MODELING TURNOVER INTENTIONS, BURNOUT, AND JOB SATISFACTION OF NURSE ANESTHETISTS: THE SENSITIVITY OF RESULTS TO CHOICE OF STATISTICAL METHOD

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ABSTRACT

Turnover by nurse anesthetists is expensive because they are highly skilled and difficult to replace. This study examines the turnover intentions of 882 Dutch nurse anesthetists. Turnover intention is modeled as a function of job satisfaction, burnout, personality, work context characteristics, and work climate. Previous research used the dataset to estimate the model using structural equation modeling (SEM). This study examines the sensitivity of results by using a two-level multilevel model with fixed or random intercepts. This study finds that the major substantive conclusions of the previous study are not sensitive to statistical methodology, which increases ones confidence in the conclusions.

INTRODUCTION

Organizations can have significant investments in their employees. Employees are the human capital of the organization and job turnover results in loss of this human capital. The costs of turnover can be significant: Turnover can negatively affect morale, productivity, organizational effectiveness, and quality of services provided, and it increases costs. Furthermore, when an employee voluntarily quits, the organization then incurs the costs to hire a replacement, including the costs associated with recruiting a pool of well-qualified applicants, evaluating the applicants using the organizations selection methods and making the selection decision, providing orientation and training to the new hire, evaluating the new hire's job performance, and undertaking efforts to enhance the new hire's job performance to match or exceed the performance of the employee who quit.

Organizations can have a difficult time hiring well-qualified employees for some jobs even during economic recessions. Skilled healthcare workers, for example, can be in tight supply for some healthcare jobs even during recessions. Understanding the causes of turnover of healthcare workers in a tight labor market is important because it is costly, increasing the already high costs of healthcare.

The Netherlands is facing a tight labor market for healthcare workers. One of the essential causes of the current tight labor market in The Netherlands is the changing funding system in the hospitals. Previously, hospitals received a set amount of money to perform a certain amount of operations.

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Currently, hospitals have to compete with each other; this stimulates hospitals to further decrease costs and function more efficiently. Cost reductions have resulted in workforce reduction and a decrease in training possibilities for new nurse anesthetists. In The Netherlands, hospitals are confronted with significant shortages of staff nurse anesthetists, which has led to increased dependence on employing agency nurse anesthetists who are much more costly. Due to differences in training and practices, the nurse anesthetist profession is not similar enough in European countries, despite the legal possibilities, to make recruitment of foreign nurse anesthetists an option. Reducing the rate at which nurses voluntarily leave their workplace can be one of the solutions to the shortage of staff nurse anesthetists.

Research concludes that nurse turnover is related to high levels of job dissatisfaction and job-related burnout [39]. Previous investigations of nurses' work environment indicate that burdensome workloads, insufficient social support, and aversive work climate are some of the factors that have been found to lower nurses' satisfaction with the work situation [42]. Associated with this decrease in job satisfaction is a correspondent increase in perceived levels of stress and burnout [22], which may contribute to nurses' turnover intention.

In addition to work environment characteristics as predictors of job satisfaction, burnout, and turnover intention, there is also evidence that individual characteristics may contribute to these work outcomes. Several personality traits have been related to job satisfaction [18] and burnout [14].

Because the work situation of nurse anesthetists is complex, both workplace attributes and personal characteristics are likely to affect job satisfaction and burnout levels. Few studies have focused on the combined influence of work-related and personal characteristics on nurses' turnover intention. Moreover, because very little research on the group of nurse anesthetists' specifically is done, our current understanding of why nurse anesthetists leave their job is still limited.

To address the gap in the research literature, [28] examined the processes underlying nurse anesthetists' turnover intentions in The Netherlands. In particular, they used a sample of 882 Dutch nurse anesthetists to examine how work context characteristics, work climate, and personality dimensions affect burnout and job satisfaction, and in turn how burnout and job satisfaction affect turnover intentions. They hypothesized that work context factors (task content, social environment, relation with supervisor, and career and rewards), work climate, and personality dimensions (easy-going, orderly, compassionate, and receptive), mediated by burnout and job satisfaction, would predict turnover intention. They used structural equation modeling (SEM) to fit their model and test their hypotheses. They found that burnout mediated the relationship between personality dimensions and turnover intentions; job satisfaction mediated the relationship of work climate and work context factors to turnover intentions. They concluded that creating a positive work climate and work context would increase job satisfaction, and using personality assessments to select suitable applicants would reduce burnout.

The structural equation modeling (SEM) used by [28] is appropriate when all the variables are measured on interval or ratio scales. However, they measured one of the key variables, *turnover intentions,* as a binary (dummy) variable depending on the subjects' intentions to leave their job within the next two years (0 = no; 1 = yes); SEM ignores the binary nature of the turnover intentions variable. Furthermore, SEM does not take into consideration that some of the subjects in the sample had the same employer.

