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Psychosocial Aspects at work and the Quality of Sleep of Professors in Higher Education

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ABSTRACT

The present study aims to investigate the association between psychosocial aspects at work and the quality of sleep of professors in a public university in Feira de Santana, Bahia, Brazil. A cross-sectional study was conducted, with descriptive, bivariate and multivariate analysis, including a random sample of 423 professors. The psychosocial aspects work aspects were associated to a perception of poor sleep quality. In analysis of effect modifiers, the variable "practice of physical activity" modified the main association under test. Among professors that did not practice physical activity, the following variables kept statistically associated to the perception of poor sleep quality: having children (PR = 1.33, CI 95% 1.02–1.74), poor self-rated health (PR = 1.49; CI 95% 1.24–1.79) and quality of life self-evaluation (PR = 1.60, CI 95% 1.45–2.00), insufficient time for regular leisure activities (PR = 1.52, CI 95% 1.23–1.86) and high psychological demand (PR = 1.40, CI 95% 1.14–1.72). In final analysis, high strain and passive work were experiences associated to the perception of a poor sleep quality among professors that did not practice physical activity. The results confirmed that the adverse psychosocial aspects at work are associated to negative impacts on the professor's quality of sleep.

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worker health; sleep; professors; higher education

Introduction

Sleep plays an important biological function on the recovery of physical and mental fatigue. It is a physiological state understood as rhythmic, restorative, complex, regular, recurring and reversible to the wakefulness state.[1–3] Its role is fundamental to health and quality of life.[4] People with acute and/or chronic sleep deprivation perceive that, even after rest, they don't feel rested, and their daily activities, including professional and family ones, might be affected.

Several variables may contribute to sleep problems. Labor, one of the most important dimensions of life, might also trigger alterations in sleep quality,[5] causing sickness due to the way it is carried out and due to the environment conditions in which the work is performed.[6]

Sleep quality may be assessed through the evaluation of complaints such as: drowsiness, insomnia, difficulties to sleep or to wake up, waking up in the middle of the night, breathing alterations during sleep and restless sleep. These symptoms represent some of the aspects that configure alterations on the pattern and quality of sleep, being important the frequency in which they occur.[7] Nowadays, sleep alterations configure an important problem of public health that has affected a great part of the population.[8,9]

In the context of the labor of professors in higher education, multiple academic demands such as extensive workload, excessive activities undertaken in and outside working hours, pressures to increase productivity and performance, as well as other characteristics associated to the function of these workers, contribute to the development of high stress levels and, as a result, the quality of sleep is affected.[5,10–12] Therefore, among university professors, issues related to the invasion of free time by work activities, which increase the total working load, have been particularly pointed as a highly relevant problem that compromises several spheres of life, including the amount of time that was supposed to be dedicated to sleep and rest.

In order to evaluate the psychosocial aspects and the stressful situations present at the occupational context, Robert Karasek proposed, in 1979, the Job Demand Control Model (JDC model), developed through the Job Content Questionnaire (JCQ).[13] This

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model highlights two dimensions of work: the psychological demand and the job decision latitude. Based on these two dimensions, different work experiences are proposed: "Low Strain", situation characterized by low psychological and high control over one's own work, "Passive Job", when low demand and low control are experienced, "Active Job", situations of high demand and high control, and "High Strain", which corresponds to the experience of higher health risks related to high psychological demand and low control over one's own work.[13,14] Studies have shown that this model is capable of identifying adverse characteristics in the psychosocial context of work, and allows the analysis of the association of these characteristics to the sleep alterations among workers.[15,16]

In light of the above, the assessment of the correlation between the negative psychosocial work aspects of labor and its connection to the quality of sleep among professors in higher education becomes a necessary investigation, keeping in mind that such workers are in a context of labor in which sleep has an important function to the execution of the teaching-learning activities. In addition, one must consider the consequences of cognitive performance, which is highly dependent on logic and rational thinking, functions that, clearly, can be affected by the duration and quality of sleep.[5]

Due to the importance of the psychosocial aspects of labor on the quality of life at work, and taking as a basis the incipient state of publications about the effects of sleep on the health of professors in higher education, this study aims to investigate the association between psychosocial aspects at work and the quality of sleep among professors at a public university in Feira de Santana, Bahia, Brazil.

Methods

Study type, site and population

This is cross-sectional study, integrated to the research "Occupational stress and health among professors at UEFS", developed by the Epidemiology Center of the State University of Feira de Santana (NEPI/UEFS) from November 2015 to April 2016.

