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Time budget allocation by and stress and job satisfaction among eye care workers

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Background: Studies on eye care workers' time budget are relevant because a current ophthalmologist is challenged by a high caseload, necessity to have at least two part-time jobs to help his/her financial status, job-related burnout, stresses, interrole conflicts, etc. To our best knowledge this is the first study to investigate the relation between time budget allocations and social and demographic parameters, and the role of an adequate time budget in job satisfaction and combating stress and burnout.
Purpose: To determine (1) the composition of time spent in different activities by different categories of eye care workers and (2) the relations between time budget parameters, stress reactions and job satisfaction.
Material and Methods: Two hundred and eleven eye care workers from the Filatov Institute of Eye Disease and Tissue therapy were requested to respond to relevant questions. The response rate was 85.8% (181/211). The 181 responders included 99 nursing staff members and 82 ophthalmologists. The responders completed a specially designed questionnaire. In addition, we used the Rodina, Biron, Ukhanova, Semeniuk, and Kernas Interrole Conflict Scale for Eye-care Workers, the Tsekhmister, Daniliuk, Rodina, Biron, and Semeniuk's Stress Reaction Inventory for Eye Care Workers, and the Kim, Leong, and Lee's Job Satisfaction Scale (JSS).
Results: Time spent working represented the largest component of the time budget for both physicians and nurses. It was demonstrated that ophthalmologists worked overtime, and both eye care doctors and eye care nurses self-reported sleep deprivation. Our principal component analysis demonstrated the presence of interrole conflicts (work-family and family-work conflicts) for eye care doctors, but not for eye care nurses. Adequate physical activity and adequate sleep duration appeared to provide protection against family-work conflicts and improve both the capacity to mitigate emotional responses to stressors and job satisfaction. There was a decrease in nurses' job satisfaction with an increase in their engagement in professional activities; this characterizes a vocational maladjustment mechanism (they worked just because they had to). Therefore, the time allocation study methodology enabled rather objectively assessing working conditions of care workers and approaches to meeting their needs.
Keywords: time budget allocation, interrole conflict, stress, job satisfaction, ophthalmologists

Introduction

Time budget allocation is one of the most capacious characteristics of the specialist's daily life, and represents a quantitative estimate of daily activity, the time spent on this or that activity or task/work, or form of representation of actual data on the use of time [1]. Studies on eye care worker's time budget allocations are relevant because a current ophthalmologist is challenged by a high caseload, necessity to have at least two part-time jobs to help his/her financial status [2], job-related burnout [3, 4], stresses [2, 5], interrole conflicts [5-7], etc.

Studies have demonstrated that (1) medical staff member's time budget structure and principles of distribution of duties among all the staff undergo changes, and (2) demands on medical specialists (particularly, study physicians [8], emergency physicians [9], and nurses [10]) are increasing. It is important to investigate the relation between time budget allocations and social and demographic parameters [8], and the role of an adequate time budget in job satisfaction and combating stress and burnout [10].

However, to the best of our knowledge, no such studies on eye care workers have been conducted. Therefore, the purpose of the current study was to determine (1) the composition of time spent in different activities by different categories of eye care workers and (2) the relations between time budget parameters, stress reactions and job satisfaction.

Material and Methods

The study sample consisted of the eye care workers from the Filatov institute. Two hundred and eleven eye care workers were requested to respond to questions on their weekly time budget and specify their age, professional experience, gender, marital status, number of children in the family (Social and Demographic Domain), and number of working hours per week, number of hours devoted to family per week, number of hours spent in sleep per week, and number of hours spent in physical activity (Time Domain). The response rate was 85.8% (181/211). The 181 responders included 99 nursing staff members and 82 ophthalmologists.

We used the Interrole Conflict Scale for Eye-care Workers [6] developed by Ukrainian researchers N.V. Rodina, B.V. Biron, A.I. Ukhanova, N.S. Semeniuk, and A.V. Kernas. The scale comprises two subscales. The work-family conflict (WFC) subscale characterizes the role conflict in which the general demands of, time devoted to, and strain created by the job interfere with performing family-related responsibilities. The family-work conflict (FWC) subscale characterizes the intensity of interrole conflict in which the general demands of, time devoted to, and strain created by the family interfere with performing work-related responsibilities.

