

THE RELATIONSHIP OF SHIFT WORK TO NURSES' SATISFACTION AND PERCEIVED WORK PERFORMANCE

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Shift work is an important issue in the nursing profession because it is difficult for most nurses to avoid it in some form or another (Mott, Mann, McLoughlin & Warwick, 1965; Rose, 1984). Being a working nurse, in most circumstances, implies working some form of shift schedule. Not only does shift work affect an individual's health, social life and performance (Aschoff, 1980; Colligan, 1983; Colquhoun & Rutenfranz, 1980; Felton, 1975), it also affects job satisfaction, fitness and life satisfaction in general (McGrath, Kelly & Machatka, 1984). The deleterious effects of shift work have generally been attributed to desynchronization of the work-sleep cycle (Felton, 1975). This, in turn, may lead to disruption of the various metabolic functions which follow a circadian pattern (Tom, 1976; Walker, 1978). Thus, while shift work is essential for patient care, it can obviously result in negative effects on the nurses themselves. It is important, therefore, that researchers concern themselves with the effects of shift work and, in particular, with predicting individual responses to shift work.

With regard to the question of individual differences in adjustment to shift work, research by Folkard, Monk and Lobban (1979) found that morning types (M types: people who feel more alert and "alive" during the morning) have a more difficult time adjusting to shift work than evening types (E types: people who prefer sleeping later in the morning and staying up later in the evenings). Folkard et al. (1979) developed a scale which when factor analysed produced three factors: sleep rigidity (flexibility of sleep habits), vigorousness (ability to overcome drowsiness and fatigue) and morningness. However, Courtwright and Frankenfeld (1984), in two administrations of this scale failed to replicate the factor structure originally obtained by Folkard et al. In fact, the factors extracted from the first administration by Courtwright and Frankenfeld did not compare to those extracted from the second administration. They concluded, therefore, that the Folkard et al. scale did not have predictive validity, at least in their case.

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Akerstedt and Gillberg (1981) have also produced a six-factor scale which purports to measure quality of sleep, difficulty of falling asleep, premature awakening, environmental disturbances, restorative value of sleep and mood. Scores on these subscales should, theoretically, bear a relationship to satisfaction and perceived job performance of shift workers. However, to date there has been no reported replication of the factor structure of the Akerstedt and Gillberg scale. The purpose of the present study, therefore, was to determine for a group of working nurses and nurse interns a) whether or not the factor structures of the Folkard et al. and Akerstedt and Gillberg scales could be replicated, and b) whether measures of job satisfaction with and perceived performance on the day and night shifts under a rapidly rotating shift system bear any relationship to scores on these scales.

Method

Subjects

The study sample consisted of all nonsupervisory registered nurses and nurse interns working the "rapidly rotating two-shift system" on either a medical or surgical floor of a large urban hospital in St. John's, Newfoundland. Of 63 people who consented to participate in the study, 50 actually returned their questionnaires, for a return rate of 80%. All respondents were female (no males employed), 62% were single, and 69% were RNs. The mean number of years worked was 3.8 (Standard deviation [s.d.] = 5.1) and the average age was 25.6 years (s.d. = 6.1).

Materials

The questionnaire consisted of the following: six items related to demographic characteristics (age, sex, work experience, marital status) and respondents' perceptions of the level of performance on and satisfaction with days, nights, and eight-hour shifts; 19 items from the Folkard et al. (1979) scale that were related to their constructs of sleep flexibility, morningness, and drowsiness; and ten items from the Akerstedt and Gillberg (1981) scale that were related to quality of sleep, difficulty falling asleep, premature awakening, environmental disturbances, restorative value of sleep, and mood. The questionnaire was divided into three sections corresponding to the demographic information plus the two scales. Because neither the Folkard et al. nor the Akerstedt & Gillberg scales are copyrighted and both are published in the public domain, and because their use was for research purposes only, permission from the authors to use their scales was deemed unnecessary, a generally accepted practice.