The University under study offers undergraduate and graduate courses (specialization, masters and doctorate) and is structured in departments on the big areas: Health, Biological Sciences, Exact Sciences, Education, Physics, Technology, Literature and Arts, Human Sciences and Philosophy and Applied Social Sciences. The study included all professors effectively engaged in their teaching responsibilities, regardless of their employment relationship with the institution. The exclusion criteria were: absence by reason of professional or sick leave, vacations, award or maternity leave, and refusal to partake in the study.

Study population sample

The sample was selected by random criteria and proportionally stratified by department and type of employment relationship. For the size of the sample, the study considered 931 professors of the institution distributed in the nine education departments of the referred University. For the sample estimation, parameters of study conducted by Valle were considered.[17] The study adopted the following criteria: expected frequency of altered sleep among non-exposed of 66%, altered sleep frequency among exposed of 87%, power of the study of 90% and confidence interval of 95%. The initial calculated sample counted 191 professors. Due to potential losses e refusals, 20% was added to the reached amount, resulting in a sample size of 229 professors. At the end of data collection, 423 professors participated in the survey. Thus, the conducted analysis presented statistical power to the intended evaluation.

Data collection instrument

For the data collection, the study adopted a standardized, anonymous and self-applicable questionnaire, composed by nine blocks of questions. Before starting the application of the questionnaires, the team of researchers conducted, in each department, a collection of data regarding dates and times for the meetings, as well as about the schedule of classes of the selected professors, in order to ease meeting with them. Selected professors were contacted, primarily, the same days in which department and collegiate meetings were held, being made up to four tries to meet the professors, in order to avoid losses in the study. If the professor was not found after four tries, he/she was replaced, having consideration to his/her department, type of employment relationship and gender.

Study variables and data measurement

The effect variable, perception of poor quality of sleep, was measured through the scale *Mini-Sleep Questionnaire* (MSQ).[18] In this instrument, higher scores define a worse quality of sleep. The MSQ is composed of ten questions in a Likert scale with answer options ranging from 1 (never) to 7 (always); the score may vary from 10 to 70 points. The total

sum of scores is divided in four levels of difficulties, being: 10–24 points, good sleep; 25–27 points, slightly altered sleep; 28–30 points, moderately altered sleep; and $\geq$ 31 points, highly altered sleep. In the present study, the MSQ was analyzed as a dichotomized variable: good quality of sleep, which was characterized by the sum of the answers that scored between 10 and $\leq$ 27 points, and poor quality of sleep, which was defined by scores ranging from $\geq$ 28 up to 70 points.[19]

The psychosocial aspects at work, variable of main exposure, were measured through the Job Content Questionnaire (JCQ). The quadrants proposed in the Job Demand Control Model (**JDC model**) were built based on the answers of psychological demand (five items) and decision latitude (six items about the skill discretion and three items about authority of decision), which were evaluated by answers scale ranging from 1 = (strongly disagree) to 4 = (strongly agree). [14] The score obtained to each one of the dimensions of the JCQ was categorized in "high" and "low", utilizing the median as a cutoff point. After this step, the four work experiences proposed by the MDC were constituted: high strain (low control and high demand) evaluated as the group of higher exposure, active (high control and high demand) and passive work (low control and low demand), groups of intermediary exposures and low strain (high control and low demand), considered as the reference group.

The covariates of interest were evaluated based on dichotomous questions, defined according to the following conditions: 0 (for the group of non-exposed professors), and 1 (for the exposed professors), according to the investigated outcome (poor quality of sleep). The questions were categorized the following way: a) sociodemographic characteristics: sex (0 male; 1 female), age (025 to 46 years old; 147 to 59 years), marital status (0 with partner; 1 no partner), having children (0 no; 1 yes); b) health and life habits evaluation: self-rated health (0 good; 1 bad), quality of life (0 good; 1 bad), time for leisure activities (0 yes; 1 no), hours of sleep (07 to 8 hours; 1 less or equal to 6 hours), practice of physical activities (0 yes; 1 no), time for regular leisure activities (0 yes; 1 no).

Data analysis

The study analyzed the unadjusted association between psychosocial aspects at work and quality of sleep and proceeded to the evaluation of effect modifiers. In order to define effect modifiers, the Breslow-Day test of homogeneity was employed, considering values $p \leq 0{,}05$.[20] Among the investigated covariates, practice of physical activity was found to be a modifier of the association between the negative psychosocial aspects at work and poor quality of sleep. Therefore, the sequence of the analyses was conducted considering the strata of this variable.

