Psychosocial risks, sleep quality, arterial hypertension and metabolic diseases among teachers at an educational institution in Guayaquil, Ecuador

Riesgos psicosociales, calidad del sueño, hipertensión arterial y enfermedades metabólicas en docentes de una institución educativa de Guayaquil, Ecuador

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Abstract

The interaction between psychosocial demands and the biological processes governing sleep and metabolism constitutes a critical axis of the teaching profession, although it remains insufficiently explored in occupational health research. The aim of this study was to analyze the association between psychosocial risks, sleep quality, and metabolic diseases among teachers at an educational institution in Guayaquil. A quantitative, correlational, cross-sectional study was conducted in 107 teachers using a digital questionnaire that included the following instruments: FPSICO 4.1, the Pittsburgh Sleep Quality Index, and WHO STEPS. Data were analyzed using descriptive statistics and tests of association. The results showed greater exposure in the domains of relationships and social support, participation/supervision, psychological demands, and workload. Fifty-five percent of teachers had poor sleep quality. Arterial hypertension was the most frequent metabolic disease, and nearly half of the participants reported at least one metabolic condition. A significant association was found between sleep quality and metabolic disease (p=0.003), as well as greater psychosocial exposure among teachers with poor sleep quality and metabolic disease. These findings underscore the need to integrate preventive occupational health interventions that jointly address psychosocial factors, sleep, and metabolic health in teachers.

Keywords: psychosocial risks, sleep quality, metabolic diseases, teachers.

Resumen

La interacción entre las exigencias psicosociales, los procesos biológicos del sueño y metabolismo constituyen un eje crítico del trabajo docente, aunque aun insuficientemente explorado en la investigación en salud ocupacional. El objetivo del presente estudio fue analizar la asociación entre riesgos psicosociales, calidad del sueño y enfermedades metabólicas en docentes de una institución educativa de Guayaquil. Se realizó un estudio cuantitativo, correlacional y transversal en 107 docentes, mediante un formulario digital que incluyó los siguientes instrumentos: FPSICO 4.1, Pittsburgh Sleep Quality Index y WHO STEPS. El análisis se efectuó con estadística descriptiva y pruebas de asociación. Los resultados evidenciaron mayor exposición en relaciones y apoyo social, participación/supervisión, demandas psicológicas y carga laboral. El 55% de los docentes presentó mala calidad del sueño. La hipertensión arterial fue la enfermedad metabólica más frecuente y cerca de la mitad reportó al menos una enfermad metabólica. Se encontró asociación significativa entre calidad del sueño y enfermedad metabólica (p=0,003), así como mayor exposición psicosocial en docentes con mala calidad del sueño y enfermedad metabólica. Estos hallazgos resaltan la necesidad de integrar intervenciones preventivas en salud ocupacional que aborden de forma conjunta los factores psicosociales, el sueño y la salud metabólica en docentes.

Palabras clave: Riesgos psicosociales, calidad del sueño, enfermedades metabólicas, docentes.

Introduction

The United Nations Educational, Scientific and Cultural Organization (UNESCO), through the International Task Force on Teachers 2030, has documented the adverse working conditions faced by teachers, characterized by administrative overload, limited institutional support, and high emotional demands, all of which create a context of high exposure to psychosocial risks and deterioration of well-being[1]. These factors compromise sleep quality, which has been recognized as an essential restorative process for health and physiological functioning[2]. In this context, teaching work has shown a substantial prevalence of sleep disturbances, with most teachers reporting poor sleep quality associated with high levels of stress and anxiety[3-4]. Reflecting the importance of this issue, the American Heart Association (AHA) includes sleep as an essential component of cardiometabolic health within Life's Essential 8, emphasizing that chronic sleep disruption increases the risk of obesity, hypertension, and type 2 diabetes mellitus[5]. The direct link between psychosocial demands, disturbed sleep, and metabolic risk has immediate implications for teachers' occupational health, affecting quality of life, educational productivity, and the social costs associated with absenteeism[6-7].

Exposure to psychosocial risks in teachers' work environment, such as workload overload, administrative pressure, and emotional demands, represents a stressor that directly disturbs sleep quality, a fundamental process for physiological recovery. Scientific literature indicates that inadequate rest is associated with the development of insomnia, chronic fatigue, and wakefulness disturbances, significantly compromising teachers' professional performance and general well-being[8]. From the perspective of the Effort–Recovery Model proposed by Meijman and Mulder, when job demands exceed available resources and recovery is insufficient, a cumulative wear process develops that interferes with physiological restoration[9]. Insufficient recovery therefore emerges as a key mechanism linking exposure to psychosocial factors with vulnerability to metabolic diseases.