This paper examines the sensitivity of the empirical results of [28] to an alternative statistical method that takes into consideration that the variable *turnover intentions* is measured as a binary variable and that some of the subjects in the sample had the same employer. To the extent that the substantive

empirical results of a study do not change when the statistical methods change, our confidence in the results is increased.

LITERATURE

Since the purpose of our research is replicate the research of [28] using a different statistical method, here we only briefly summarize and update the literature reviewed by [28]. In their model, turnover intentions is a function of burnout and job satisfaction; burnout and job satisfaction are each a function of work context characteristics, work climate, and personality dimensions.

The turnover literature indicates that the decision to quit a job results from a comparison of organizational and work-related job characteristics in the employee's current job against corresponding characteristics in perceived alternative jobs; if the employee believes that there are available jobs with better organizational and work-related job characteristics than the employee's current job, then the employee will develop a behavioral intention to quit [12]. Thus, much of the turnover literature examines the determinants of *turnover intentions.*

One frequently studied determinant of turnover intention is *job satisfaction*. Job satisfaction is defined as a positive or negative judgment about one's job [44]. The literature concludes that turnover intention is related to job satisfaction [12]. Similarly, a meta-analysis of nurse turnover research found that nurses' intention to leave the job was related to satisfaction with the work situation [19]. A comprehensive review of the nurse turnover literature confirmed the importance of job satisfaction as a determinant of nurse turnover [15].

Burnout has also been studied as a determinant of turnover intentions. Burnout is defined as a state of persistent exhaustion, including emotional exhaustion (a feeling of being "empty" or "worn out"), disengagement from work, and reduced competence [25]. A meta-analysis concluded that turnover intention is related to emotional exhaustion [23]. Similarly, research focused on nursing found that burnout is related to turnover intention [8].

Thus, [28] hypothesized that turnover intention is negatively related to job satisfaction and positively related to burnout. In turn, they hypothesized that job satisfaction and burnout were each influenced by three factors: work context characteristics, work climate, and personality.

The literature on the determinants of job satisfaction examines a wide variety of *work context* characteristics that fall into a limited number of categories [1] [42]. Four categories of work context characteristics that affect job satisfaction are *job characteristics* (e.g., autonomy, participation, challenge, job responsibilities, routinization, role ambiguity, and role conflict), the *social environment* (e.g., co-worker support, communication, and co-worker friendships), *supervision* (e.g., supervisor support, leadership quality, and the employee's relationship with the supervisor), and *career characteristics* (e.g., opportunities for career advancement and pay). Based on the relevant literature [10] [14] [24], [28] examine *task content, social environment, supervisor relationship,* and *reward* as determinants of both *job satisfaction* and *burnout.*

In addition to work characteristics, the literature concludes that *work climate* is an important determinant of both job satisfaction and burnout. Work climate is defined as employee perceptions of the extent to which the employer is realizing the employee's full potential [4] [10] [39]. Based on the literature [13]

[10] [16], [28] hypothesize that job satisfaction is positively related to work climate and that burnout is negatively related to work climate.

The final determinant of both job satisfaction and burnout is *personality*. Personality is defined as the enduring ways a person has of thinking, feeling, and behaving [9]. Research indicates that an individual's personality is an important determinant of work behaviors and work attitudes, including job satisfaction [7] [21], and stress reactions, including burnout [14] [27] [29] [37]. Thus, [28] hypothesize that job satisfaction is positively related to personality (easy going, orderly, compassionate, and receptive) and that burnout is negatively related to personality.

METHODS

Sample

In January 2007, at the annual Dutch national congress of nurse anaesthetists, the start of the study was announced; every participant at the congress received an invitation to fill out the online questionnaire. In addition, a personal letter was sent to every member of the NVAM (Nederlandse Vereniging van Anesthesiemedewerkers), asking for participation in the study. All nurse anaesthetists working in Dutch hospitals and private clinics were asked to fill out an on-line multiple choice questionnaire containing the following items: work context, work climate, job satisfaction, burnout and personality traits. Directors of private clinics, and employment agencies specializing in nurse anaesthetists also received requests to promote participation in the study. The on-line questionnaire was closed three months later (April 2007). The study was approved by the Medical Ethical Committee of the Catharina Hospital Eindhoven, The Netherlands.

Out of 2,000 Dutch nurse anaesthetists, 923 filled out the questionnaire (response rate of 46%), although 41 failed to complete it entirely and were excluded from further study. This study concentrated on the responses of 882 of the nurse anaesthetists (431 female and 451 male) who filled out the questionnaire completely. The majority of the nurse anaesthetists were between 25 and 54 years old (89.2%), with the largest group (21.2%) being between 45 and 49 years old. More than two-thirds of the respondents (68.7%) were considered experienced as they had been working for more than 5 years as nurse anaesthetists.