The analysis of confounding was made through the method of Mantel-Haenszel,[21] to which were considered variations equal or higher than 20% between the measure of unadjusted and adjusted association. As none of the investigated covariates presented variations above the estimated value, the study utilized, as criteria for confounding, the theoretical knowledge for selecting confounding variables and adjusting the final model.

Multiple regression analysis was carried out according to the proceedings recommended by Hosmer and Lemeshow.[22] Poisson regression with robust variance was utilized to estimate prevalence ratios. The final model was obtained based on statistical significance at 5%. The goodness of fit of the model was verified through the Hosmer-Lemeshow Test and the area under the ROC curve.[22]

The analyses e processing of data was executed on the statistical programs Social Package for the Social Sciences (SPSS), version 23.0, and Statistics Data Analysis (Stata) version 17.

Ethical aspects of the study

The study followed the resolution of the National Council of Health 466/2012, and was submitted to and approved by the Research Ethics Committee (CEP) of the State University of Feira de Santana, under the number: 1.145.223 and Certificate of Presentation for Ethical Consideration (CAAE): 44623115.8.0000.0053. By accepting to participate in the study, before receiving the questionnaires, all participants read and signed the Informed Consent Form (TCLE). The participation of professors on the study was voluntary, and the data obtained was kept confidential during all steps of the study.

Results

The sociodemographic characteristics and life habits of 423 studied professors are described on Table 1. The study observed predominance of females (52.0%), young adults (51.1%), aged between 25 and 46 years, marital status with partner (70.6%), with children (70.3%). In self-rated health, 76.5% defined it as good. Quality of life was also reported as good by 67.0%.

Table 1. Prevalence, prevalence ratio and 95% confidence interval of the poor quality of sleep, according to the sociodemographic, psychosocial work characteristics and the experiences of the Demand Control Model. Professors of higher education in a public university in Bahia, Brazil, 2016.

	Total		Poor Quality of sleep			
Variable (n)*	n*	%	P(%)**	PR***	95% CI****	*p* value
Quality of Sleep	408	100.0	61.3	–	–	
Sex (421)						
Male*****	202	48.0	56.7	1.00	–	
Female	219	52.0	65.0	1.14	(0.97–1.34)	0.08
Age (407)						
25–46 years*****	208	51.1	58.5	1.00	–	
47–59 years	199	48.9	62.4	1.06	(0.90–1.25)	0.42
Marital Status (418)						
With Partner*****	295	70.6	57.8	1.00	–	
Without Partner	123	29.4	68.0	1.17	(1.00–1.37)	0.06
Having children (420)						
No*****	125	29.7	56.1	1.00	–	
Yes	295	70.3	63.2	1.12	(0.94–1.34)	0.17
Self-reported health (421)						
Good*****	322	76.5	55.3	1.00		
Bad	99	23.5	80.4	1.45	(1.26–1.67)	< 0.001
Quality of Life (421)						
Good*****	282	67.0	53.0	1.00	–	
Bad	139	33.0	77.6	1.46	(1.26–1.69)	< 0.001
Time for regular leisure activities (422)						
Yes*****	371	88.0	58.3	1.00	–	
No	51	12.0	83.6	1.43	(1.23–1.66)	< 0.001
Hours of Sleep (418)						
7 to 8 hours*****	274	65.5	53.6	1.00	–	
≤ 6 horas	144	34.5	74.0	1.38	(1.18–1.60)	<0.001
Practice of Physical Activity (420)						
Yes*****	132	31.4	66.9	1.00		
No	288	68.6	58.3	0.87	(0.74–1.01)	0.09

*Valid Answers, excluding missing.
**Prevalence.
***Prevalence Ratio.
****Confidence Interval 95%.
*****Reference Group.

A high proportion of professors 88.0% reported having time to practice regular leisure activities. More than a third of the population reported having six or less hours of sleep a day (34.5%). The low percentage of professors that practice physical activity (31.4%) is remarkable (Table 1). The global prevalence of poor sleep quality perception was of 61.3%.