Within this framework, arterial hypertension, obesity, and type 2 diabetes are associated with alterations in neuroendocrine regulation and with inflammatory processes that intensify in the setting of non-restorative sleep and prolonged exposure to work demands[10,11]. Likewise, although existing evidence acknowledges the relationship between psychosocial risks and sleep quality in teachers, studies that simultaneously integrate the presence of metabolic diseases within this framework remain limited. This gap restricts understanding of how the educational work environment affects health and hinders the design of evidence-based preventive strategies.

The present study analyzed the relationship between psychosocial risks, sleep quality, and metabolic diseases among teachers at an educational institution in Guayaquil in order to generate evidence for an occupational health intervention plan. Internationally validated instruments were used, including the Psychosocial Factors Assessment (FPSICO 4.1), the Pittsburgh Sleep Quality Index (PSQI), and the WHO STEPS instrument, first evaluating exposure to psychosocial risks, then measuring sleep quality, and finally identifying the prevalence of metabolic diseases through self-report. Thus, statistical associations were established to support comprehensive interventions aimed at reducing occupational risks, improving rest, and preventing chronic complications, thereby contributing to scientific development and educational practice and aligning with Sustainable Development Goals (SDGs) 3 and 8 by promoting health, preventing noncommunicable diseases, and building work environments that protect teachers' well-being[12]. In this way, the study seeks to foster a better understanding of how working conditions affect teachers' health and performance, guiding strategies that promote well-being, reduce absenteeism, and mitigate the burden of chronic diseases associated with poor sleep.

Materials and methods

The study adopted a quantitative, correlational, cross-sectional design. The study population consisted of teachers from an educational institution in the city of Guayaquil, Ecuador. Participants were recruited from the institution's teaching staff, considering a defined occupational population with institutional access. The sample included teachers who met the study criteria and voluntarily agreed to participate. Inclusion criteria comprised teachers actively working during the data collection period, with at least one year of employment at the institution in order to ensure sufficient and stable exposure to the working conditions under evaluation. In addition, only those who voluntarily agreed to participate by signing informed consent were included, in accordance with the ethical principles of autonomy and confidentiality.

Exclusion criteria included teachers on medical or administrative leave, as well as those with a current or recent diagnosis of severe psychiatric illness, due to the possible interference of these conditions with the perception of the work environment and sleep patterns. Participants with acute pathology or decompensated chronic disease

were also excluded, as were women who were pregnant or within the first six months postpartum, given that these conditions generate physiological and metabolic changes independent of work-related psychosocial risks and could therefore act as confounding factors. Teachers who, in the exercise of their autonomy, chose not to provide informed consent were likewise excluded.

Data were collected through a structured and standardized process. Prior to participation, teachers received information about the study objectives, the voluntary nature of participation, data confidentiality, and instructions for completing the form. Participation was contingent upon explicit acceptance of the informed consent presented in the first section of the form. Data were gathered through a single digital questionnaire created in Google Forms and administered during the weekly teachers' meeting so as not to interfere with rest periods or routine teaching activities. The form included sequential sections: self-designed sociodemographic and behavioral variables intended to characterize the population and control for possible confounding factors; questions aimed at identifying exclusion criteria, used for subsequent screening during data analysis.

Occupational psychosocial risks were assessed using FPSICO 4.1, developed by the National Institute for Safety and Health at Work (INSST) of Spain[13], which analyzes the dimensions of working time, autonomy, workload, psychological demands, variety and content of work, participation and supervision, interest in the worker and compensation, role performance, and personal relationships and social support. Results were interpreted through dimension-specific scores and a global risk index. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. in 1989 and internationally validated in adult populations. This instrument evaluates subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of hypnotic medication, and daytime dysfunction[14]. To identify metabolic diseases, the STEPwise instrument of the World Health Organization (WHO) was used for the standardized surveillance of noncommunicable disease risk factors, allowing the identification of a history of arterial hypertension, diabetes mellitus, and obesity, as well as associated clinical and anthropometric parameters[15].

