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Psychosocial factors at hospital work: experienced conditions related to job strain and effort-reward imbalance

Fatores psicossociais no trabalho hospitalar: situações vivenciadas para desgaste no trabalho e desequilíbrio entre esforço e recompensa

Abstract

Introduction: inadequate hospital work conditions and organization constitute psychosocial factors at work (PSFW) that trigger stress and may have negative outcomes for workers, patients and institutions. *Objective*: to evaluate the prevalence of PSFW and associated personal and occupational conditions among hospital workers. *Methods*: cross-sectional study with 1,795 workers from a hospital in São Paulo, Brazil. A self-administered form was used to evaluate demographic and occupational features and PSFW (questionnaires based on the Demand-Control and Effort-Reward models). Descriptive analysis and ordinal logistic regression of partial proportional odds were performed. *Results*: prevalence rates of conditions related to job strain were: 13.6% low risk, 73.0% intermediate risk and 13.4% high risk. Effort-reward imbalance prevalence rates were: 33.1% low imbalance, 31.3% moderate imbalance, 30.8% high imbalance and 4.8% non-answer. Individual and occupational features were associated with the occurrence of PSFW. *Conclusion*: the two models evaluate different aspects of the work activities and social insertion of individuals at work, and individual and occupational conditions were associated with PSFW. The results show that different issues should be considered when planning intervention to improve the psychosocial environment at work.

Keywords: psychosocial aspects; working conditions; psychological stress; occupational hazards; occupational health.

Resumo

Introdução*: condições e organização inadequadas do trabalho hospitalar configuram fatores psicossociais no trabalho (FPST) desencadeantes de estresse, que podem gerar desfechos negativos para trabalhadores, pacientes e instituições.* Objetivo*: avaliar prevalências de FPST e características pessoais e ocupacionais a elas associadas entre trabalhadores do setor hospitalar.* Métodos*: estudo transversal com 1.795 trabalhadores de um hospital de São Paulo, Brasil. Foi utilizado um formulário autoaplicável avaliando aspectos demográficos, ocupacionais e FPST (questionários baseados nos modelos Demanda-Controle e Esforço-Recompensa). Foram realizadas análise descritiva e regressão logística ordinal de chances proporcionais parciais.* Resultados*: as prevalências de situações vivenciadas para desgaste no trabalho foram: 13,6% de baixo risco, 73,0% de risco intermediário e 13,4% de alto risco. As prevalências no desequilíbrio esforço-recompensa foram: 33,1% com baixo desequilíbrio, 31,3% com desequilíbrio moderado, 30,8% com desequilíbrio elevado e 4,8% sem respostas. Características individuais e ocupacionais estiveram associadas à ocorrência dos FPST.* Conclusão*: os dois modelos avaliam diferentes aspectos das atividades e da inserção social dos indivíduos no trabalho, e características individuais e ocupacionais estiveram associadas aos FPST. Os resultados indicaram que distintas questões devem ser consideradas quando do planejamento de intervenções para melhorias no ambiente psicossocial do trabalho.*

Palavras-chave: *aspectos psicossociais; condições de trabalho; estresse psicológico; riscos ocupacionais; saúde do trabalhador.*

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Introduction

Psychosocial factors at work (PSFW) relate to the dynamic interaction between workplace environment and human factors that may influence health, performance and satisfaction at work. Negative interaction, with demands that are incompatible with workers' resources, may be a source of stress, triggering harmful physical and emotional responses, leading to neurohormonal and biochemical changes, behavioral problems, emotional disorders and physical illness. Harmony between work and human factors increases self-confidence, motivation, satisfaction and work ability. Human factors include: skills, abilities, knowledge, needs, culture, values and expectations outside work. PSFW, in turn, are linked to job content and context. Content concerns the physical environment, equipment and job design, workload, work pace and working hours. Context, in turn, relates to organizational culture and operation, roles in the organization, career development, control over work, interpersonal relationships and work-home interface[1].

The relevance of PSFW in the hospital sector has grown in recent decades, influenced by demographic and epidemiological changes, spread of high complexity technologies and increasing demands in healthcare safety[2,3].

Hospital work entails intense physical and mental burdens, both in direct patient care and administrative and support activities[2-4]. Hospital work processes can be divided into three levels: (1) main – provision of direct patient health care; (2) specific support – technical care support services such as diagnosis, nutrition, social care and pharmacy; and (3) nonspecific support – no direct involvement with care, such as cleaning, maintenance, and administrative services.[4] All of these activities involve demands that vary in type, frequency and intensity[2-4].

Delivering quality, safe and cost-effective hospital care requires adequate working conditions not only in terms of physical environment and equipment, but also in relation to PSFW[2,3,5,6]. Knowledge of PSFW in the hospital environment can contribute to guide improvement measures, but few studies address a broad set of hospital workers.

Considering such aspects, this study aims to evaluate the prevalence of PSFW and associated personal and occupational conditions among hospital workers.

