires in paper form may increase response rates. However, the Kaiser–Meyer–Olkin measure of sampling adequacy was .711, indicating that the factors should yield distinct and reliable results (Field, 2013).

### Table 4

**Covariance Between NMWCQ Factors and Background Variables of Nurse Managers**

| Covarying Variable                                      | Est. | SE  | CR  | $p$   |
|---------------------------------------------------------|------|-----|-----|-------|
| Total work experience ↔ age                             | 0.63 | 0.07| 9.01| < .001*** |
| Collaboration ↔ daily management                        | 0.07 | 0.03| 2.53| .011* |
| Financial management ↔ Daily management                 | 0.14 | 0.03| 4.27| < .001*** |
| Collaboration ↔ planning of processes                   | 0.06 | 0.02| 2.55| .011* |
| Quality of care ↔ job satisfaction                      | 0.13 | 0.03| 4.85| < .001*** |
| Responsibility for new employees ↔ planning of processes | 0.10 | 0.03| 2.97| .003** |
| Work experience as a nurse manager ↔ total work experience | 0.29 | 0.05| 6.50| < .001*** |
| Work experience as a nurse manager ↔ age                | 0.31 | 0.05| 6.35| < .001*** |
| Decision making ↔ human resource management             | 0.21 | 0.04| 5.52| < .001*** |
| Human resource management ↔ development                  | 0.05 | 0.02| 2.83| .005** |
| Human resource management ↔ collaboration                | 0.10 | 0.02| 4.65| < .001*** |
| Ensuring knowledge ↔ clinical nursing                    | 0.15 | 0.03| 4.40| < .001*** |
| Ensuring knowledge ↔ planning of processes               | 0.07 | 0.02| 3.16| .002** |
| Evidence-based management ↔ development                  | 0.11 | 0.03| 4.22| < .001*** |
| Evidence-based management ↔ planning of processes        | 0.12 | 0.03| 4.05| < .001*** |
| Ensuring care quality ↔ planning of processes            | 0.08 | 0.03| 3.17| .002** |
| Ensuring knowledge ↔ financial management                | 0.11 | 0.02| 4.67| < .001*** |
| Clinical nursing ↔ financial management                  | 0.20 | 0.04| 4.98| < .001*** |
| Human resource management ↔ responsibility for new employees | 0.05 | 0.02| 2.06| .039* |
| Human resource management ↔ financial management         | 0.09 | 0.02| 4.07| < .001*** |
| Clinical nursing ↔ daily management                      | 0.16 | 0.04| 3.59| < .001*** |
| Decision making ↔ financial management                   | 0.16 | 0.04| 4.01| < .001*** |
| Decision making ↔ collaboration                          | 0.10 | 0.04| 2.85| .004** |
| Human resource management ↔ daily management             | 0.14 | 0.03| 4.82| < .001*** |
| Decision making ↔ daily management                       | 0.13 | 0.05| 2.63| .009** |
| Evidence-based management ↔ financial management         | 0.10 | 0.03| 3.72| < .001*** |
| Evidence-based management ↔ ensuring knowledge           | 0.08 | 0.03| 3.23| .001** |
| Evidence-based management ↔ clinical nursing             | 0.11 | 0.04| 2.86| .004** |
| Evidence-based management ↔ number of nurses             | 0.09 | 0.04| 2.40| .016** |

*Note. NMWCQ = Nurse Managers’ Work Content Questionnaire; Est. = regression weight; SE = standard error; CR = critical ratio; $p$ = probability level. $*p \leq .05$. **$p < .01$. ***$p < .001$. 

In addition to direct relationships, the identified model included instances of statistically significant ($p < .05$) covariance between certain background variables and factors (shown in Table 4). The correlations between the 12 NMWCQ factors are shown in Table 5.
A clear majority (92%) of the 207 participants were female. According to the National Institute for Health and Welfare, 5,017 nurse managers are employed in Finnish hospitals, of which 93.4% are female (National Institute for Health and Welfare, Finland, 2018). The ratio between female and male nurse managers in this study was close to the national average. Although national statistics on the average age of Finnish nurse managers are not available, the average age for all healthcare professionals is approximately 45 years (Department of Health and Welfare, Finland, 2020). Thus, the participants in this study were older than the national average for healthcare professionals. It has been projected that nurse managers represent the largest occupational group in the municipal sector that will retire in the near future, with an average age of retirement of 63.8 years in 2018. On the basis of this, 49% of the participants in this study may be expected to retire by 2029 (Municipal Pension Insurance, Finland, 2020).