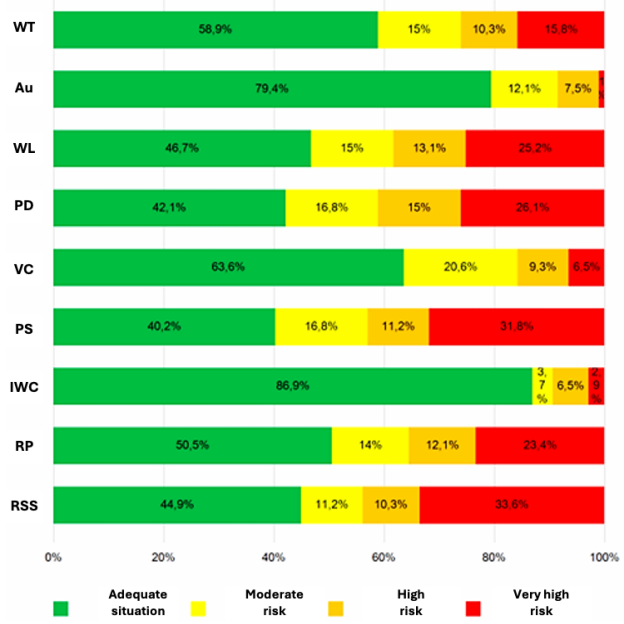
Pearson's chi-square test was used to determine the presence of a statistically significant association between qualitative variables. Additionally, the internal reliability of the instruments used was evaluated through Cronbach's alpha coefficient in SPSS software to determine the internal consistency of the scales applied in the study population. This statistic is calculated from the item variance and the total variance of the instrument. The values obtained were interpreted according to established criteria for internal consistency, with values closer to 1 indicating greater reliability. Finally, behavioral variables were treated as control factors and used only to contextualize the results and reduce the effect of possible confounders, without constituting principal variables of analysis.

Results

Of the 112 teachers surveyed, 107 were included in the analysis. **Table 1** summarizes their sociodemographic and occupational characteristics. The 40–49-year age group predominated, as did the female sex. Regarding academic training, most participants held a bachelor's degree. Likewise, the highest proportion of teachers had more than 10 years of experience, with a predominance of those working in basic education. Concerning lifestyle habits, low tobacco and alcohol consumption was observed in the study population.

The assessment of exposure levels to psychosocial risks by dimension is presented in **Figure 1**. The highest proportion of participants in the adequate situation category was observed for Interest in the worker/Compensation (IWC) (86.9%) and Autonomy (79.4%), followed by Variety/Content (VC) (63.6%) and Working Time (WT) (58.9%). In contrast, the highest proportions of very high risk were recorded for Relationships and Social Support (RSS) (33.6%) and Participation/Supervision (PS) (31.8%), as well as Psychological Demands (PD) (26.1%) and Workload (WL) (25.2%).

Figure 1. Distribution of psychosocial risk levels by dimension in the teaching population



Furthermore, poor sleep quality predominated in the study population, being observed in 59 teachers (55%), compared with 48 (45%) who had good sleep quality. Among the metabolic diseases assessed, arterial hypertension was the most prevalent, reported by 38 teachers

Table 1. Sociodemographic and occupational characteristics of the teachers

Sociodemographic characteristic	Category	Frequency (n)	Percentage (%)
Age	20–29 years	13	12
	30–39 years	19	18
	40–49 years	36	34
	50–59 years	31	29
	60–69 years	8	7
Sex	Male	24	22
	Female	83	78
Educational attainment	Bachelor's degree	62	58
	Master's degree	36	34
	Doctorate	9	8
Years of teaching experience	< 1 year	7	7
	1–5 years	10	9
	6–10 years	19	18
	> 10 years	71	66
Educational level	Basic education	67	63
	Upper secondary education	40	37
	Total	107	100

(36%), followed by type 2 diabetes mellitus in 20 (19%) and obesity in 17 (16%). 53 participants (50%) had none of the evaluated conditions, 38 (36%) had one, 11 (10%) had two, and 5 (5%) had three metabolic diseases. Additionally, body mass index classification showed overweight in 57 teachers (53%).

Teachers with good sleep quality showed higher proportions of adequate situation and moderate risk in all evaluated dimensions compared with those reporting poor sleep quality. The most marked differences were recorded in Working Time (WT) (88% vs. 63%), Workload (WL) (77% vs. 51%), and Role Performance (RP) (79% vs. 53%). In contrast, the group with poor sleep quality showed the lowest percentages for Workload (WL) (51%), Role Performance (RP) (53%), and Psychological Demands (PD) (54%), reflecting a higher proportion of high and very high risk levels in these dimensions, **Figure 2**.