Methods

Study design and population

Cross-sectional study with data from the last year of a 5-year cohort (2008-2012), conducted in a high complexity private hospital in São Paulo, Brazil. The 1,795 eligible workers were invited to take part in the study, 615 (34.3%) of whom did not participate (refusal, incomplete questionnaire or on vacation at the time of the survey). The final sample consisted of 1,180 workers (65.7%).

Data collection and study variables

Data were collected by means of a self-administered questionnaire. PSFW-related outcome variables were evaluated using Job Stress Scale (JSS) and Effort-Reward Imbalance (ERI), based respectively on the Demand-Control and Effort-Reward Imbalance models. These models were chosen for having high explanatory power and defining different work stressors, and are widely used in the international and national literature[7-12].

The study adopted a short version of JSS validated for use in Brazil[7], comprising 3 scales: psychological demands at work (score from 5 to 20, the higher the score, the worse the situation); job control (score from 6 to 24, the lower the score, the worse the situation); and social support at work (score from 6 to 24, the lower the score, the worse the situation)[7-9]. The scores were dichotomized into high/low from the midpoint of each scale. JSS assesses situations that pose a risk of job strain from PSFW: low strain (high control/low demand), active work (high control/high demand), passive work (low control/low demand) and high strain (low control/high demand)[7-9].

The Demand-Control Model predicts that the main negative adverse reactions occur in high job strain, and that low job strain is the situation with the lowest levels of residual psychological stress and illness risk. These two conditions configure the risk diagonal for psychological strain and physical illness. Active work and passive work make up the motivation diagonal for learning, with active work characterized by challenging situations and high levels of performance and passive work by situa tions that generate apathy[8]. In this study, low strain was considered the best condition, high strain was deemed the worst situation and active and passive work conditons were classified as intermediate. The reliability of JSS assessed by

Cronbach's alpha was: demand α=0.66; control α=0.55; and social support α=0.84.

The study adopted a version of ERI validated for use in Brazil which contains 3 scales: efforts at work (score from 6 to 30, the higher the score, the worse the situation); rewards at work (score from 11 to 55, the lower the score, the worse the situation); and overcommitment at work (score from 6 to 24, the higher the score, the worse the situation)[10-11]. ERI assesses the risk of stress from PSFW based on the ratio between efforts and rewards, providing a score ranging from 0.17 to 5.00, with scores from 1.00 suggesting negative imbalance[10-11]. In this study, the distribution tertiles of the scores were adopted as cutoff points to categorize imbalance as: low (1st tertile), moderate (2nd tertile) and high (3rd tertile). The reliability of ERI assessed by Cronbach's alpha was: efforts α=0.77; rewards α=0.84; and overcommitment α=0.79.

The form also included questions on sociodemographic characteristics (sex, age, marital status, level of education, responsibility for underage children), lifestyle (smoking, alcohol consumption, body mass index and practice of physical exercise) and occupational characteristics (initial working age, years in current profession, length of service in the institution, second job, work shift, weekly workload – in the hospital, second job and at home – workplace violence, job content – physical, mental or mixed – major work department, work area, job title, work-related accident or illness history).

Also used was the validated Brazilian version of the questionnaire *Work-Related Activities that May Contribute to Job-Related Pain and/or Injury* (WRAPI), which evaluates situations related to the physical environment and work biomechanics that may cause musculoskeletal pain or injury[6]. Considering the intense physical load of hospital work and consequent musculoskeletal injury[3,5,6], this instrument was used as a proxy for physical workload. The questionnaire provides a score ranging from 0 to 150 in which the higher the score, the worse the work situation[13]. The score distribution tertiles were adopted as cutoff points to classify risk of musculoskeletal pain or injury: low (1st tertile), moderate (2nd tertile) and high (3rd tertile). WRAPI presented satisfactory reliability (Cronbach's alpha = 0.93).

Data analysis

The descriptive analysis of data used means and their variations for quantitative variables and percentages for qualitative variables. Univariate analyses of factors related to strain risk (JSS) and effort-reward imbalance (ERI) were performed using the chi-square test. Multiple stepwise models were applied using ordinal logistic regression of partial proportional odds, including variables with $p<0.20$ in the univariate analysis. Ordinal regression estimates odds ratios (OR) and confidence intervals (95%CI) for each level of outcomes[12]. Stata software (IC version 14.2) was used, with gologit2 command for variables with categories with no proportional odds, and with the autofit option, which adjusts the variables to the proportional odds assumption, equalizing the effects of variables between equations[14]. In all analyses the level of significance was 5.0%.

Ethical aspects

The study was approved by the Research Ethics Committee of the School of Public Health of University of São Paulo (Opinion No. 257518) and developed in accordance with the principles of the Declaration of Helsinki.