In addition, we used the Stress Reaction Inventory for Eye Care Workers [5] developed by Ukrainian researchers I.V. Tsekhmister, I.V. Daniliuk, N.V. Rodina, B.V. Biron, and N.S. Semeniuk, which had showed evidence of internal consistency and construct validity. Within the inventory, the four categories representing Reactions to Stressors are Physiological (F), Emotional (G), Behavioral (H), and Cognitive Appraisal (I).

The Kim, Leong, and Lee's Job Satisfaction Scale (JSS) [11] was translated into Ukrainian and psychometrically analyzed by Semeniuk [12], and used for the assessment of conscious job and organizational satisfaction. The JSS consists of 5 items describing a subjective assessment of individual's job [13], and responders check a box for the items using a 5-point Likert-type scale.

The Lüscher 8-color test was used for the assessment of unconscious job and organizational satisfaction, with the proximity to the autogenic norm calculated as the difference between the maximum possible deviation from the autogenic norm (32 points) and the deviation value for a particular subject. This characteristic was psychometrically analyzed by Semeniuk [12] and demonstrated adequate internal consistency.

Results

In the first phase of the study, an exploratory analysis of the data from the chronological block of the questionnaire for assessing eye care workers was completed. Table 1 presents descriptive statistics for questionnaire items.

Skewness (S) and kurtosis (K) were assessed for each of time budget items. The distributions of some of the above items substantially deviated from the normal distribution. In order to determine

whether a factor is normally distributed, the skewness and kurtosis should not be more than 2.5 times the standard error of skewness (SES) and standard error of kurtosis (SEK) [14]. Therefore, nonparametric statistic methods, the Mann-Whitney U test and Kendall's tau-b test were used for further statistical analyses.

Let us consider the composition of the time budget for the nursing staff sample versus the physician staff sample. It was demonstrated that the physician staff had more working hours a week than the nursing staff. The mean number of working hours a day (based on the five-day working week) and the mean number of working hours a week were 8 hours and 40 hours, respectively, for the nursing staff. Physicians were busy with their work for significantly longer periods of time than the nursing staff (the Mann-Whitney U test, 1052.000; $p < 0.001$). The mean number of working hours a day (based on the five-day working week) and the mean number of working hours a week were 9 hours and 45 hours, respectively, for the physician staff.

The nursing staff reported to spend more hours a week devoted to family than the physician staff, and the former spent five hours a day, whereas the latter, four hours a day devoted to family. The mean number of hours spent in sleep per day was 6.5 both for the nursing staff and the physician staff. Both for the nursing staff and the physician staff, the mean number of hours spent in physical activity was more than 0.5 a day, ranging to four hours a week. Of note that the Mann-Whitney U test showed no significant differences between the nursing staff sample and the physician staff sample in the number of hours devoted to family ($U = 1579.000$; $p = 0.146$), number of hours spent in sleep ($U = 1614.000$; $p = 0.193$) and number of hours spent in physical activity ($U = 1586.000$; $p = 0.151$).

The percentages of time spent on work-related activities, family activities, sleep, physical activity, and other activities were 23.9%, 21.9%, 27.4%, 2.2%, and 24.6% respectively, for the nursing staff sample, and 26.9%, 16.8%, 27.3%, 2.4%, and 26.6%, respectively, for the physician staff sample. The Chi-squared test value was 9.363, with a p-value of 0.052. Since the level of significance $p \leq 0.05$ was assumed, the result was not statistically significant, but may be considered as evidence of systemic differences in time budget composition between the nursing staff and the physician staff.

A Principal Component Analysis was conducted, using a Promax Rotation, to evaluate the underlying dimensional structure of each sample, and a two-component solution was selected. Component loadings of the structure matrix were used to describe the data determined in the course of data reduction (Table 2).

It was demonstrated that all the examined parameters belonged to this or that component, and the only exclusion was the scale of number of hours spent on family activities, which showed high loadings on the first and second components for the physician staff sample.

The two-component solution for the nursing staff sample comprised a first component with positive loadings on number of working hours and number of hours spent on family activities and a second component with positive loadings on number of hours spent in sleep and negative loadings on number of hours spent on physical activity. The two-component solution for the physician staff sample comprised a first component with positive loadings on number of working hours and number of hours spent on physical activity and a second component with positive loadings on number of working hours, negative loadings on number of hours spent on family activities, and positive loadings on number of hours spent in sleep.

At the next phase of the study, we investigated significant relations between time budget parameters and social-and-demographic parameters of the relevant block of the questionnaire.