The Instrument
The development of the instrument started with a literature review, which was performed to provide an overall picture of the current work content of nurse managers (Boateng et al., 2018). This process was not theory based. However, although the POSDCORB theory did not guide the literature review, this review included certain aspects that coincided well with subareas of the developed NMWCQ instrument. Consequently, components of the validated NMWCQ were related to the seven management factors (planning, organizing, staffing, directing, coordinating, reporting, and budgeting) of the POSDCORB managerial theoretical framework. Every component of the POSDCORB framework is found in NMWCQ factors. For example, the planning aspect of POSDCORB is included in the planning of processes and financial management NMWCQ factors, whereas the organizing aspect of POSDCORB is included in the daily management NMWCQ factor. The aspect of staffing is found in both human resource management and responsibility for new employees, whereas directing is included in human resource management, ensuring knowledge, and development. Furthermore, the aspect of coordinating coincides with components of Daily management and decision making, whereas aspects of reporting and budgeting are included in collaboration and financial management, respectively. The POSDCORB framework was originally formulated to be general and applicable to managers from any organization (Chalekian, 2016). In this study, this classic theory was found to still be relevant and applicable to structuring the work of nurse managers.

The NMWCQ was validated and psychometrically tested 3 times, initially using EFA and subsequently using CFA and SEM. EFA was applied to identify and interpret latent variables, whereas CFA was used to investigate the construct validity of the instrument and to obtain statistical confirmation of a predefined hypothetical latent variable structure (Kline, 2016). On the basis of these analyses, 12 items were deleted, with the validation providing a final solution for NMWCQ that included 12 factors and 75 items.

Only three factors, including clinical nursing, collaboration, and financial management, retained their original names. Thus, item loadings of factors and the number of factors differed across the two NMWCQ versions. The remainder of the factors were renamed to better describe the items they contained. For example, work well-being was renamed as human resource management in the new version of NMWCQ because this factor included items from the previous work atmosphere.
and organizing factors. There were also many similarities between the previous and new versions of NMWCQ in terms of item loadings. For example, responsibility for new employees (previously recruitment), daily management (previously organizing), clinical nursing (previously clinical nursing), collaboration (previously collaboration), and financial management (previously financial management) included many of the same items across both versions of the questionnaire. However, factor loadings were divided more unevenly (from three to 12 items per factor) in the previous version of questionnaire than the new version of the questionnaire (from four to nine items per factor). These differences between the two NMWCQ versions may be explained by the fact that the instrument was still at an early stage of development in the pilot study; that is, it included more variables and was validated on a smaller sample (n = 61) than the instrument analyzed in this study. Therefore, the results of this study should be considered more reliable than those obtained in the pilot study (Boateng et al., 2018; Kline, 2016). Therefore, the new version of NMWCQ showed a more consistent structure than the version that was evaluated in the pilot study. The internal consistency measured for the new factors (α = .605–.851; Table 2) showed acceptable reliability, as Cronbach’s alpha values over .6 are generally considered acceptable (Gray et al., 2016). Notably, most of the factors earned Cronbach’s alpha values greater than .7, and the usability of the questionnaire was improved.

SEM is a suitable analysis approach for investigating the construct validity of NMWCQ (Kline, 2016). Several statistically significant (p < .05) direct background variable–factor and factor–factor relationships were detected in the NMWCQ model after SEM. Essentially, the items that showed high degrees of correlation were grouped together to form the factors of the instrument. The results of Bartlett’s test were < .001, which indicates the presence of significant correlations in the model (Field, 2013). Moreover, the model included several instances of covariance (Field, 2013; Kline, 2016), indicating that the overall model achieved acceptable values for goodness of fit. The calculated IFI value suggests that the model has an excellent level of adequacy. Furthermore, several additional fit indices, namely, CFI and RMSEA, showed excellent model fit (Kline, 2016; Musil et al., 1998). On the basis of the values calculated for these separate indices, this model should be considered as acceptable, with SEM proving to be a suitable method for studying the complex relationships between several different factors and background variables.

Relationships Between Factors and Background Variables
The results of the conducted analyses revealed that the number of employees a manager is responsible for increases the amount of time nurse managers dedicate to various parts of their daily work. Previous studies have suggested that the number of employees a nurse manager oversees is negatively related to metrics of organizational performance such as turnover rate and patient outcomes (Omery et al., 2019). One explanation for these findings is that nurse managers who are in charge of a large number of employees must dedicate a significant share of their time to human resource responsibilities.

An unexpected finding was that nurse managers who were responsible for a larger number of staff were less dedicated to daily management and human resource management activities. One explanation may be that nurse managers delegate some of their duties to the charge nurse, team leader, or assistant nurse managers. Another explanation may be that nurse managers lack time to manage staff conflicts, prepare and manage meetings, and support personnel. However, it should be noted that previous research has shown how important it is for nurse managers to be visible and accessible, provide regular feedback (Omery et al., 2019; Stevanin et al., 2020), and motivate and support their staff (Nurmekselä et al., 2019).

In addition, this model revealed between-hospital differences in some subareas of nurse managers’ work. According to Mazurenko et al. (2017), certain hospital characteristics, for example, teaching status and number of beds, relate positively to patient satisfaction, although other studies have shown contrary results. For example, McFarland et al. (2017) suggested hospital size to be negatively associated with patient satisfaction, with larger hospitals associated with lower patient satisfaction (McFarland et al., 2017). Magnet® status has been identified as a positive indicator of work environment as well as of patient and nursing outcomes in hospitals (Cummings et al., 2018). However, the hospitals in this study did not differ significantly in terms of nurse managers’ assessed job satisfaction, with most participants providing excellent assessments of job satisfaction.