Results

Participants (n=1,180) did not differ from non-participants (n=615) regarding length of service in the institution (p=0.819): mean 5.2 years (SD=6.1) for participants and 5.3 years (SD=6.1) for non-participants. **Table 1** shows that there were statistically significant differences regarding sex (28.8% of sample loss among women and 46.6% among men, $p<0.001$), job title (highest losses among administrative staff – 53.3%, $p<0.001$) and major department, with variations between them ($p<0.001$). There was also a difference in age: 34.9 years (SD=8.5) for participants and 35.9 years (SD=8.5) for non-participants (p=0.012).

Most participants were females (74.9%), married or living with a partner (51.1%), with a monthly household income of up to 5.0 state minimum wages (51.5%), complete or ongoing higher education (51.8%) and with responsibility for underage children (53.5%). The average age was 34.9 years (SD=8.5), with a median of 34 years, and 72.4% of the workers were under the age of 40.

As for lifestyle, 5.6% reported being smokers, 5.0% reported regular alcohol consumption (two or more days a week), 53.4% were overweight or obese and 63.8% were sedentary.

Table 1 Comparative analysis between losses and participants according to demographic and occupational features (qualitative variables), private hospital, São Paulo, 2012

Variable	*Participation*		*Loss*		*Total*	*p**
	nº	*%*	*nº*	*%*	*nº*	
Sex						
Male	886	71.2	358	28.8	1.244	<0.001
Female	294	53.4	257	46.6	551	
Major departments						
Corporate	21	44.7	26	55.3	47	<0.001
Overall operations	369	42.7	496	57.3	865	
Human resources	20	35.1	37	64.9	57	
Sales	131	38.5	209	61.5	340	
Financial	46	40.7	67	59.3	113	
Clinical	585	38.4	940	61.6	1.525	
Social responsibility	8	28.6	20	71.4	28	
Job Title						
Specialized administrative staff	129	46.7	147	53.3	276	<0.001
Management or patient care nurse	183	78.9	49	21.1	232	
Technician	118	65.9	61	34.1	179	
Nursing technician or assistant	370	63.7	211	36.3	581	
Assistant	220	62.0	135	38.0	355	
Kitchen staff	60	93.8	4	6.3	64	
Cleaning staff	100	92.6	8	7.4	108	
Total	1,180	65.7	615	34.3	1,795	

* Chi-square association test.

Regarding occupational aspects, 13.1% started working under the age of 14 and 49.7% between 14.0 and 17.9 years old (average 16.7 years, SD=3.5). Regarding time in current profession, 19.5% reported 16 or more years; 44.5%, 6.0 to 15.9 years; and 35.0%, under 6 years (average of 9.8 years, SD=7.3). As for length of service in the institution, 14.5% reported 11.0 or more years; 13.7% from 6.0 to 10.9 years; 32.2% from 2.0 to 5.9 years; and 39.6% under 2 years.

Among the workers, 11.7% reported having more than one job. There was a similar distribution regarding work shifts, and 24.6% reported night work (in this hospital or in another job). Regarding weekly workload, 61.8% reported more than 36.0 hours in the studied hospital, 5.1% reported 36.0 or more hours in a second job and 21.7% reported 20.0 or more hours of housework; 39.1% reported a total load (jobs and housework) ranging from 50.0 to 59.9 hours and 18.0% reported 60.0 or more hours. And 35.2% of workers reported a history of work-related accident or illness in the last 12 months.

Regarding job content, 58.8% reported mixed content, 33.2% reported predominance of mental content and 8.0% of physical content. On a score from 7 to 21, 29.8% reported some level of workplace violence. Most of the workers were in the clinical (49.6%), overall operations (31.3%) or sales (11.1%) department. Subdividing into work areas, the largest numbers were in nursing services (47.2%), hospitality services (22.8%) and diagnosis and treatment (8.9%). Regarding job titles, the distribution was: nursing technician/assistant (31.4%), assistant in support activities, management or patient care nurse (15.5%), specialized administrative staff (10.9%), intermediate level technician (10.0%), cleaning staff (8.5%) and kitchen staff (5.1%).

The WRAPI score averaged 63.0 (SD=37.1; median=63.0) on a scale of 0 to 150. Among the workers, 32.8% showed low risk of pain/injury, 33.5% showed moderate risk and 33.7% showed high risk. The items with the highest scores (on scales from 0 to 10) were: working when in pain or injured (average 5.4); working in the same body position for long periods (average 5.2); bending or twisting the back uncomfortably (average 5.2); carrying, lifting or moving heavy material or equipment (average 4.6); and working close to or at one's physical limit (average 4.6).

Regarding PSFW evaluation according to the Demand-Control Model, 82.5% reported high demands as the main source of stress (mean=14.7, SD=2.3); 17.3% reported poor control at work (mean=16.9, SD=2.5); and 5.6% reported low social support (mean=19.8, SD=3.2). Regarding situations of job strain, the results were: 13.6% with low risk of strain, 73.0% in intermediate situations (69.1% with active work and 3.9% with passive work) and 13.4% with high risk of strain. **Figure 1** shows which aspects of PSFW constituted the main sources of job strain risk in each of the JSS dimensions. In demands they were very fast work, work very intense and much effort at work; in control they were to do the same thing over and over, to choose what to do and to choose how to do; and in social support they were lack of understanding in a bad day.