Procedure

Potential subjects for the study were approached by an inside contact (the spouse of the senior author, a registered nurse) rather than by the researchers themselves as a precaution against consent bias (Polit & Hungler, 1983). Informed consent, a requirement of the Health Sciences ethics committee, was obtained from all potential respondents; they were also assured of complete confidentiality. Those who agreed to participate were then contacted at the beginning of their next night shift and provided with a copy of the questionnaire to be completed during the shift. The night shift, typically, is not as task oriented or hectic as the day shift and therefore research participants have more time available for completion of questionnaires, etc. (Mott et al., 1965). A pilot study carried out with six nurses working the day shift had shown that, by the end of their shift, none of the six were able to complete the questionnaire. In addition, because of the chronic understaffing at this hospital during the day shifts, having respondents complete the questionnaire during the day, even if they could have found the time to do it, may have introduced more biases into the results than relying only on nurses working the night shift. For this reason, it was not possible to analyse responses separately for those completing the questionnaire who worked days and those who worked nights. Finally, because respondents were free to complete the questionnaire at any point during their shifts, they probably did so when they most felt like it (i.e., when they were most mentally alert). Thus they probably completed the questionnaire earlier rather than later in their shifts and any problems arising from fatigue were probably minimal.

Results

Factor analyses

Both sets of scales were factor analysed using principal components analysis and varimax rotation. Factor analysis is a statistical procedure used to determine, for a questionnaire such as the one employed in the present study, how many independent "subscales" or "factors" there are. While in theory there are as many factors as there are items, extracting this many factors would be pointless. Thus the procedure identifies those items that are highly intercorrelated as the principal components. The varimax rotation procedure assures that the sets of factors identified are as independent of one another as possible (i.e., orthogonal). This then means that scores computed for one subscale or factor are as uncontaminated by scores on other factors as is statistically possible.

While the factor analyses of the two scales were successful in one sense (in that they produced a factor structure for each scale), they were unsuccessful at reproducing the original factor structures reported by Folkard et al. (1970) and by Akerstedt and Gillberg (1981). Therefore no further analyses were attempted with the separate scales. Instead, the questions from the two scales were combined into one set and factor-analysed. This procedure turned out to be very satisfactory. After eliminating seven questions with low or near zero item-total correlations (r 's $< .15$), the principal components analysis, followed by varimax rotation, yielded seven factors with Eigenvalues greater than 1.0 and accounted for 71.3% of the variance. These are shown in Table 1. As can be seen, each question clearly loaded on only one factor and the factor loadings ranged from .41 to .87. The factors were labelled (from one to seven respectively) Sleep Difficulty, Control Over Sleep, Restorative Value of Sleep, Drowsiness, Effects of Sleep Loss, Regularity, and Rigidity.

Analysis of variance

A score was computed for each subject, on each of the seven factors that were derived from the factor analysis, by summing their responses across all items composing a given factor. The subjects were then divided into three groups on the basis of the shift identified as resulting in their worse performance (e.g., day, night or no difference), and their scores on each of the factor subscales analysed using a one-way anova. Only one factor proved to be significantly related to perceived performance. That was the Sleep Difficulty factor. Those who reported that they performed less well on day shifts had the lowest scores on the Sleep Difficulties factor ($\bar{X} = 4.8$, s.d. = 4.9), those reporting nights as lower performance shifts had the highest scores ($\bar{X} = 8.0$, s.d. = 2.5), while those reporting no difference between days and nights had intermediate scores ($\bar{X} = 5.8$, s.d. = 3.1). The analysis of variance was statistically reliable: $F(2,46) = 3.38$, $p < .05$.

Scores on the seven-factor analytically derived subscales were also analysed by perceived shift satisfaction. Three factors distinguished between day, night, and no difference groups. These were the Sleep Difficulty, Control Over Sleep and Drowsiness factors. Subjects reporting the least satisfaction with the day shift had the lowest scores on the Sleep Difficulty subscale ($\bar{X} = 4.9$, s.d. = 4.8), while those reporting dissatisfaction with the night shift had the highest scores ($\bar{X} = 7.4$, s.d. = 2.5). Those reporting no difference between days and nights were intermediate ($\bar{X} = 5.2$, s.d. = 2.4). The differences were statistically reliable: $F(3,45) = 2.95$, $p < .05$.