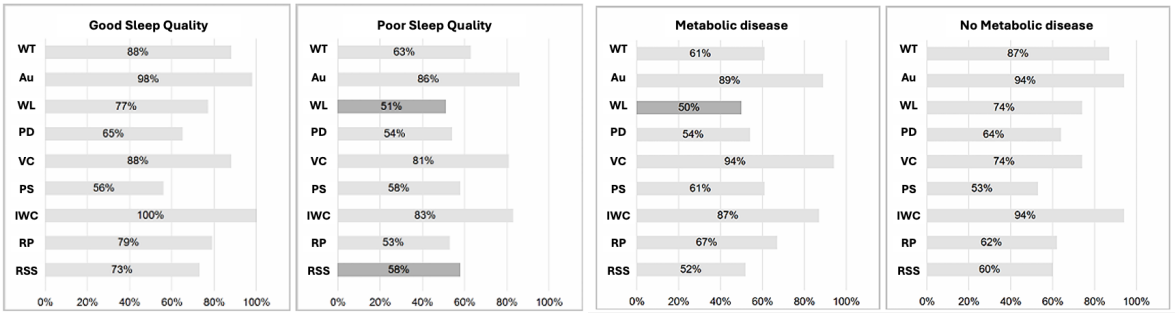
The relationship between psychosocial risk dimensions and the presence of metabolic diseases is shown in **Figure 2**. Teachers without metabolic disease showed higher proportions of adequate situation and moderate risk in most dimensions, especially Working Time (WT) (87% vs. 61%) and Workload (WL) (74% vs. 50%). In contrast, the group with metabolic disease showed lower values for Workload (WL) (50%), Psychological Demands (PD) (54%), and Relationships and Social Support (RSS) (52%), indicating a greater presence of high and very high risk in these dimensions.

Sleep quality was significantly associated with the presence of metabolic disease (p=0.003). Metabolic disease was more common among teachers with poor sleep quality (35%; n=38) than among those with good sleep quality (15%; n=16). Conversely, the absence of metabolic disease was more frequently observed in teachers with good sleep quality (30%; n=32) than in those with poor sleep quality (20%; n=21).

No statistically significant associations were found between sociodemographic variables and scores on FPSICO 4.1 or the PSQI. However, for body mass index (BMI), statistically significant associations were observed with marital status (p=0.001), educational attainment (p=0.001), and years of teaching experience (p=0.038). Descriptively, a higher frequency of grade I obesity was observed among married and single teachers, as well as among those holding a bachelor's degree and those with more than 10 years of teaching experience. No statistically significant associations were observed for the remaining variables analyzed (p>0.05).

The internal consistency of the instruments applied was evaluated using Cronbach's alpha coefficient in the 107 valid records included in the analysis. FPSICO 4.1 showed high reliability (α= 0.96), as did the PSQI (α=0.83). The full set of instruments reached a Cronbach's alpha of 0.89, demonstrating adequate internal consistency for application in the study population.

Figure 2. Psychosocial risks versus sleep quality and metabolic disease.



The results of this study show a consistent pattern of exposure to psychosocial risks among teachers, particularly in the dimensions of relationships and social support, participation/supervision, psychological demands, and workload, which concentrated the highest proportions of high and very high risk. This pattern reflects a work environment characterized by high organizational demands and limited psychosocial resources, in agreement with previous evidence describing teaching as a profession with a high psychosocial burden[7-16].

In this context, sociodemographic variables were not significantly associated with psychosocial risk scores or sleep quality, suggesting that these dimensions may be more strongly determined by work environment and organizational factors than by individual characteristics. In addition, the low level of tobacco and alcohol use observed in the study population reduces the likelihood that these habits substantially contributed to the risk profile identified. Nevertheless, significant associations were found between body mass index (BMI) and variables such as marital status, educational attainment, and years of teaching experience, with a higher frequency of overweight and obesity among teachers with longer professional trajectories. This pattern may reflect the cumulative effect of lifestyle-related factors and workload over time, which is consistent with previous studies reporting a relationship between job seniority, occupational stress, and metabolic alterations[17,18].