Measures

We studied characteristic aspects about the individual work perceptions of nurse anaesthetists, based on models introduced by Maslow, Herzberg, Hackman & Oldham and Karasek, all founders of most modern motivation / work context questionnaires. The TOMO (TOetsingslijst Mens & Organisatie), which was developed by [43], is an observational list to evaluate psychosocial relations in the working environment and is considered one of the most complete and objective lists [33] [43], specifically created for the Dutch market. We adjusted the TOMO into a questionnaire suitable for Dutch nurse anaesthetists. The questionnaire consisted of 51 items and was measured using a five-point Likert scale with 1 = far too few, 2 = too few, 3= enough, 4= too much and 5= far too much. Factor analysis (eigenvalues > 1) was used to find the underlying dimensions.

Psychological health was measured using the Maslach Burnout Inventory (MBI), developed in 1986 to measure burnout as a specific kind of occupational stress reaction amongst human service professionals. The MBI has a stable factor structure within human service occupations across cultures and is judged as

a very reliable instrument [2] [3]. In this study we used the Dutch version, the MBI-DV (Maslach Burnout Inventory Dutch Version) with the efficacy scale, which is considered as valid as the original one [36]. The questionnaire consists of 16 items rated on a seven-point Likert scale anchored 'never' (1) to always (7).

In this study work climate is based on the perceptions of nurse anaesthetists about using their work climate. The Gallup Institute in the United States, performed two major studies where they optimized personnel management and examined the difference between employees who are successful and employees who fail. They concluded that work climate can be measured by twelve different factors, which are in accordance with different motivation models (Herzberg's Two Factor Theory [40], the Job Characteristics Model [13], and the Revised Causal Model of Job Satisfaction [1]). Our questionnaire has respondents rate these 12 factors on a seven-point Likert scale anchored 'never' (1) to always (7) and finally summed (range 12-84).

Personality traits were measured using the Myers Briggs Type Indicator (MBTI) questionnaire. It contains multiform personalities, which is necessary in this homogenous population of nurse anaesthetists [30]. [41] strongly supported the MBTI instrument's construct validity, but their population was rather limited. [20] found some support for the four factor structure, but these results were no more useful than the Big Five model. [26] also argued that the MBTI questionnaire is not a valid instrument to measure the four dimensions. Considering these controversial results, we used factor analysis to examine the structure of the MBTI questionnaire. The MBTI questionnaire is this study contained 56 items rated on a five point Likert scale: a lot (1), a fair amount (2), few (3), very few (4) and absent (5).

The construct of job satisfaction was measured with three items: satisfaction with the job, satisfaction with the organization, and satisfaction with the department's atmosphere on a four point scale (1 = totally disagree, 2 = disagree, 3 = agree and 4 = totally agree).

Finally, the variable turnover intention was measured asking the participants if they intended to leave the profession within the next two years (0 = no, 1 = yes).

Analytical Approach

At least part of the variation in turnover intention is assumed to be explained by the characteristics of the individual nurse anesthetists, and another part by the characteristics of the hospital environment in which they work. Therefore a two-level multilevel model with fixed or random intercepts was estimated. Multilevel modeling and its' technical statistical techniques are discussed in numerous sources in the literature [11] [38]. The model implicitly assumes that the within and between effects are identical as well as assuming that any omitted level-two variables are uncorrelated with the level-two error term [34]. The multilevel models are estimated using restricted generalized least squares. Models were fitted using MLwiN (version 2.24) [35].

RESULTS

Table 1 shows the results of the multilevel model analysis. Level one consists of individual-level characteristics (age, burnout, total job satisfaction, work load factors, personality factors,); level two consists of hospital-level characteristics (number of operating rooms, mean number of activities, mean number of functions, academic hospital).

Column 1 in Table 1 replicates the basic model used in the previous structural equation analysis, previously published [28]. Age, burnout, job satisfaction are significant, similar to the previous structural equation analysis. However, only one workload factor (relation with supervisor) and one personality factor (receptive) were significant in this model. This model, in Column 1 does not account for hospital level variation.