Table 2 presents the self-referred answers of poor sleep quality according to the psychosocial characteristics at work, based , on the Demand Control Model (JDC Model). High psychological demand was reported by 44.2% of professors and 53,4% reported having low control over their own work. 18.7% were classified under the high strain quadrant, and 25% under the passive work one. Thus, 43.7% of the investigated professors experienced unfavorable situations at work (Table 2).

The study determined an association between quality of sleep and high strain (prevalence 44% higher) and passive work (31% higher), when compared to work in low strain. Therefore, low control over own work and high psychological demand were associated to poor quality of sleep. It must be observed that, for the outcome of interest, high demand had a more relevant role over quality of sleep than control over own work, given that exposure only to high demand (passive work) presented statistically significant association, while exposure only to low control, whether separately or together with psychological demand (active work) did not confirm statistically significant association to the quality of sleep (Table 2).

As the practice of physical activity was a modifier of the association between the negative psychosocial aspects at work and the quality of sleep, the analysis was conducted in every stratum of such variable. At the bivariate analysis (Table 3), the percentages of those who did or did not practice physical activity was similar between sexes. Small differences were observed in relation to the other sociodemographic characteristics: those who did not practice physical activity were older (52.7% over 47 years old), with a bigger proportion of those with children and with partners in comparison to those that practice physical activity. However, the more expressive differences were observed in relation to the bad self-rated health (80.0%), bad quality of life (70.0%) and insufficient

Table 2. Prevalence, prevalence ratio and 95% confidence interval of the perception of poor quality of sleep, according to the sociodemographic, psychosocial characteristics of labor and the experiences of the Demand Control Model. Professors of higher education of a public university in Bahia, Brazil, 2016.

	Total		Poor Quality of Sleep			
Variables (n)*	n*	%	P(%)**	PR***	95% CI****	*p* value
Psychological demand (417)						
Low*****	233	55.8	55.6	1.00	–	
High	184	44.2	67.0	1.20	(1.03–1.40)	0.01
Decision Latitude (393)						
Low	210	53.4	63.2	1.08	(0.92–1.28)	0.30
High*****	183	46.6	58.0	1.00	–	
Demand/control Model (389)						
Low Strain job*****	85	21.8	49.4	1.00	–	
Passive job	97	25.0	65.2	1.31	(1.01–1.72)	0.03
Active job	134	34.5	57.8	1.17	(0.89–1.52)	0.23
High Strain job	73	18.7	71.2	1.44	(1.10–1.87)	<0.001

*Valid Answers, excluding missing.
**Prevalence.
***Prevalence Ratio.
****Confidence Interval 95%.
*****Reference Group.

Table 3. Prevalence ratios and 95% confidence intervals of the perception of the poor quality of sleep, according to the sociodemographic characteristics, life habits and psychosocial aspects of labor, by strata of the variable practice of physical activity. Professors of higher education in a public university in Bahia, Brazil, 2016.

	Practice of Physical Activity (n = 132)				No Practice of Physical Activity (n = 288)			
	n*	%	PR* (95% CI)**	*p* value	n*	%	PR* (95% CI)**	*p* value
Sex (420)								
Male	64	48.0	1.00		139	48.0	1.00	
Female	68	52.0	1.17 (0.91–1.50)	0.19	149	52.0	1.13 (0.92–0.39)	0.21
Age (409)								
25–46 years	78	58.4	1.00		132	47.3	1.00	
47–59 years	52	41.6	0.98 (0.75–1.27)	0.90	147	52.7	1.14 (0.93–1.40)	0.19
Marital Status (415)								
With Partner	86	66.2	1.00		206	72.3	1.00	
Without Partner	44	33.8	1.14 (0.89–1.45)	0.29	79	27.7	1.18 (0.96–1.46)	0.12
Having children (417)								
No	46	35.4	1.00		77	27.0	1.00	
Yes	84	64.6	1.17 (0.91–1.50)	0.60	210	73.0	1.33 (1.02–1.74)	0.01
Self-Report Health (419)								
Good	92	70.0	1.00		58	20.0	1.00	
Bad	40	30.0	1.33 (1.08–1.69)	0.01	229	80.0	1.49 (1.24–1.79)	<0.001
Quality of Life (418)								
Good	83	63.0	1.00		88	30.0	1.00	
Bad	49	37.0	1.20 (0.95–1.52)	0.13	198	70.0	1.60 (1.45–2.00)	<0.001
Time for regular leisure activities (419)								
Yes	104	78.8	1.00		21	7.0	1.00	
No	28	21.2	1.27 (1.00–1.61)	0.09	266	93.0	1.52 (1.23–1.86)	<0.001
Psychological demand (414)								
Low****	76	58.0	1.00		128	45.2	1.00	
High	55	42.0	0.92 (0.71–1.18)	0.52	155	54.8	1.40 (1.14–1.72)	<0.001
Decision Latitude (390)								
Low	69	56.0	1.12 (0.85–1.47)	0.40	139	52.0	1.07 (0.87–1.31)	0.50
High****	54	44.0	1.00		128	48.0	1.00	

