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# The structure of mentors' behaviour in clinical nursing education: Confirmatory factor analysis

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ABSTRACT

*Aims:* To study if a three-factor structure of mentors' behaviour identified through exploratory factor analysis could be confirmed in a dataset assessing mentors' performance using structural equation modelling.
*Background:* To measure mentor's behaviour in clinical nursing education in China, a specific instrument was developed and preliminarily validated; a three-factor structure (professional development, facilitating learning and psychosocial support) was identified in a dataset of assessment of the importance of mentors' each behaviour using exploratory factor analysis and Mokken scale analysis.
*Design:* A cross-sectional study with online and hard copy survey was applied.
*Methods:* Convenience sampling was conducted. Nursing students (n = 634) in Southwest China participated in the study from July to August 2014. Confirmatory factor analysis was used.
*Results:* Mentors' behaviour can be perceived as a secondary order factor with three first order factors: professional development; facilitating learning; and psychosocial support.
*Conclusion:* The three-factor structure of mentors' behaviour was confirmed by structural equation modelling. This structure is visible in mentors' real performance and implies that this instrument could be used to assess mentors' behaviour in addition to students' expectation from mentors.

## 1. Introduction

In clinical teaching of pre-registered nursing students, mentors are key members of the team. A mentor is a Registered Nurse, facilitating a student's learning and supporting his/her professional development in clinical placement on a one-to-one, day-to-day basis. A nursing student, simply being with a staff nurse does not guarantee that mentoring and learning take place, some 'toxic mentor' may even block study (Darling, 1986). Gray and Smith (2000) also identified the characteristics of bad mentors, such as disliking their job, over-protecting students, lack of knowledge, intimidating students and being unfriendly. Therefore, mentors' behaviour needs assessment (Sawatzky and Enns, 2009), and a reliable measurement instrument is in need.

Nursing academia used mentoring instruments from other fields to measure mentorship in nursing (Chen et al., 2016a), such as doctoral mentoring, faculty mentoring, and leadership mentoring as no suitable tool was found in nursing. But with regard to nursing students mentoring in clinical teaching, no tools from other fields have been adopted (Chen et al., 2016a). Nursing researchers started to develop their specific instrument. Till now a scale to measure faculty mentorship (Berk et al., 2005), and one instrument (Chow and Suen, 2001) to evaluate clinical nursing students mentoring have been developed. Unfortunately, these are not suitable to assess students' mentoring due to difference of conceptualization between faculty mentorship and student mentorship and/or poor psychometric evidence (Chen et al., 2016a)). Therefore, a specific instrument – the Mentors' Behaviour Scale in Nursing has been developed recently (Chen et al., 2016b), but further validation is needed.

### 1.1. Background

The Mentors' Behaviour Scale in Nursing is focused on mentors' behaviour in clinical teaching of pre-registered students. This scale is based on a tentative theoretical framework generated from review of 43 studies. Mentors' behaviour was conceptualised as a three-dimensional model. It includes facilitating learning, professional development and psychosocial support. Psychosocial support includes establishment of relationships and support and encouragement. Facilitating learning contains planning and organizing learning activities, teaching and guiding, plus feedback and assessment. Finally professional

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development consists of promoting students' professional socialization and role modelling (unpublished PhD thesis).

This scale was validated in a group of Chinese nursing students (n = 699) to explore the structure of mentors' behaviour and students were asked to assess the importance of mentors' behaviour, each behaviour rated by five steps (scoring 1–5) (Chen et al., 2016b). Both exploratory factor and Mokken scale analysis identified a three-factor model, professional development, facilitating learning and psychosocial support (Chen et al., 2016b), which implies that this instrument could be used to match students with mentors according to students' perspective of the importance of mentors' behaviour.

### 1.2. This Study

#### 1.2.1. Aims

This paper aims to investigate if the structure of mentors' behaviour can be confirmed in the dataset of mentors' real performance assessment using the structural equation modelling facility in AMOS 22.0.

#### 1.2.2. Design

A cross-sectional study using an online and a hard-copy survey was employed.

#### 1.2.3. Participants

A convenience sampling was applied in this study (Chen et al., 2016b). Eighty nursing students completed the online questionnaires among 900 potential respondents in one southwest medical school in China from July to August 2014. Nursing students (n = 610) from different programs in three hospitals of one city in southwest China completed the questionnaires at the end of a lecture in August 2014.