Regarding PSFW evaluation according to the Effort-Reward Imbalance Model, 8.8% reported high efforts at work (average=12.1; SD=4.3); 3.7% reported low rewards at work (mean=51.0, SD=6.7); and 3.7% reported overcommitment (mean=12.9, SD=3.7s). The ERI score averaged 0.50 (median=0.40, SD=0.30). Regarding the categories, the results were: 33.1% with low imbalance, 31.3% with moderate imbalance and 30.8% with high imbalance. **Figure 2** shows the main sources of PSFW-related risk in each of the ERI dimensions. In efforts they were job responsibility, increased demands over the past years, and time pressure due to workload; in rewards they were wages, unwanted changes at work, poor possibilities for promotion, poor respect and recognition; and in over commitment they were work-related sacrifices, trouble sleeping at night, overwhelmed by time pressures at work and trouble relaxingThe univariate analyses showed an association of some factors with job strain situations (JSS): monthly household income ($p<0.001$), level of education ($p=0.032$), responsibility for underage children ($p=0.019$), initial working age ($p=0.036$), work shift ($p=0.004$), total weekly workload ($p=0.003$), workplace violence ($p<0.0001$), major department ($p<0.001$), work area ($p<0.001$), position ($p<0.001$), previous work-related accident or illness history ($p=0.006$), situations that may lead to musculoskeletal pain or injury ($p<0.001$), social support ($p<0.001$) and overcommitment ($p<0.001$).