With regard to Control Over Sleep, those most dissatisfied with working days scored highest ($\bar{X} = 5.8$, s.d. = 1.6), those most dissatisfied with

Table 1

Factor Item Loadings for Combined Scales

		Factors		
Item and Source*		1 Sleep Difficulties	2 Control Over Sleep	
A 3.	Difficulty falling asleep at night	.69		
A 5.	Premature awakening during day sleep	.81		
A 7.	Environmental disturbances during day sleep	.68		
F 2.	"Sleep in" late	.62		
F13.	Overcome drowsiness		.79	
F17.	Ease of waking up		.82	
F19.	Wake up before alarm		.57	
		3 Restorative Value of Sleep	4 Drowsiness	5 Effects of Sleep Loss
A 9.	Restorative value of day sleep	.75		
F 1.	Ease of taking "cat naps"	.70		
F 5.	Ease of sleep during day	.72		
A10.	Restorative value of night sleep		.66	
F 4.	Phases when difficult to get to sleep		.48	
F 9.	Drowsy during day		.68	
F12.	"Wake up" properly		.62	
A11.	Mood change (irritated) during night work			.74
F15.	Reaction working odd hours			.47
F16.	Feel livelier during day			.78
		6 Regularity	7 Rigidity of Sleep	
A 8.	Environmental disturbances during night	.57		
F 6.	Regularity of bed-time	.64		
F11.	Miss a night's sleep	.75		
A 4.	Difficult falling asleep at night		.87	
A 6.	Premature awakening during night sleep		.66	

*"A" denotes questions from Akerstedt and Gillberg (1981).

**"F" denotes questions from Folkard et al. (1979).

working nights scored lowest ($\bar{X} = 4.6$, s.d. = 1.8), and those indicating no difference were intermediate (5.3, s.d. = 1.2), $F(3,45) = 3.39$, $p < .05$).

Finally, on the Drowsiness factor, those most dissatisfied with working nights scored highest ($\bar{X} = 6.2$, s.d. = 1.8) while those most dissatisfied with working days and those indicating no difference scored about the same ($\bar{X} = 4.7$ and 4.6, s.d. = 1.9 and 1.2, respectively). The analysis of variance was reliable: $F(3,44) = 3.32$, $p < .05$.

Discussion

The results of the present study are partially consistent with past research. First of all, the factor analysis of the separate Folkard et al. (1979) scale and the Akerstedt and Gillberg (1981) scale failed to confirm earlier analyses. The present findings with regard to the factor structure of the Folkard et al. scale are consistent with the earlier findings of Courtright and Frankenfeld (1984). In two administrations of the Folkard et al. scale, they also were unable to replicate the factor structure originally obtained by Folkard et al. (1979). The nonreplication of the factor structure of the Akerstedt and Gillberg scale also raises questions about the original findings. This, however, does not mean that the scales are not useful. Factor analysis of the complete set of questions from both scales produced a factor structure that may be both meaningful and useful. Moreover, three of the factor subscales were related to nurses' perceptions about which shift they performed most inadequately on and which shift they were least satisfied with.

Nurses who perceived their worse performance as occurring on the night shift reported more sleep difficulties than those reporting no difference between days and nights or those whose worse performance was reported as occurring on the day shift. This finding concurs with earlier research (Foret, Bensimon, Benoit & Vieux, 1981; Hepburn, Ortiz & Locksley, 1984; Mecacci & Zani, 1983).

The present study also examined perceived satisfaction with the different shifts. It was found that three factor subscales distinguished between those reporting most dissatisfaction with night shift and those reporting most dissatisfaction with day shifts or those reporting no difference. Those reporting least satisfaction with the night shift were also those reporting the most sleep difficulties, the least control over sleep and the greatest problems with drowsiness and related problems. Conversely, those reporting least satisfaction with the day shift, had fewer sleep difficulties, more control, and fewer complaints about drowsiness than those dissatisfied with the night shift. It appears that those nurses dissatisfied with working days were not dissatisfied because of sleep problems, but perhaps because of other problems not assessed in the present research. These could be such things as

disruption of family, social and recreational life (Harrington, 1978) or perhaps more general dissatisfactions with the nursing profession. Obviously more research should be done to determine whether or not this pattern persists and what the basis of it is.