However, as this model shows, level of job satisfaction was positively linked to the time spent on both development and evidence-based management duties. It has been stated that nurse managers have an influential role in the implementation of evidence-based practice and creation of a supportive culture (Bianchi et al., 2018). More research is needed to explain whether the finding that nurse managers focus more on resource activities than development work is based on an underlying strategy or on a lack of either education or resources.

An emphasis on financial management and daily management duties was found to positively influence how much time nurse managers allotted to responsibility for new employees, which, in turn, increased the share of ensuring knowledge activities. It may be expected that nurse managers who are in charge of a large number of employees will need to spend more of their time on operational management than nurse managers who are in charge of smaller teams. Recruitment not only ensures new and versatile knowledge within the unit but also increases the amount of time that must be spent on the orientation and education of new employees. Contemporary nurse managers must be aware of how finances impact nursing care. However, nurse managers are not always involved in
budget planning and have also reported a lack of influence, although they are responsible for the unit’s budget (Labrague et al., 2018). This may explain the finding by Warshawsky and Cramer (2019) that nurse managers commonly rate their financial management competence poorly.

The model in this study found that increasing collaboration and planning of processes activities positively affects the amount of time nurse managers allot to development tasks. Interdisciplinary collaboration between professionals has been connected to improvements in nurse and patient outcomes (Ma et al., 2018). More specifically, Sveinsdóttir et al. (2018) found that nurse managers, similarly to other managers, focus predominantly on quality of care, patient safety, and staff encouragement activities, while spending limited time on activities related to communication, support, and fostering a positive work environment (Sveinsdóttir et al., 2018).

**Limitations**

The response rate in this study was relatively low (27.38%). As this study included the validation of the NMWCQ, an item-to-respondent ratio of at least 1.5 should be used, with at least five participants for each item in the validated instrument enrolled (Watson & Thompson, 2006). Using a 1.5 ratio in the context of this study would require at least 435 participants. However, in SEM, the sample size is determined by the parameters being estimated rather than the number of items. Therefore, sample sizes for small or medium models are not required to exceed 200 participants (Kline, 2016). Therefore, as a new instrument, the NMWCQ needs to be validated on a larger data set. This study included 207 respondents, which may have affected the reliability of the subsequent analyses. The study represented all five Finnish university hospitals and three central hospitals, but the results are not generalizable to all Finnish nurse managers.

**Conclusions**

After three rounds of validation, the NMWCQ was proven to be a valid instrument for exploring the current work content of nurse managers. Furthermore, the presented results suggest the NMWCQ to be a useful instrument for describing how nurses divide their time across diverse duties. Hence, the NMWCQ may be beneficial for clarifying nurse managers’ complex work to provide a framework for improving the often-insufficient job descriptions attached to this position. Nevertheless, the instrument requires further validation. In addition, future research should confirm reliability by recruiting larger samples and expanding the scope to cover multiple countries and cultural settings.

On the basis of the results of this study, nurse managers require greater organizational support to develop and build the competencies necessary to manage diverse work areas. It is also important to stress that nurse managers, as frontline managers, are critical to motivating nurses and other staff to achieve organizational goals. Therefore, it is essential that they be permitted adequate work time to motivate and support their staff and to participate in multiprofessional collaboration. We found the nurse managers in this study to be very satisfied with their work. In light of the fact that a large proportion of Finnish nurse managers will retire in the coming years, it is even more important to clarify job descriptions to ensure the challenging role of nurse manager remains an attractive career option for current nursing staff. The findings of this study provide evidence that nurse managers who are satisfied with their professional role will be more committed to the development of their clinical practice and of evidence-based management.

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**Author Contributions**

Study conception and design: AN, JK, TK
Data collection: AN
Data analysis and interpretation: AN, SM, TK
Drafting of the article: All authors
Critical revision of the article: AN, TK

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*Address correspondence to: Anu NURMEKSELA, PhD, RN, Department of Nursing Science, Faculty of Health Sciences, University of Eastern Finland, P.O. Box 1627, Kuopio 70211, Finland. Tel: +358 504 729 636; E-mail: anu.nurmeksela@uef.fi
The authors declare no conflicts of interest.

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**Author Contributions**

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Data collection: AN
Data analysis and interpretation: AN, SM, TK
Drafting of the article: All authors
Critical revision of the article: AN, TK

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*Address correspondence to: Anu NURMEKSELA, PhD, RN, Department of Nursing Science, Faculty of Health Sciences, University of Eastern Finland, P.O. Box 1627, Kuopio 70211, Finland. Tel: +358 504 729 636; E-mail: anu.nurmeksela@uef.fi
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