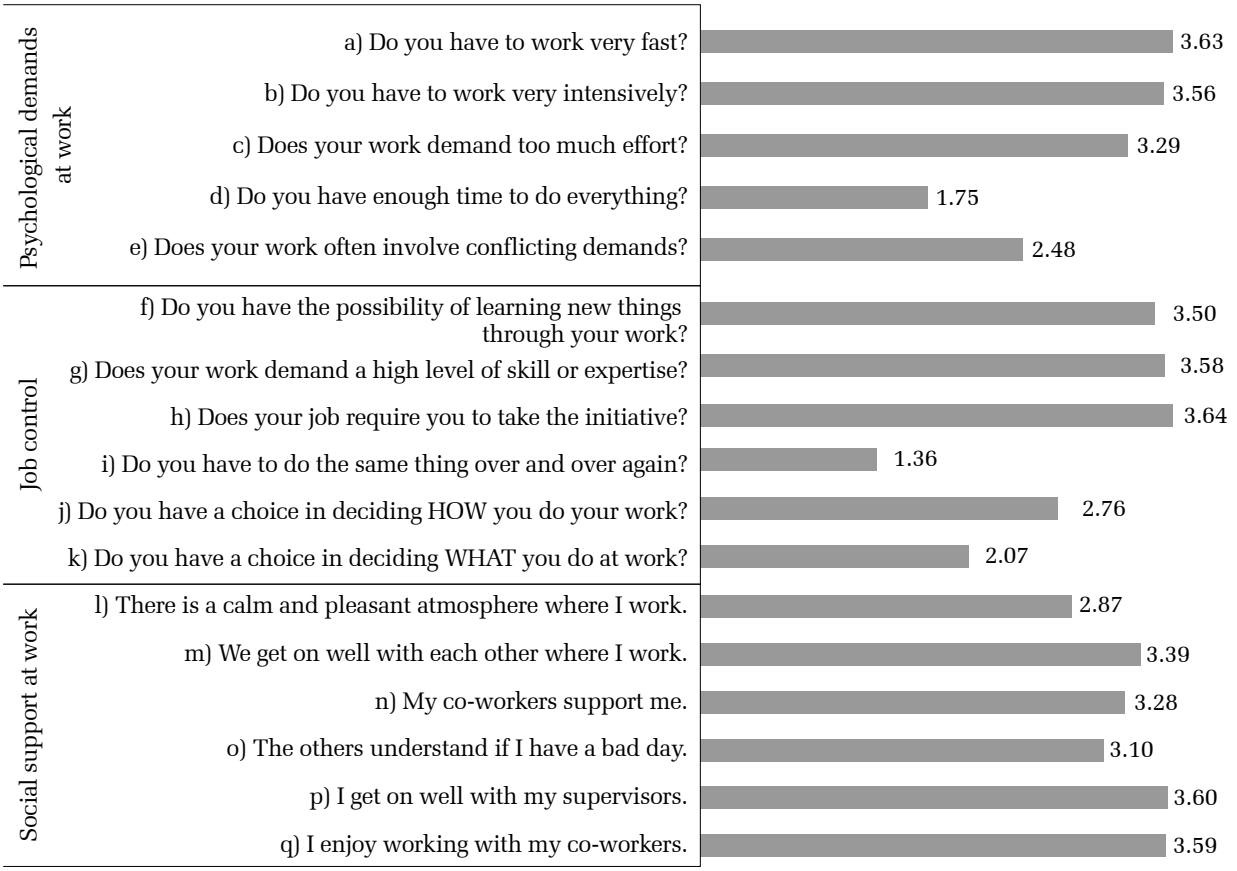
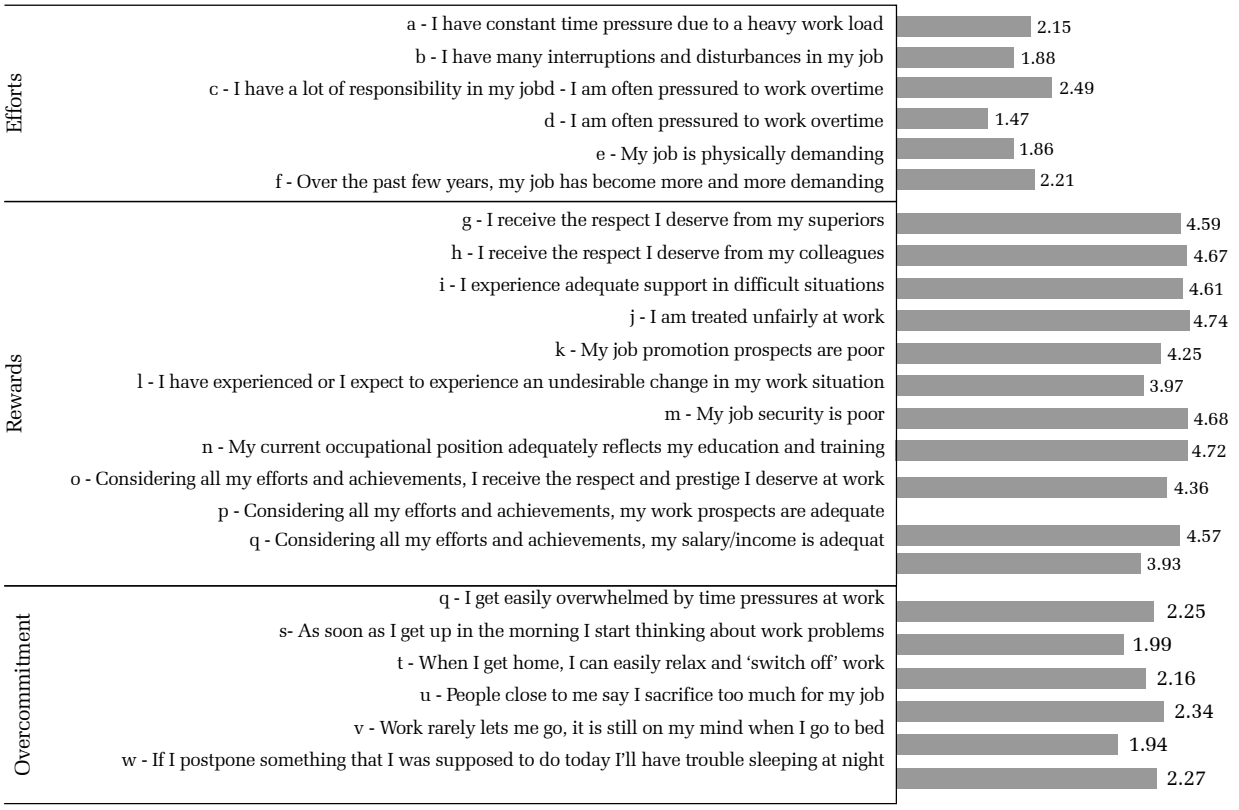


Figure 1 Psychosocial factors at work in job strain situations according to the model of Demand-Control, private hospital, São Paulo, 2012



Observation: rewards: the higher the value, the better the situation; Efforts and overcommitment: the higher the value, the worse the situation.

Figure 2 Psychosocial factors at work that present risk of stress according to the model of Effort-Reward Imbalance, private hospital, São Paulo, 2012

The univariate analyses showed that the factors associated with effort-reward imbalance (ERI) were: monthly household income ($p<0.001$), level of education ($p<0.001$), years in current profession ($p=0.022$), length of service in the institution ($p<0.001$), second job ($p=0.021$), total weekly workload ($p=0.001$), workplace violence ($p<0.001$), job content ($p<0.001$), major department ($p=0.001$), work area ($p=0.004$), job title ($p<0.001$), previous work-related accident or illness history ($p=0.001$), situations that may lead to musculoskeletal pain or injury ($p<0.001$), social support ($p<0.001$) and overcommitment ($p<0.001$).