The present findings call into question the need for instruments that purport to assess "morning" types and "evening" types, at least among nurses working day and night shifts on a rapidly rotating basis. While our sample was admittedly on the small side and nonrandom (although it was the total population of nurses on the two floors), we could find no evidence of the existence of these two types of individuals among our nursing sample, let alone any evidence that satisfaction and performance with or on certain shifts was related to this typology. We can suggest, and somewhat more parsimoniously, that dissatisfaction among nurses with the night shift and the perception that one's performance is less than optimum on this shift are primarily a function of sleep difficulties and sleep-related problems such as drowsiness and feelings of lack of control over sleep.

The present findings have implications for nursing administration. Cohen (1981) suggested that circadian rhythms must be considered when shift systems are devised and that nurses' circadian rhythms may affect the quality of patients' health care. Our subjects would apparently agree. Furthermore, Harrington (1978) argued that in order to increase the popularity of the night shift, only volunteers ought to be employed on this shift. This might be feasible if proper incentives could be provided. However, given the general dissatisfaction with the night shift, at least among our nurses, these incentives would have to be quite significant in order to be effective. However, given that night shifts are essential and that significant incentives, perhaps in terms of shift differentials may not be possible, other ways of reducing the effects of night work on job performance and satisfaction may be possible. For example, Bennett, Smith and Wedderburn (1982) found that counselling makes shift work easier to cope with. Minors, Waterhouse and Folkard (1983) argue that a major way of dealing with the disturbances of night work is for the individual to build a structured lifestyle around that shift, with regular eating, sleeping and leisure times built in. Walker (1978) also recommends that only a single night shift, with at least 24 hours of free time between each such shift, be assigned any given individual. Though this is not always possible, the "rapidly rotating shift system" comes close to satisfying Walker's criterion. Finally, because we know that a sense of control is important in coping with environmental stressors (Baum & Singer, 1980), it might be worthwhile introducing some form of individual control by allowing a certain degree of choice in shift scheduling.

In summary, the results of the present research reinforce the notion that the night shift, among nurses, is seen as detrimental to both job

satisfaction and job performance. Specifically, sleep difficulties, drowsiness, and control over sleep appear to be the factors that lead to satisfaction and performance decrements. There was no evidence that the "morning" and "evening" typology is a useful construct when examining the relationship of perceptions of work performance and of satisfaction to a "rapidly rotating shift system".

REFERENCES

- Akerstedt, T. & Gillberg, M. (1981). Sleep disturbances and shiftwork. In A. Reinberg, N. Vieux, & P. Andlauer (Eds.), *Night and shift work: Biological and social aspects* (pp. 122-127). Toronto: Pergamon.
- Aschoff, J. (1980). Features of circadian rhythms for the design of shift schedules. In W.P. Colquhoun & J. Rutenfranz (Eds.), *Studies of shift work*. London: Taylor and Francis.
- Baum, A. & Singer, J.E. (Eds.). (1980). *Advances in environmental psychology, Volume 2: Applications of personal control*. New York: Erlbaum.
- Bennet, S., Smith, P., & Wedderburn, A.A. (1982). Towards a synthesis of research findings for application with shiftworkers. *Journal of Human Ecology*, 11, 13-19.
- Cohen, M. (1981). A case against inflexible routine shift rotation. *Nursing Leadership*, 4, 14-81.
- Colligan, M. (1983). Health and safety: Shift work and nurses' health. *Oregon Nurse*, 48, 22.
- Colquhoun, W.P. & Rutenfranz, J. (Eds.). (1980). *Studies of shiftwork*. London: Taylor and Francis.
- Courtwright, J.F. & Frankenfeld, C.A. (1984). Evaluation of a questionnaire to predict adjustment to shift work. In M.J. Alluisi, S. DeGroot, & E.A. Alluisi (Eds.), *Proceedings of the human factors society 28th annual meeting: Volume 2*. San Antonio, Texas: New Frontiers for Science and Technology.
- Felton, G. (1975). Body rhythm effects on rotating work shifts. *Journal of Nursing Administration*, 5, 16-19.
- Folkard, S., Monk, T.H., & Lobban, M.C. (1979). Towards a predictive test of adjustment to shift work. *Ergonomics*, 22, 79-81.
- Foret, J., Bensimon, G., Benoit, O., & Vieux, N. (1981). Quality of sleep as a function of age and shift work. In A. Reinberg, N. Vieux, & P. Andlauer (Eds.), *Night and shift work: Biological and social aspects* (pp. 149-154). Toronto: Pergamon.
- Harrington, J.M. (1978). *Shift work and health: A critical review of the literature*. London: Her Majesty's Stationary Office.
- Hepburn, C., Ortiz, V., & Locksley, A. (1984). Morning and evening people: Examination of an identifying scale and of social- and self-perceptions of personality differences. *Journal of Research in Personality*, 18, 99-109.