#### 1.2.4. The Measurement Instrument

The instrument used in this study is a newly developed and validated tool with 47 items and three inter-related factors (professional development ($\alpha = 0.91$); facilitating learning ($\alpha = 0.87$) and psychosocial support ($\alpha = 0.87$) (Chen et al., 2016b). The scale level content validity index, S-CVI was 0.95 based on the nine mentoring experts in the UK. The test-retest reliability is high (ICC = 0.92).

#### 1.2.5. Data Collection

Data were collected from the same sample at the same time as that applied in EFA (Chen et al., 2016b); ideally different database should be used to do EFA and CFA separately. There is an unresolved debate about if same database can be used to do both EFA and CFA (Watson et al., 2013), but there is no discussion about whether or not the data and results will be influenced by the survey using same sample at the same time. In the main research project (the unpublished PhD thesis) two different databases (importance and assessment database) were established in the same sample. In the importance dataset students were invited to rate the importance of mentors' behaviour; in the assessment database, students were asked to rate the extent to which they did witness the behaviour of their mentors and a clear stem question: 'Thinking about your most recent mentor, how much do you agree that they show the following behaviours?' was presented in the questionnaire and students responded on a 5-point Likert scale (1–5) from 'strongly disagree' to 'strongly agree'.

Questionnaires were administered to approximately 900 nursing students through the Bristol Online Survey tool because students were allocated in different hospitals across provinces in clinical learning. One month was given to finish the online questionnaire, and reminders were sent out to increase response rate in this period in 2014.Unfortunately, only 80 students responded; the response rate was low (80/900 = 8.89%) and the quality was problematic as the data showed low variance in response (15 cases were excluded due to this). Then three hard-copy surveys in three hospitals in one southwest city of China were conducted (Chen et al., 2016b) as a complement in the same year, and the response rate ranged from 82 to 85%.

#### 1.2.6. Ethical Considerations

Ethical approval was granted by Faculty of Health and Social care (University of Hull) ethical committee in the UK and data collection permission was obtained from one university and three hospitals in China. Informed consent statement was provided to online survey and face-to-face survey respondents, which outlined the rights to confidentiality of their data and participation was voluntary. The security of data was maintained using encryption.

#### 1.2.7. Data Analysis

After checking the quality of data, cases with missing data and low variance were excluded. Finally 634 cases were included in analysis, which was sufficient for structure equation modelling.

In confirmatory factor analysis, distribution of variables was checked first as it can affect the model fit index and accuracy of model estimation. In addition, distribution can also guide the selection of estimation methods. Because multivariate normality inspection is difficult to carry out, univariate normality was checked as a base. According to Kline (2005), multivariate normality is usually met when univariate normality holds. All the measured variables are normally distributed, as all the absolute values of skewness are $< 3$ and all values of kurtosis are $< 7$.

AMOS®, which is the statistical package used for confirmatory factor analysis in this study, also requires large sample size for accurate estimation and this was satisfied in this data set (n = 634): the ratio of cases to variables is > 20:1 (634:29), which is over the recommended rule of thumb value (5–10:1). At the same time no case with missing data was included to assure stable and precise model estimation.

Multicollinearity was also checked using linear regression, putting each variable in the dependent variable box in turn, and other variables in the independent variable box in SPSS 22.0. No tolerance is below 0.1, nor is any Variance Inflation Factor (VIF) is over 10. No VIF is even over 5. The correlation matrix was also checked: no correlation coefficient was over 0.85, so these suggest that there is no multicollinearity among all the observed variables (Kline, 2005; Field, 2009).

#### 1.2.8. Specifying the Model

According to the results generated from EFA, the model was specified (Chen et al., 2016b). The preliminary modelling found that the three factors were highly correlated ($r > 0.8$) which suggested a general second-order factor 'mentorship' may exist. So the final model was modified as mentors' behaviour was a general factor at the second-order, having a direct effect on the three first-order factors (professional development; facilitating learning and psychosocial support).

#### 1.2.9. Model Fit Estimation and Modification

Maximum likelihood method (ML) was used to estimate the model fitness as it is a robust method. This data set, with large sample size, normality and no missing data basically meets all the requirements of conducting ML. The preliminary model fit index showed that the model did not fit the data well, so modification based on the model modification indices was conducted by co-varying several pairs of errors, and the corresponding observed variables of correlated errors measure similar concepts; so this will not cause change to the hypothesised model.

#### 1.2.10. Equivalent Model and Model Stability

When establishing a model, an alternative model or equivalent model should be considered to find out which model is preferable. Under some conditions there are infinite equivalent models (Kline, 2005). After a model is established in one data set, model stability across data sets should be checked (Kline, 2005).This model was also checked in the importance data set ($N = 669$) (Chen et al., 2016b) using CFA with ML in AMOS 22.0.