Table 2 shows the results of the multiple ordinal regression analysis for JSS. For the variables with a statistically significant association, the categories that presented the highest risk of job strain (when compared to the others) were: income between 3.1 and 5 minimum wages (OR=1.63) and income up to 3 minimum wages (OR=2.10); workplace violence history (OR=1.83); the areas of hospitality services (OR=2.12), nursing services (OR=2.46 – when comparing moderate+high to low strain) and diagnosis and treatment (OR=2.81); situations that may generate musculoskeletal pain or injury with moderate exposure (OR=1.53) and high exposure (OR=2.40); low social support (OR=2.07) and high overcommitment (OR=13.85 when comparing moderate+high to low strain and OR=1.71 when comparing high to moderate+high strain); and responsibility for underage children (OR=1.58 – when comparing moderate+high to low strain). The analysis was adjusted by sex. The constrained final model does not violate the proportionality principle (p-Wald=0.970), is good (likelihood ratio test with $p<0.001$), and at least one category has statistically significant differences.

Table 3 shows the results of the multiple ordinal regression analysis for ERI. For the variables with a statistically significant association, the categories that presented higher risk or protection for effort-reward imbalance (when compared to the others) were: income from 3.1 to 5 minimum wages (OR=0.73) and income up to 3 minimum wages (OR=0.58 – when comparing moderate+high to low imbalance); length of service in the institution, from 2 to 5 years (OR=3.41) and 6 or more years

(OR=2.19); workplace violence history (OR=1.83); mixed job content (OR=1.35); situations that may generate musculoskeletal pain or injury with moderate exposure (OR=2.36) and high exposure (OR=3.87 when comparing moderate+high to low imbalance and OR=5.68 when comparing high to moderate+high imbalance); and high overcommitment (OR=7.30). It was not possible to adjust the analysis by gender according to its collinearity with other variables. The constrained final model does not violate the principle of proportionality (p-Wald=0.344), is good (likelihood ratio test with p<0.001), and at least one category has statistically significant differences.

Table 2 Multiple ordinal analysis of factors associated with job strain situations, private hospital, São Paulo, 2012

Variable	*Low* vs *(moderate + high) strain* 1^{st} X (2^{nd} + 3^{rd})				*(Low + moderate)* vs *high strain* (1^{st} + 2^{nd}) X 3^{rd}			
	$_{95\%}OR$	$_{95\%}CI$ (OR)		*p*	$_{95\%}OR$	$_{95\%}CI$ (OR)		*P*
		Low.	*Upp.*			*Low.*	*Upp.*	
Monthly household income (in no. of minimum wages)								
5.1 and higher	1.00				1.00			
3.1 to 5.0	1.63	1.18	2.24	0.003	1.63	1.18	2.24	0.003
Up to 3.0	2.10	1.38	3.20	<0.001	2.10	1.38	3.20	<0.001
Workplace violence history								
Yes	1.00				1.00			
No	1.83	1.34	2.51	<0.001	1.83	1.34	2.51	<0.001
Area								
Other	1.00				1.00			
Hospitality services	2.12	1.34	3.34	0.001	2.12	1.34	3.34	0.001
Nursing services	2.46	1.64	3.69	<0.001	1.03	0.65	1.66	0.887
Diagnosis and treatment	2.81	1.65	4.76	<0.001	2.81	1.65	4.76	<0.001
Potential pain/injury situations								
Low (1st tertile)	1.00				1.00			
Moderate (2nd tertile)	1.53	1.10	2.12	0.012	1.53	1.10	2.12	0.012
High (3rd quartile)	2.40	1.69	3.40	<0.001	2.40	1.69	3.40	<0.001
Social support								
High	1.00				1.00			
Low	2.07	1.19	3.62	0.010	2.07	1.19	3.62	0.010
Overcommitment								
High	1.00				1.00			
Low	13.85	5.03	38.16	<0.001	1.71	1.15	2.56	0.009
Responsibility for underage children								
No	1.00				1.00			
Occasionally/yes	0.84	0.59	1.05	0.347	1.76	1.92	2.76	0.015

Note: Gender-adjusted model. Wald test: p=0.970. Likelihood ratio test: p<0.001.

Table 3 Multiple ordinal analysis of factors associated with effort-reward imbalance, private hospital, São Paulo, 2012