We found an inverse relationship between responder's age and number of working hours (Kendall's tau-b = -0.179, $p = 0.017$) for the nursing staff sample. It was also found that the involvement of these eye care workers into professional activity decreased with total professional experience (tau-b = -0.200, $p = 0.008$) and professional experience in eye care (tau-b = -0.153, $p = 0.042$). This indicates that with age and increased professional experience, nursing staff members devote less time to their jobs. There was no significant correlation of age with number of working hours (Kendall's tau-b = -0.020, $p = 0.796$), total professional experience (tau-b = -0.042, $p = 0.710$) or professional experience in eye care (tau-b = -0.049, $p = 0.534$) for the physician staff sample. There was, however, significant correlation of number of hours spent on family activities with responder's age (tau-b = 0.278, $p = 0.012$), total professional experience (tau-b = 0.153, $p = 0.048$) and professional experience in eye care (tau-b = 0.290, $p = 0.008$) for the physician staff sample. Therefore, more experienced physicians had a higher potential to devote time to their family. We

found a significant inverse relationship between number of hours spent on physical activity and responder's age (Kendall's tau-b = -0.221, p = 0.028) for the nursing staff sample, but there was no significant relationship between these parameters for the physician staff sample. It is obvious that the level of physical activity decreased with increasing age for nursing staff members.
Gender was significantly correlated with number of working hours a week (point-biserial correlation coefficient (rpb) = -0.229, p = 0.015) for the physician staff sample. That is, female physicians were less engaged in the professional activity than male physicians. There was, however, no significant correlation of gender with number of hours spent on family activities (rpb = 0.024, p = 0.831), number of hours spent in sleep (rpb = -0.117, p = 0.297) and number of hours spent on physical activity (rpb = -0.146, p = 0.190) per week. Number of hours spent on family activities was significantly associated with marital status both for the nursing staff sample (rpb = 0.199, p = 0.049) and for the physician staff sample (rpb = 0.339, p = 0.002).
Finally, we considered the relations of time budget items with stress reaction, interrole conflict and job satisfaction indices. We found a significant inverse relationship between number of hours spent on physical activity and the family-work conflict subscale (Kendall's tau-b = -0.225, p = 0.005) for the nursing staff sample. Therefore, among the nursing staff members engaged in physical activity, there was a high intensity of the interrole conflict in which the general demands of, time devoted to, and strain created by the family interfered with performing work-related responsibilities. In addition, there was a significant inverse relationship between the number of hours spent on physical activity and the family-work conflict subscale among the physician staff members (tau-b = -0.225, p = 0.005). There were however no other significant relations between time budget indices and the interrole conflict scale.
We found a significant inverse relationship between number of hours spent on family activities and the Emotional stress reaction subscale (H) (Kendall's tau-b = -0.185, p = 0.011) for the nursing staff sample. That is, the more time these eye care workers spend with their families, the less intense are their emotional reactions to stressors. There was also a significant inverse relationship between the above parameters (tau-b = -0.225, p = 0.005) for the physician staff sample. There were however no other significant relations between time budget indices and the Stress Reaction Inventory for Eye Care Workers.
Job satisfaction was found to be inversely related to number of working hours a week (tau-b = -0.287, p < 0.001) for the nursing staff sample. Therefore, the more these eye care workers are engaged in work-related activities, the less satisfaction they have with their job. Moreover, the proximity to the autogenic norm was found to be directly related to the number of hours a week spent on physical activity (tau-b = 0.191, p = 0.011) for the nursing staff sample, which indicated the influence of an active way of life on unconscious job satisfaction. There was a significant direct relationship between job satisfaction and number of hours spent in sleep (tau-b = 0.189; p = 0.027) for the physician staff sample. That is, the more physician staff sample members sleep, the more satisfaction they have with their job.