*Valid Answers, excluding missing.
**Prevalence.
***Prevalence Ratio.
****Confidence Interval 95%.
*****Reference Group.

time for leisure activities (93.0%), in an opposite situation to those who practiced physical activities. Differences were also observed in relation to the psychosocial aspects, those who did not practice physical activity being in a more unfavorable situation (high strain, 54.8%, and low decision latitude, 52.0%) (Table 3).

In addition, among professors that did not practice physical activity, the variables having children (RP = 1.33, IC 95% 1.02–1.74), bad self-rated health (RP = 1.49, IC 95% 1.24–1.79) and quality of life self-evaluation (RP = 1.60, IC 95% 1.45–2.00), insufficient time for regular leisure activities (RP = 1.52, IC 95% 1.23–1.86) and high psychological demand at work

Table 4. Result of the analysis of the logistic regression between the Demand Control Model and the poor quality of sleep, according to the strata of the variable practice of physical activity. Professors of higher education in a public university in Bahia, Brazil, 2016.

	Poor Quality of Sleep			
	Practice of Physical Activity (n = 130)*		No Practice of Physical Activity (n = 276)*	
Variable	PR unadjusted (95% CI)***	PR adjusted**(95% CI)***	PR unadjusted (95% CI)***	PR adjusted** (95% CI)***
Demand-control model				
Low Strain	–	–	–	–
Passive job	0.84 (0.54–1.31)	0.86 (0.56–1.32)	1.64 (1.15–2.33)	1.57 (1.11–2.23)
Active job	0.99 (0.69–0.42)	0.99 (0.69–1.41)	0.15 (0.89–1.86)	1.29 (0.91–1.84)
High Strain	1.07 (0.74–1.56)	0.99 (0.69–1.42)	1.71 (1.19–2.46)	1.50 (1.04–2.16)

*Valid answers, excluding missing.
**Adjusted by the variables sleep less than six hours and poor health self-assessment.
***Confidence Interval 95%.

(RP = 1.40, IC 95% 1.14–1.72) were statistically associated to a poor quality of sleep (Table 3).

Table 4 shows the final models, unadjusted and adjusted to confounding factors, including sleep lower or equal to six hours and bad health self-evaluation. Amongst professors that reported to practice physical activity, an association between stressful work experiences and an alteration of the quality of sleep was not identified, in both models. However, amongst professors that affirmed not to practice physical activity, high strain and passive work were experiences statistically associated to a poor quality of sleep. In other words, the occupational stressors were associated to a poor quality of sleep only in the group of professors that did not practice physical activity (Table 4).

The goodness of fit of the final model was evaluated by the Hosmer-Lemeshow Test[22] ($p = 0.24$); therefore, the obtained model was well adjusted to the data. The ROC curve evidenced an area equal to 0.71, which demonstrates a satisfactory discrimination on the analysis of data.

Discussion

In this study, results indicate that the psychosocial aspects at work, evaluated by the levels of psychological demand and decision latitude, are associated to a poor quality of sleep among the studied professors. The high prevalence of poor sleep found at high psychological demand, high strain work experiences, and passive work, indicate that these occupational stressors may be unfavorable to health, with effects over a poor quality of sleep among professors of higher education.

Association of high strain, stress at work and sleep alterations were also found in other studies.[9,23–27] These findings reinforce the presupposition established at the Job Demand Control Model (JDC model), elaborated by Karasek,[3] which corroborates the hypothesis that prolonged exposures to high strain at work (high psychological demand and low control) influence health negatively.[5,13,17,28]

Experiences with high psychological demands and high strain at work were likewise emphasized in studies conducted with workers from German and Swedish industries, and with Australian nurses. These studies also evidenced that such psychological demands and work strain altered the quality of sleep in the long run.[16,25,29,30] Even though such comparisons may be prejudicial, due to differences in work, cultural characteristics and work conditions, one notices that the most vulnerable presupposition among workers with high demands, high strain and the quality of sleep were consistently evidenced.