Variable	*Low* vs *(moderate + high) imbalance* 1^{st} X (2^{nd} + 3^{rd})				*(Low + moderate)* vs *high imbalance* (1^{st} + 2^{nd}) X 3^{rd}			
	$_{95\%}OR$	$_{95\%}CI$ (OR)		p	$_{95\%}OR$	$_{95\%}IC$ (OR)		p
		Low.	*Upp.*			*Low.*	*Upp.*	
Monthly household income (in no. of minimum wages)								
5.1 and higher	1.00				1.00			
3.1 to 5.0	0.73	0.55	0.97	0.029	0.73	0.55	0.97	0.029
Up to 3.0	0.58	0.41	0.82	0.002	0.87	0.59	1.29	0.491
Length of service at the institution								
Fewer than 2 years	1.00				1.00			
2 to 5 years	2.10	1.58	2.79	<0.001	2.10	1.58	2.79	<0.001
6 years or more	2.19	1.62	2.95	<0.001	2.19	1.62	2.95	<0.001
Workplace violence history								
No	1.00				1.00			
Yes	3.41	2.58	4.51	<0.001	3.41	2.58	4.51	<0.001
Job content								
Mainly physical or mental	1.00				1.00			
Mixed: physical and mental	1.82	1.42	2.33	<0.001	1.82	1.42	2.33	<0.001
Potential pain/injury situations								
Low (1^{st} tertile)	1.00				1.00			
Moderate (2^{nd} tertile)	2.36	1.76	3.18	<0.001	2.36	1.76	3.18	<0.001
High (3^{rd} quartile)	3.87	2.70	5.53	<0.001	5.68	3.95	8.15	<0.001
Overcommitment								
Low	1.00				1.00			
High	7.30	5.27	1.01	<0.001	7.30	5.27	1.01	<0.001

Note: Wald test: p=0.344. Likelihood ratio test: p<0.001.

Discussion

This study showed high prevalence rates of moderate or intense exposure to PSFW, which poses risks for stress and strain at work. Individual and occupational conditions were associated with the occurrence of PSFW.

To evaluate PSFW the study used instruments based on the Demand-Control and Effort-Reward theoretical models, currently the most relevant in the area of workers' health for the number of studies they support, for their proven theoretical and measurement validity and for their operational simplicity[12,15,16]. The two models are complementary in helping understand work conditions and organization and how they affect workers' health[15,16].

The Demand-Control Model focuses on the performance of work activities, based on the notion that health risks result from the combination of demands and/or pressures deriving from psychosocial workloads (time pressure, necessary concentration and interruption of activities) and low control (use of skills and decision-making authority) to deal with such demands[7-9]. The Effort-Reward Model expresses the risk of stress arising from the workers' perception of their insertion in the organizational context, weighing the efforts made at work against the rewards obtained (financial, appreciation, opportunities and career and job security)[10-11].

Comparison with results from other studies is limited due to methodological differences (research site, work segment and measurement method). In any case, the literature shows that work in the hospital sector is characterized by high risk of stress and strain: moderate/high risk prevalence rates of 69.2% to 74% up to 79.6% to 92.0%[17-20] were identified for strain situations (using the Demand-Control Model) and of 69.4% to 84.9%[2,12] for stress situations (using

the Effort-Reward Model), and such prevalence rates are understood in the light of different activities performed in the hospital sector.

In recent decades, work conditions related to PSFW in the hospital environment have increased: contact with pain and suffering; time pressure and responsibilities; bullying and/or violence; conflicting relationships between colleagues and leaders, unsatisfactory management and organizational justice; role conflicts; working hours and shifts; high demands; and limited autonomy[2,3,5,15,21]. New work demands result from the increasing requirements in care quality and safety, use of new technologies, precarious employment relationships, staff reduction, demographic and epidemiological population changes, and increased requirements for managerial skills[3,6,21-23]. Such characteristics are reflected in the results of this study when we observed that the main sources of risk in each of the JSS and ERI dimensions that stood out were aspects related to workload intensity and volume, time and responsibility pressure, repetitive work and limitation on the choice of tasks and their means of execution.

The factors associated with PSFW prevalence were individual (income, responsibility for underage children and overcommitment) and occupational (length of service, situations that may lead to musculoskeletal pain or injury, job content, work area, workplace violence and social support at work).

The results showed that the lower the monthly household income bracket, the more intense the strain situations evaluated and the less intense the risk of stress evaluated through ERI. Lower pay often characterizes lower skilled jobs and poor working conditions, where the inadequate configuration of PSFW can be more intense.

The greater emphasis on the execution of the Demand-Control Model activities may reflect that situation, which appears in the JSS results, which show the relevance of characteristics such as contradictory demands, frequent intense work, fast pace, little freedom in choosing how to work and repetitive work.

On the other hand, the Effort-Reward Model expresses the workers' perception of their social insertion in the institution, offsetting efforts and rewards. Higher-income workers often occupy job title with great demands in terms of skills and responsibilities, for which they expect adequate rewards. Again, the results of this study reflect those characteristics by showing the relevance of PSFW features assessed by ERI such as increased accountability, increased demands and time pressure, inadequate salaries, unwanted changes, and limited possibilities for promotion, respect and recognition.

Responsibility for underage children was associated with a higher risk of strain only when comparing moderate+high versus low strain. This responsibility may generate heavy psychosocial burden, especially when we consider that most workers in health services are women, which increases the chances of an extra household workload, increasing the effect of workload [3,24,25]. Negative health impact may result from the accumulation of unpaid (domestic work) and paid work (hospital work), and there is a frequent need to reconcile two jobs to compensate for low wages and meet household financial needs[24,25]. Unpaid and paid work are important elements in the social production of health and illness[24,25]. Nursing workers are especially affected by double or triple shifts due to inadequate working conditions and long working hours[25].