- McGrath, J.E., Kelly, J.R., & Machatka, D.E. (1984). The social psychology of time: Entrainment of behaviour in social and organization settings. *Applied Social Psychology Annual*, 5, 10-44.
- Mecacci, L., & Zani, A. (1983). Morning-evening preferences and sleep-waking diary data of morning and evening types in students and worker samples. *Ergonomics*, 26, 229-241.
- Minors, D.S., Waterhouse, J.M., & Folkard, S. (1983, April 10). Out of rhythm. *Nursing Times*, 26-27.
- Mott, P.E., Mann, F.C., McLoughlin, Q., & Warwick, D.P. (1965). *Shift work: The social, psychological and physical consequences*. Ann Arbor: University of Michigan Press.
- Polit, D. & Hungler, B. (1983). *Nursing research: Principles and methods* (2nd. Ed.). Toronto: Lippincott.
- Rose, M. (1984). Shiftwork: Worth the risk? *Occupational Health and Safety*, 54, 42-48.
- Tom, C.K. (1976). Nursing assessment of biological rhythms. *Nursing Clinics of North America*, 11, 621-630.
- Walker, J. (1978). *The human aspects of shiftwork*. London: Management Paperbacks.

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RÉSUMÉ

Lien entre le travail par postes, et la satisfaction au travail infirmier et le rendement perçu chez le personnel

La présente étude a été conçue de manière à reproduire, à l'aide d'un échantillon d'infirmières, la structure par facteurs de deux questionnaires précédemment utilisés et qui portaient sur le travail par postes (Akerstedt & Gillberg, 1981; Folkard, Monk, & Lobban, 1979); l'étude vise également à mettre en rapport les résultats de ces échelles et la satisfaction au travail ainsi que le rendement perçu. L'échantillon était composé de cinquante infirmières diplômées et infirmières stagiaires travaillant dans un grand hôpital général, selon un horaire à deux postes et à roulement rapide.

Bien que des analyses factorielles distinctes n'aient pas permis de reproduire les résultats obtenus antérieurement, une analyse factorielle des échelles combinées a permis de dégager un ensemble utile de facteurs. Parmi les facteurs isolés, la difficulté à dormir a montré le lien le plus clair avec la satisfaction et le rendement. Deux autres facteurs, la somnolence, ainsi que la lutte contre le sommeil étaient également associés à la satisfaction. On en a conclu que les infirmières travaillant selon un horaire par postes à roulement rapide fondent l'évaluation qu'elles font de leur rendement et de leur degré de satisfaction sur les problèmes liés au sommeil (p.ex. difficulté à s'endormir ou à préserver son sommeil, et lutte contre la somnolence et la fatigue). Rien n'indique que la typologie "matin" et "soir" soit utile lorsqu'on examine le lien entre les perceptions du rendement et la satisfaction au travail, et le système par postes à roulement rapide.