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Sleep and stress of Havana workers during lockdown due to Covid-19

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Abstract

Sleep quality is related to daily performance and stress. The working conditions imposed by the coronavirus disease 2019 (COVID-19) pandemic have impacted individuals and families. To analyze the relationship between sleep quality, daily activities, and stress of workers during the pandemic, a study of activity diaries of 113 workers in Havana, Cuba, in August 2020, with data collected by telephone, was carried out. Descriptive and inferential statistics, regression, and social microsequence analysis were used to study the data. Women slept 8.64 hours a day, dedicated 5.30 hours to leisure, 3.53 hours to work, and 3.40 hours to household chores. Men slept 8.33 hours a day, dedicated 6.64 hours to leisure, 4.12 hours to work, 2.32 hours to personal needs, and 1.99 hours to household chores. There were statistically significant differences by sex in terms of role changes, time spent on leisure activities and on household chores, and the number of roles experienced. Women had a positive and statistically significant relationship between the level of rest and time spent sleeping, while men had a negative and statistically significant relationship between the level of rest and hours in household chores. Men slept and rested more than women. The findings corroborate different behaviors by sex, according to the activities and roles they perform in different environments, and their influence on sleep quality and stress.

Keywords: stress, work, sleep quality, sociology of time, social microsequences analysis

SONO E ESTRESSE DOS TRABALHADORES DE HAVANA DURANTE O LOCKDOWN DA COVID-19

Resumo

A qualidade do sono está relacionada ao desempenho diário e ao estresse. As condições de trabalho impostas pela pandemia da *coronavirus disease 2019* (Covid-19) tiveram impacto sobre indivíduos e famílias. Para analisar a relação entre qualidade do sono, atividades diárias e estresse dos trabalhadores durante a pandemia, foi realizado um estudo dos diários de atividades de 113 trabalhadores de Havana, na Cuba, em agosto de 2020, coletados por telefone. Estatísticas descritivas e inferenciais, regressão e análise da microsequência social foram usadas para analisar os dados. As mulheres dormiam 8,64 horas por dia, passavam 5,30 horas em lazer, 3,53 horas em trabalho e 3,40 horas em tarefas domésticas. Os homens dormiam 8,33 horas por dia, gastavam 6,64 horas em lazer, 4,12 horas em trabalho, 2,32 horas em necessidades pessoais e 1,99 horas em tarefas domésticas. Houve diferenças estatisticamente significativas por sexo em termos de mudanças de papéis, tempo gasto em atividades de lazer e em tarefas domésticas, e número de papéis desempenhados. As mulheres tinham uma relação positiva e estatisticamente significativa entre o nível de descanso e o tempo gasto para dormir, enquanto os homens tinham uma relação negativa e estatisticamente significativa entre o nível de descanso e as horas gastas em tarefas domésticas. Os homens dormiam e descansavam mais do que as mulheres. Os resultados corroboram os comportamentos diferenciados de gênero, de acordo com as atividades e papéis que desempenham em diferentes ambientes, e sua influência na qualidade do sono e do estresse.

Palavras-chave: estresse, trabalho, qualidade do sono, sociologia do tempo, análise das microsequências sociais

SUEÑO Y ESTRÉS DE LOS TRABAJADORES DE LA HABANA DURANTE EL LOCKDOWN POR LA COVID-19

Resumen

La calidad del sueño está relacionada con el rendimiento diario y el estrés. Las condiciones de trabajo impuestas por la pandemia de *coronavirus disease 2019* (Covid-19) han impactado en individuos y familias. Para analizar la relación entre la calidad del sueño, actividades diarias y estrés de trabajadores durante la pandemia, se realizó un estudio de diarios de actividades de 113 trabajadores de La Habana, Cuba, en agosto de 2020, cuyos datos fueron recolectados telefónicamente. Para analizar los datos se utilizaron estadística descriptiva e inferencial, regresión y análisis de microsecuencias sociales. Las mujeres dormían 8,64 horas al día, dedicaban 5,30 horas al ocio, 3,53 horas al trabajo y 3,40 horas a las tareas del hogar. Los hombres dormían 8,33 horas al día, dedicaban 6,64 horas al ocio, 4,12 horas al trabajo, 2,32 horas a las necesidades personales y 1,99 horas a las tareas del hogar. Existieron diferencias estadísticamente significativas por sexo en cuanto a los cambios de papel, el tiempo dedicado a las actividades de ocio y a las tareas domésticas, y el número de papeles desempeñados. Las mujeres presentaron una relación positiva y estadísticamente significativa entre el nivel de descanso y el tiempo de sueño, mientras que los hombres tuvieron una relación negativa y estadísticamente significativa entre el nivel de descanso y las horas en tareas del hogar. Los hombres dormían y descansaban más que las mujeres. Los resultados corroboran comportamientos diferentes por sexo, según las actividades y papeles desempeñados en diferentes ambientes, y su influencia en la calidad del sueño y el estrés.