With regard to sleep quality, the higher proportion of metabolic diseases among teachers with poor sleep quality (35% vs. 15%) supports an association between these variables, in line with recent evidence showing that sleep disturbance is significantly related to a greater risk of metabolic diseases such as obesity, diabetes, and hypertension[19]. In this regard, the observed results provide empirical support for the effort–recovery model. uggesting that exposure to psychosocial risks, together with insufficient recovery, is associated with impaired sleep quality and adverse metabolic health outcomes. Within this framework, sleep quality may function as a moderating factor that influences the magnitude of the health effects associated with psychosocial risk exposure. More specifically, poor sleep quality may exacerbate the negative metabolic consequences of work-related stress, thereby increasing susceptibility to chronic disease. This interpretation is consistent with recent literature describing sleep as a key modulator of the physiological stress response, acting either as an amplifier or as an attenuator of its effects[20].

Particular attention should be given to arterial hypertension, which was the most frequent metabolic condition identified in this study. This behaviour is clinically plausible, as the relationship between psychosocial strain, poor sleep, and elevated blood pressure is supported by several physiological pathways, including sustained sympathetic nervous system activation, hypothalamic–pituitary–adrenal axis dysregulation with prolonged cortisol exposure, endothelial dysfunction, and alterations in nocturnal blood pressure regulation. Recent evidence has emphasized that blood pressure during sleep may be an even stronger predictor of cardiovascular events than conventional office or daytime measurements, highlighting the relevance of sleep-related mechanisms in the development of hypertension. In occupational settings, changing levels of work-related stress have also been associated with hypertension and biological markers of chronic stress, while studies in teaching populations have reported a substantial coexistence of stress and elevated blood pressure. From a preventive perspective, these findings indicate that hypertension in teachers should not be approached solely as an isolated cardiometabolic outcome, but rather as a condition potentially amplified by chronic occupational strain and insufficient recovery. Accordingly, risk reduction strategies should combine periodic blood pressure screening with organizational measures aimed at reducing psychosocial burden, interventions to improve sleep quality, and lifestyle-based actions such as weight management, regular physical activity, dietary counseling, and stress-management programs, all of which are currently recognized as key components of hypertension prevention and control[21-25].

The findings of the present study also highlight the need to implement a structured prevention plan in the educational setting in response to the limited management of the psychosocial and metabolic risks identified. This proposal is grounded in current Ecuadorian occupational safety and health regulations, which establish the obligation to identify risks, implement preventive measures, train workers, and continuously monitor working conditions in order to prevent occupational diseases[26]. From a broader occupational health perspective, these results should not be interpreted as isolated associations, but rather as part of an interdependent pathway linking work organization, recovery opportunities, sleep disturbance, and cardiometabolic vulnerability. Recent literature has emphasized that psychosocial hazards should be addressed with the same preventive priority as traditional occupational exposures, given their growing contribution to worker ill-health and impaired well-being. In the teaching profession specifically, burnout and chronic occupational strain have been associated not only with psychological distress but also with somatic complaints, inflammatory dysregulation, and other markers of physical ill-health. Likewise, teacher-focused evidence has shown that poor sleep quality is closely intertwined with stress and somatization, while population-based research in adults indicates that worse sleep quality is associated with a less favorable cardiometabolic profile. Importantly,

emerging intervention studies suggest that these pathways may be modifiable, as multicomponent programs in teachers with overweight have shown benefits in mental health together with improvements in biochemical and immunological parameters linked to metabolic and cardiovascular risk. Taken together, these observations reinforce the need for integrated surveillance and intervention strategies in educational settings that address psychosocial risk, sleep health, and metabolic prevention simultaneously[27–31].

Within this framework, a plan based on three operational components is proposed: awareness-raising, aimed at training and sensitizing teaching staff; implementation of interventions focused on health promotion and risk control; and continuous evaluation through the monitoring of indicators that make it possible to assess the effectiveness of the actions undertaken. In practical terms, the prevention plan includes interventions such as training in sleep hygiene, strengthening stress-coping strategies, and periodic surveillance of metabolic risk factors, with the aim of reducing disease burden and promoting healthy work environments.

The comprehensive assessment of psychosocial risks, sleep quality, and metabolic diseases, together with the use of validated instruments, strengthens the consistency of the findings. However, the cross-sectional design limits causal inference, and the use of self-reported data on metabolic diseases may have introduced bias. In this regard, the incorporation of objective clinical assessments would improve the precision of future investigations, as would the development of longitudinal studies capable of evaluating the temporal relationship among the variables analyzed and the effectiveness of the proposed interventions. Overall, the results highlight the importance of integrating psychosocial risk management and sleep quality into the prevention of metabolic diseases in teaching populations. These patterns support the implementation of occupational intervention strategies aimed at health promotion and the strengthening of healthy work environments, thereby consolidating a comprehensive preventive approach applicable to the educational context.

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