The day-to-day work life of the higher education professor involves complex activities, which have been intensified in recent years, both in terms of multiple tasks, and of the expansion of the total working hours taken to undertake such tasks. These characteristics make this group one the most stressful and prone to the occurrence of prejudicial alterations to the quality of life and health.[5,31,32] In this context, the quantity, complexity and, primarily, the new pressures of time for productivity have contributed to the exacerbation of the negative psychosocial factors which are harmful to professors of higher education.[33]

It is noteworthy that the prevalence of a poor quality of sleep was high (61.3%), among the studied professors. Other studies that utilized self-referred instruments of quality of sleep, work conditions, health and occupational stress among professors, found similar results.[34,35] In a study that aimed to analyze the quality of sleep and the associated factors among professors of primary education, a prevalence of poor quality of sleep of 54.3% was seen.[35] Another study, in order to analyze the burnout syndrome and sleeping complaints among university professors, found a prevalence of 59.7%.[34]

The specificities of the work, correlated to the high demands and strains present at this context, help to understand, at least to some extent, the observed associations and its analysis may be greatly useful to identify which psychosocial dimensions of work contribute to the occurrence of the alteration of the quality of sleep among professors of higher education.

This association may be partly explained by the effect of the accentuated release of cortisol, an important endogenous hormone that is produced by the adrenal glands during the period of wakefulness and during moments of higher stress. Release of cortisol occurs primarily by the end of the sleeping period, preparing the organism to initiate the phase of wakefulness.[36] When the worker keeps being exposed to situations that claim high physical and/or psychological demand, a sharp release of cortisol occurs, which may be biologically interpreted by the body as an extemporaneous phase of awakening. This may cause or worsen sleep disorders, which results in worse self-evaluations of the quality of sleep, of the quality of life and health.[25,37]

When physical stress rises, there are impulses in the organism that tend to cause tiredness and, consequently, sleep disturbances. However, when the psychological stress is the elevated one, the effect over the organism is different, being common the occurrence of partial sleep deprivation. Thus, tensions caused by high psychological demands and high exigence at work are associated to a poor quality of sleep, which results in negative consequences to health and to quality of life, bearing in mind that reduced sleep causes effects on the health of people.[9,15,25,38]

In this study, the analysis of the psychosocial aspects of work and the quality of sleep was not homogeneous, since the practice of physical activity modified the effect of the stressful experiences associated to a poor quality of sleep. The regular practice of physical activity is appointed as a positive factor to the protection and promotion of the health levels in people, which reduces the occurrence of many types of aggravations, including cardiovascular problems,[39] mental health,[40] rise of medication consumption[41] and alterations in sleep.[42–44]

Physical activity is, thus, a good strategy to overcome poor sleep among professors in higher education. Studies show that the absence of practice of physical activity is directly associated to the social characteristics of labor, anxiety, depression, psychological and occupational stress, cognitive function and alterations in the quality of sleep.[35,45–49]

In the present study, among professors of higher education that reported practicing physical activity, none of the variables of the work experiences of the JDC model was kept associated to a poor quality of sleep. However, in the group of professors that did not practice physical activity, it was observed that high strain and passive work were associated to the quality of sleep, even after adjust by potential confounding variables.

The relation between passive work and a poor quality of sleep among professors of higher education is still little studied, with significant gaps in the epidemiologic literature. Work under these conditions shapes behaviors of little engagement with the labor activities, something similar to what Selligman[50] identified as affective blunting, which might produce the so-called burnout syndrome. That is characterized by feelings of absence, low motivation e, primarily, by the loss of purpose and meaning at work. This affects the sentiments of being useful to the world, of having one's own worth disseminated by significant contributions (concrete and affective) to the society. Hence, work under such conditions establishes situations of vulnerability, which may reflect on the capacity to relax, to obtain pleasure from one's own work and to be able to enjoy an adequate rest, with satisfactory duration and quality of sleep. If these conditions are associated to the continuous raise of cortisol, as already pointed, they can also impact the quality of sleep. Therefore, the dimensions under question in this work experience (low control and high psychological demand) may be prejudicial to the quality of sleep, since low control over work contributes to the occurrence of occupational stress, anxiety, gradual loss of acquired abilities and interest of the worker.[51]

It is important to highlight the current complexity of the world of work, in which many factors simultaneously influence the occurrence of an event that must be better dimensioned and understood. For example, while evaluating the sociodemographic characteristics, the life and health habits, and the psychosocial characteristics work, it was noted, among the group of professors that reported not to practice physical activity, a more prominent exposure to occupational stressors (JDC model), smaller time and/or irregularity in leisure activities, higher percentage of children, worse quality of life and health, when compared to professors that practiced physical activity. Therefore, those who did not practice physical activity also presented other characteristics that exposed them more strongly to the unfavorable situations.