Palabras clave: estrés, trabajo, calidad del sueño, sociología del tiempo, análisis de las microsecuencias sociales

At home, work, and other social settings, people carry out daily activities, which have been studied from different perspectives to understand their dynamics and impacts. Psychosocial research emphasizes work dynamics and investigates the thoughts, moods, attitudes, and people's behaviors in different scenarios (Durán & Roguero, 2010).

From a labor perspective, there is research on this topic in Latin America and the Caribbean. The Economic Commission for Latin America and the Caribbean (Cepal) carried out different studies on time use and unpaid work (Aguirre & Ferrari, 2014).

In turn, there is some research from demographical and sociological perspectives from Cuba (Álvarez et al., 2018). The results have served to outline policies that offer workers greater professional comfort.

Sequential time-use studies are relevant to determine specific aspects such as stress and sleep behaviors in workers throughout the day. It allows explaining the switches in activities, roles, and environments that people experience. However, in our geographical region, to the best of the authors' knowledge, there are few studies from this perspective.

The coronavirus disease 2019 (COVID-19) scenario is susceptible to this type of research since social dynamics have suffered substantial changes with considerable influence on the labor sector. In this sense, studies on the manifestations of workers' stress and sleep – factors that cause various health problems – allow us to know the influence of the pandemic on work activities (Cornwell, 2015; Thoits, 2010).

Sleep quality includes the physiological aspects of individuals' sleep and stress levels. Some manifestations, such as insomnia and sleepiness, are linked to the stress suffered by workers (Landry et al., 2015), according to the roles and activities they perform. The time spent sleeping or resting determines the level of well-being of individuals, and its lack may pose risks to the mental and physical health of workers (Grandner, 2019).

Sleep is a state that living beings manifest according to the need for rest. It is a physiological and psychological necessity linked to other factors, such as physical rest, well-being, mental rest, and body balance. In this sense, sleep is a determining variable for health (Holding et al., 2020), which, both mentally and physically, implies the stability of people for the performance of daily activities (Van Laethem et al., 2013).

Sleep theories have been systematically analyzed since the 19th century (Grandner, 2019). Sleep has been studied and considered relevant in people's lives from a neuro-psycho-physiological perspective, as well as the definition of the sleep state and the repercussions of sleep on people's physical and mental health.

Studies on sleep insufficiency began around 1964 with Hammond, with sleep periods being defined as "short" or "long" (Grandner, 2019) and as something that could bring consequences to the human physiology. Other authors (Basner et al., 2007) have referred to sleep duration by adding both physical and mental factors, such as body mass (linked to other health problems like diabetes, hypertension, glucose intolerance) or the daily activities that people perform (leisure or work).

In both cases, sleep length is associated with levels of morbidity and mortality (Basner et al., 2007). Studies on this subject have increased in the last 40 years, particularly with analyses of the situation considering demographic aspects, such as age, gender, race, education, etc.; or from sociological and psychological perspectives, with studies considering lifestyles, socioeconomic factors, attitudes, the subjects' behavior, among others.

Studies on sleep quality explain that the durability of sleep is related to other risks to people's health (Landry et al., 2015). Poor sleep quality, such as insufficient sleep, presenting insomnia or drowsiness, has been addressed in many ways. "[...] [S]leep quality included sleep latency (amount of time to fall asleep), wake time after sleep onset (amount of time awake at night), and sleep efficiency (proportion of the time in bed spent sleeping)" (Grandner, 2019, p. 16).

Sleep quality is affected primarily by stress, generating difficulties in the short, medium, or long term. Psychology and medicine studies carried out on stress show that this is a constant phenomenon in human life, which may be related to changes in individuals' lives and the number of activities, roles, and settings in their daily lives (Thoits, 2010).

Some of the manifestations derived from stress include anxiety, depression, irritation, and disorders that are treated by neurology. Some scholars deal with stress concerning sleep quality and its relationships and implications (McEwen, 1998). This is linked to the sequence of activities performed by individuals under pressure, which could cause breaks in the sleep dynamics.

Health behaviors such as sleep, exercise, and diet are important determinants of mental health and may serve as a protective factor when faced with stress. Stress can directly affect health, as well as indirectly influence health through the promotion of adverse health-related behaviors such as short sleep duration, poor sleep quality, or insomnia (Coiro et al., 2021, p. 127).