Discussion

Time budget allocation is a matter of interest since it is an objective indicator of balance between social roles of an eye care worker. The features of time budget allocation pattern which were found in this study are markers of adaptation to hard work which have advantages and disadvantages. Apparently, time spent working formed the largest part of the time budget for both physicians and nurses. Of note that nurses responded that they practically did not work overtime, and mean time worked by nurses was 8 hours a day and 40 hours a five-day week. The mean overtime worked by physicians was 5 hours a five-day week. Therefore, Ukrainian ophthalmologists have to work overtime, and, the presence of difficult situations at work was attributed by them to (1) the requirement to work overtime and at night and (2) widening of personal responsibility, as was found in a study by Semeniuk [12].
In the current study, both eye care doctors and eye care nurses self-reported sleep deprivation. This is in agreement with data reported by a US National prospective cohort study with monthly Web-based survey assessment of intern work and sleep hours (mean sleep duration, 6.27 hour per night) [15] and a Ukrainian study on the way of life of medical university students (with sleep duration of 6-7 hours for most responders) [16].
Our principal component analysis demonstrated the presence of work-family and family-work conflicts for eye care doctors, but not for eye care nurses, because time spent on working activities and time

spent on family activities, the two constituents of the second component, had opposite signs. This corresponds to the data obtained with the inter-role conflict scale for eye-care workers [6]. The authors demonstrated that the intensity of both types of interrole conflict was significantly higher among eye care doctors than among eye care nurses. Compared to male eye care physicians, female eye care physicians were found to be less engaged into professional activity, which was an indirect sign of gender-related differences in interrole conflicts, and was confirmed by studies among ophthalmologists [8, 9]. In the current study, we also found that ophthalmologists commonly have to choose between two options for psychophysiological restoration: engagement in physical activity or longer sleep duration.

Another difference found between eye care doctors and eye care nurses was the role of professional experience in the allocation of time. Eye care nurses exhibited a decrease in professional engagement with an increase in age and professional experience, which was likely due to a decrease in capacity for overcoming workloads with age, whereas ophthalmologists exhibited an increase in engagement in family activities with age, which was likely due to an increase in amount of family duties as well as increased experience of effective time management.

Adequate physical activity and adequate sleep duration appeared to provide protection against family-work conflicts and improve both the capacity to mitigate emotional responses to stressors and job satisfaction. Current evidence demonstrates that physical exercise can improve mood, enhance one's ability to deal with stress, and promote high-quality sleep in physicians [17]. In addition, there have been a number of studies showing altered sleep duration is associated with a higher risk of various diseases, although the evidence on the relation between altered sleep duration and increased risk of cancer is contradictory [18, 19]. A negative aspect of adapting to working conditions was the fact that here was a decrease in nurses' job satisfaction with an increase in their engagement in professional activities; this characterizes a vocational maladjustment mechanism (they worked just because they had to).

Therefore, the time allocation study methodology enabled rather objectively assessing working conditions of care workers and approaches to meeting their needs. Obviously, this parameter should be taken in account when making decisions about work organization and development of technologies for providing an adequate working environment for eye care workers. Our study has several limitations. First, information on time allocation among activities was self-reported by respondents and was assessed only one time during the study period. Second, our study objectives did not involve obtaining information on various types of leisure activities among care workers. Finally, we had no information on responders' (a) satisfaction with family relationships, (b) sleep quality or (c) intensity of physical activity. The advantages of the current study include a large number of assessed parameters, use of multidimensional statistics and scientific novelty.

Table 1. Descriptive statistics for Time Domain items of the questionnaire

Questionnaire items	Group	M	Mdn	SD	S	K
Time spent at work	1	40.162	40.000	10.858	-1.051*	4.220*
	2	45.122	43.500	14.116	-0.078	1.981*
Time spent on family activities (hours)	1	36.798	28.000	31.814	0.979*	0.290
	2	28.293	25.000	23.834	0.761*	0.263
Time spent in sleep (hours)	1	46.030	46.000	7.544	1.441*	6.260*
	2	45.915	47.500	6.171	-0.290	0.002
Time spent on physical activities (hours)	1	3.747	3.000	3.842	0.996*	0.735
	2	3.951	3.000	3.002	0.994*	1.468*

Note: Group 1, nursing stuff; Group 2, physician stuff; *, skewness and kurtosis values that do not meet the requirements of the Morgan and Griego's test.

Table 2. Component loadings of time budget parameters for eye care workers

Parameters	Nurses		Doctors	
	1	2	1	2
Time spent at work (hours)	**0.779**	0.206	-0.048	**0.389**
Time spent on family activities (hours)	**0.810**	-0.019	**0.736**	-0.348
Time spent in sleep (hours)	0.121	**0.720**	-0.004	**0.897**
Time spent on physical activities (hours)	-0.041	**-0.728**	**0.821**	0.190

Note: Component loadings maximal in absolute value are highlighted with bold font.

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