Table 1

Parameter	Turnover Intention (Basic Model)	Turnover Intention (Basic Model) Significant Variables Only	Turnover Intention Hospital Variables Added	Turnover Intention Hospital Variables Added Significant Variables Only
	Column 1	Column 2	Column 3	Column 4
Fixed				
Constant	1.969(1.204)	2.245(1.025)	1.675(1.481)	2.102(1.024)
Level One				
Age < 30	0.317(0.175)*	0.361(0.171)*	0.325(0.176)*	0.371(0.172)*
Age 30-45	0.580(0.163)*	0.602(0.161)*	0.548(0.164)*	0.582(0.162)*
Workload 1	-0.034(0.031)		-0.039(0.032)	
Workload 2	0.031(0.041)		0.041(0.042)	
Workload 3	-0.100(0.037)*	-0.108(0.340)*	-0.100(0.038)*	-.109(0.034)*
Workload 4	-0.004(0.051)		-0.026(0.053)	
Work climate	0.001(0.012)		0.002(0.012)	
Personality 1	0.117(0.093)		0.119(0.094)	
Personality 2	-0.032(0.083)		-0.037(0.084)	
Personality 3	-0.053(0.084)		-0.050(0.085)	
Personality 4	-0.260(0.088)*	-0.279(0.084)*	-0.265(0.088)*	-0.287(0.084)*
Burnout	0.066(0.010)*	0.062(0.009)*	0.066(0.010)*	0.062(0.009)*
Total Job Satisfaction	-0.403(0.068)*	-0.396(0.063)*	-0.412(0.069)*	-0.402(0.063)*
Level Two				
Academic Hospital			0.109(0.313)	
# Operating Rooms			0.020(0.116)	
# of Activities			0.243(0.900)	
# of Functions			0.576(0.301)*	0.430(0.244)*
% of Nurses				

Standard errors in parentheses
*: $p \le .05$, two-tailed t-test

As can be seen in Column 2 of Table 1, dropping the variables that were not statistically significant also had little effect on the parameters. We therefore focus on the results from Column 3 and Column 4 of Table 1 below.

Younger age is positively related to turnover (e.g., age < 30, coefficient = 0.325, SE = 0.176, $p\le.0.05$, and age from 30 to 45, coefficient = 0.548, SE = 0.164, $p\le.0.05$). Workload factor 3 (relation with supervisor) and personality factor 4 (receptive) remain significant predictors of turnover intention, as

does burnout and satisfaction (these variables are all significant at the level of p≤.0.05; see Table for exact values). Additionally, the average number of functions performed by nurse anesthetists in hospitals has a significant impact on turnover intention, the greater the number of functions, the higher the turnover intention.

Our final, and preferred, model is shown in Column 4, Table 1. All insignificant variables have been omitted. The significant variables remain the same, still similar to the original structural equation analysis. The main difference is that work climate becomes insignificant when the average number of functions at the hospital level is considered.

An analysis of the intra-class correlation coefficients (ICC) shows what proportion of the total residual variation is due to differences between hospitals. We find that total residual variation in turnover intention due to differences between hospitals drops to zero in our preferred model.

DISCUSSION

The focus of this paper has been to compare two different analysis methodologies of a model of turnover intentions: structural equation and multi-level modeling. An interesting, and arguably important question, we examine here is whether the same analysis results, and therefore the same conclusions, are reached using different analysis methodologies.

Our results indicate that if the hospital level is taken into consideration, that work climate becomes non-significant. This is not surprising, since the term "organizational climate" has most frequently been used to describe the perceptions that organization members share of particular features, or fundamental elements, of their organizational work setting—both formal and informal [5] [6] [31] [32]. The literature concludes that, regardless of how organizational climate is measured, perceptions of organizational climate are important and that perceptions of organizational climate influence employee behavior, including the decision to leave the organization.

Limitations

This study was conducted with a data collected in a single time frame. Since it is cross-sectional data, only associations can be determined from the results; we cannot rigorously infer causation. Longitudinal data would provide the opportunity collect data on those who did leave the organization (hospital), acting on their turnover intentions. The examination of the time series data may be more helpful in suggesting exactly which variables, for example, which workload factors, contribute most to individuals acting on their turnover intentions.

CONCLUSION

As in the previous research with this data, the high overall turnover intention (approximately 42%) is troublesome, particularly given the current shortage of nurse anesthetists in the Netherlands. Another concerning factor is that the younger nurse anesthetists have a higher turnover intention. This could worsen the shortage situation if greater numbers of younger nurse anesthetists leave the field to pursue different careers.

Work climate has an impact in the previous study, and is controlled for in this study by accounting for the variation between hospitals and the average number of functions that nurse anesthetists are

responsible for performing, which is clearly a part of the work climate. This is consistent with the previously mentioned literature [5] [6] [31] [32], in terms of coworkers sharing a similar perception or interpretation of the organizational climate. This could be an important factor to address, if the hospitals' goal is to decrease the turnover intentions, and resulting actual turnover, of nurse anesthetists.

Organizational climate can be altered and to some extent desired change can be promoted or even directed [17]. Change strategies should be selective, designed to balance continuity and change while retaining historically effective aspects of the organization's functions. These changes will most likely need to occur simultaneously while the organizations (hospitals) address other issues related to an increased demand for healthcare by an aging population. This may create the need for changes in the very structure of the hospitals, and may be an opportunity to address the issue of the organizational climate, as well as the levels of burnout and satisfaction, along with other human resource management initiatives.

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