The results showed that the longer the time of service in the institution, the greater the intensity of stress resulting from effort/reward imbalance. Workers with more years of service in the institution have supposedly been exposed to psychosocial stressors for longer periods. It is noteworthy that only 28.2% of workers had been 6 or more years in the institution, which indicates poor job stability and high turnover. These are characteristics of the hospital sector, private institutions included[26]. Its causes are related to high physical and mental workload and organizational factors such as low wages, underappreciation, lack of professional perspectives, interpersonal conflicts, autonomy problems, contact with suffering and death and constant changes in work processes[2.-5,21,26].

Perception of workplace violence was associated with PSFW-related strain and stress, which can trigger health and behavioral problems[21,22,27]. Violence against health professionals has increased, prompted by aspects such as interaction with patients and family members in situations of vulnerability, fear and pain, loneliness and/or night work and predominance of women, with risks linked to gender issues[21,22, 25,27]. Violence is more frequent against nursing professionals and in certain healthcare areas such as oncology, pediatric services, emergency rooms and intensive care; the most frequent violence is verbal abuse [21,22,25,27].

Work area was associated with job strain, but not with effort-reward imbalance. Hospitality services, nursing services as well as diagnosis and therapy

showed higher risk of strain compared to the others. These areas mainly comprise staff in nursing, catering, cleaning/hygiene, customer service and call centers, activities characterized by high work demands, with an intense physical component[2,28-30].

Mixed job content (physical and mental) showed a higher risk of effort/reward imbalance than physical or mental content only. Workers involved in both types of work may feel the demand for great efforts in different areas without the corresponding rewards. The new forms of work organization, the use of new technologies and the implementation of rigorous standards of healthcare quality have required versatile and flexible workers engaged in activities outside their original job descriptions. Workers must be dynamic, creative, innovative and available to take on different types of tasks and challenges, often without obtaining commensurate compensation[2,3,5,21].

Perception of greater exposure to situations related to the physical environment and biomechanics work that may generate musculoskeletal pain or injury was one of the variables with the highest risk associated with strain and effort/reward imbalance. The characteristics of hospital work linked to physical demands that exceed workers' capabilities make them prone to musculoskeletal disorders, fatigue, mental distress and impairment of work ability[1,31-33].

Inadequate social support was associated with strain situations, but not with effort/reward imbalance. The theoretical framework of the Demand-Control Model incorporates social support as a third dimension. The types of support (socio-emotional, instrumental and interpersonal hostility) that workers receive from their supervisors and colleagues may increase or mitigate strain risk[9]. Social support is a factor associated with health, well-being, work ability and permanence at work[3,34]. It is noteworthy that when comparing moderate+high versus low strain, the high values of overcommitment parameters (OR and 95%CI) were due to the small number of participants with low strain in this category.

The higher the overcommitment, the greater the risk of strain and effort/reward imbalance. Workers with a motivational pattern of overcommitment tend to maintain their level of involvement with great efforts, even when not rewarded as expected. Such a pattern may affect their perception, making them underestimate demands and overestimate coping resources, even without reciprocity in relationships. In this situation, workers are more susceptible to change in adaptive responses and burnout[35]. Hospital workers often acknowledge having great responsibility and commitment to patients' therapeutic processes[3,17,28], which may favor this personal trait.

The main limitation of this study is its cross-sectional design, which does not make it possible to establish causality. There may have been sample bias due to the participation rate, below the recommended rate of 75.0%[36], and also due to lower participation of some categories (such as sex, job title, major department and age variables). Using tertiles as cutoff points facilitates analysis by classifying participants into three groups with increasing intensity of risk exposure, but this may have induced some loss of accuracy by assuming that individuals in each group are at equal risk. A possible occurrence is the healthy worker effect, characterized by the exit of less healthy workers from the institution[37], leading to the underestimation of the prevalence of strain and stress.

An advantage is the fact of this study having used two theoretical models, evaluating different PSFW. The situations of strain and stress resulting from PSFW have associated individual and occupational characteristics common to both models (Demand-Control and Effort-Reward). They are complementary but evaluate different aspects of individuals' activities and social insertion at work.

Work in the hospital sector is characterized by negative events for workers, institutions, patients and society, such as high absenteeism and turnover, dissatisfaction, impairment of quality of life, illness, impairment of work ability and early exit from the profession [2,3,5,6,21-33]. PSFW are important determinants of these negative outcomes, which points to the need for corrective and preventive intervention.

Conclusions

Among hospital workers, strain and stress situations stemming from PSFW have associated individual and occupational characteristics that are common to both theoretical models (Demand-Control and Effort-Reward). However, despite being complementary, the models evaluate different aspects of individuals' activities and social insertion at work, indicating that different issues should be considered when planning interventions to improve the psychosocial environment at work.

Authors' contribution

The authors contributed equally to study design, data collection and analysis, drafting and final approval of the published manuscript and assume full public responsibility for its content.

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