Considering that time does not expand (one day has exact 24 hours), the inclusion of new tasks or new requirements is going to have to compete with other schedules already established. Hence, it is plausible that the practice of physical activity, for example, will be one of the activities sacrificed to accommodate a

new working schedule. The practice of physical activity modified the association between demand-control and the quality of sleep, and that may be linked to the negative consequences of time use, or even the lack of it, modifying the day-to-day of a professor's labor. Professors in unfavorable work situations (high psychological demand and low control), because of the volume of activities, multiple tasks and absence of autonomy to shape the volume of work to be executed, compromise other dimensions of life, like physical activity, and accumulate, therefore, more exposure to health harming factors. This opens, thus, the need for more complex approaches that are able to consider the relations between the several characteristics involved in the day-to-day work and life of people.

Academic activities and responsibilities have increased the demands to be undertaken by professors. Technological resources, like the internet, for example, dissolved definitely the barriers between expected working hours and the activities to be carried out outside formal workplace. The use of such communication tools, of wide reach, on the other hand, may compromise and preclude personal needs, as is the practice of physical activity, and limit drastically the time availability to leisure and family activities. The excess of activities ends up restricting the relaxation possibilities, with potential negative effects over the quality of sleep, since the expenditure of efforts to the execution of work-related activities, many times, is developed outside the academic environment.[33]

The characteristics mentioned produce a temporal pressure that is incorporated to the daily experience of professors of higher education in the current work context. This experience generates a continuous sensation of lack of time to the activities to be accomplished. This, in turn, contributes to accelerate the rhythm of work, in which more dedication and expanding the working hours become resources and strategies to get things done. As the tasks only increase, this movement solely contributes to increase, likewise, the pressure of time, which reinforces the circle that is created. These characteristics strengthen the hypothesis of the framework that these workers are in a complex work environment, marked by continuous organizational changes, which continually introduce new and diverse attributions and demands, and that has promoted transformations on the professor conditions and habits of life and health, including behaviors such as the practice of leisure activities and the time for rest and relaxation, specially the time dedicated to sleep.[52–54]

In this study, it is adequate to emphasize that some limitations should be considered on the interpretation of the results and improved in future studies. Cross-sectional epidemiological studies, as is this research, allow solely an immediate view of the exposure and the effect, therefore, it was not possible the identification of the temporality on the relation between the psychosocial aspects of labor and a poor quality of sleep on the studied group. Another aspect that must be weighed on the results addresses the objective measurement of the exposure and outcome, having in mind that the obtained answers were analyzed from subjective answers, self-related. However, other studies that utilized self-referred instruments were considered valid and useful to investigate the quality of sleep in professors.[5,17,34,35]

Another limitation refers to recall bias, since, in order to obtain the answers from professors, it was necessary to recall past information. Another factor that must be considered is the healthy worker effect, because of the fact that only professors who were in exercise of their working functions participated on this study. This fact may have produced underestimation of the found prevalence, since professors who were off work due to vacation and/or disease did not participate in this study.

Despite the possible identified limitations, this study permitted to evaluate a representative number of university professors, making it possible to investigate the associations between some psychosocial aspects at work and the quality of sleep among professors of higher education in a public university in Bahia.

Final considerations

The notably elevated prevalence of a poor quality of sleep identified in this study reinforces a context of work prone to produce negative consequences with significant damage to the quality of sleep, life and health of professors in higher education.

The practice of physical activity, which may be related to the use of time, was identified as an important element to the understanding of the investigated association. Among professors that did not practice physical activity, significant results were found between work experiences at high strain, passive work and poor quality of sleep.

Considering the relevance of the subject proposed in this study and given the lack of publications in the context of investigation of workers health, and primarily, of professors in higher education, it is expected that the data obtained provide a basis to new investigations that seek to identify the characteristics of labor related to high psychological demand, high strain, as well as the distribution of the use of time to

the activities in several spheres of life, and the consequences of it over the personal and professional life of professors of higher education.

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