One of the triggers of sleep deprivation is work-related stress, a very common aspect of current work dynamics (Coiro et al., 2021).

The COVID-19 scenario has disrupted work dynamics, increased stress and, consequently, caused poor sleep quality (Barzilay et al., 2020; Coiro et al., 2021; Barros et al., 2020). Holding et al. (2020) state that the increase in activities leads to insomnia. After a year of pandemic, institutions and workers have been pushed to readjust working conditions, which have been transferred to households and have implied more personal expenses, family readjustment, among others, as well as consequences for people's health. Multifactorial stress is one of these consequences, and poor sleep quality is one of its effects. Since lockdown, there has been a widening of the work day and household chores. At the same time, there have been accelerated, continuous, and sequential switches of activities, roles, and settings (Valdés et al., 2021).

Another determining factor for stress and poor sleep quality is the lack of social contact with other people outside home, which explains why individuals have adopted other ways of socializing and keeping in touch since lockdown, and virtual social networks have been a "salvation"; however, their excessive use has generated sleep disorders in terms of quality and quantity.

Sleep quality also predicts mental health in both clinical and non-clinical populations. A large body of research suggests that trauma and/or significant stressors are associated with sleep difficulties, including difficulty falling asleep or maintaining sleep, poor sleep quality, and/or irregular sleep patterns (Coiro et al., 2021, p. 127).

Lockdown has caused stress, prolonged the working day, triggered insomnia, and has an impact on individuals and families. The cumulative stress produced by the systematic switches influences sleep quality. Therefore, stress and sleep quality are relevant variables to research during lockdowns.

This article focuses on the switching dynamics in everyday social life and examines its consequences on sleep quality and stress. Specifically, it uses the concept of switching (Cornwell, 2013), which refers to the situation in which people move between different contexts and social roles. Scholars recognize these dynamics make daily life more agitated. In particular, quick or unexpected transitions between activities, roles, and settings challenge individuals in terms of coordination and scheduling as well as placing high cognitive demands, which potentially strains social relationships (Cornwell, 2015).

The following hypotheses were considered: 1. men sleep more than women; 2. the activity, roles, and settings switches decrease sleep quality; 3. the most stressed people sleep more; 4. the most stressed people rest more during sleep; and 5. men rest more than women do.

This article aims to: 1. illustrate the relevance of these dynamics for social-psychological research by examining their effects on individuals; and 2. given that everyday social roles and relationships are negotiated differently by gender, it considers how the switching dynamics (between activities, roles, and settings) provides clues to gender differences in the stress process and its relationship to sleep quality. In addition, we examine the association between these dynamics, stress, and sleep quality.

Method

Design and participants

This is a quantitative observational study with longitudinal panel data. Workers over 17 years old in Havana, Cuba, were selected to a non-probabilistic convenience sample. Each interviewer telephonically surveyed family members, friends, or neighbors in a snowball sampling. Eight interviewers took part in data collection from August 17th to August 25th, 2020, during the COVID-19 lockdown.

Table 1*Sample characterization by gender*

Variables		Gender			
		Women (n = 64)		Men (n = 49)	
Age	M (SD)	42.12	(12.96)	41.71	(13.53)
Age by groups	Youth (17–39 years old)	29	(45.31%)	21	(42.86%)
	Adults (40–59 years old)	29	(45.31%)	24	(48.98%)
	Older adults (60 years or older)	6	(9.38%)	4	(8.16%)
Skin	White	37	(56.92%)	28	(43.08%)
	Mestizo	17	(60.71%)	11	(39.29%)
	Black	10	(50.00%)	10	(50.00%)
Educational level	Secondary/high school	21	(47.73%)	23	(52.27%)
	University	43	(62.32%)	26	(37.68%)
Marital status	In stable union/married	42	(57.53%)	31	(42.47%)
	Divorced/single/widowed	22	(55.00%)	18	(45.00%)
Dependent children	No	52	(55.32%)	42	(44.68%)
	Yes	12	(63.16%)	7	(36.84%)
Dependent elderly	No	52	(54.74%)	43	(45.26%)
	Yes	12	(66.67%)	6	(33.33%)
Self-reported health	Bad	2	(66.67%)	1	(33.33%)
	Fair	10	(71.43%)	4	(28.57%)
	Good	24	(55.81%)	19	(44.19%)
	Very good	23	(54.76%)	19	(45.24%)
	Excellent	5	(45.45%)	6	(54.55%)
Hypertension record	No	44	(63.77%)	25	(36.23%)
	Yes	20	(45.45%)	24	(54.55%)

Note. Mean (*M*) and standard deviation (*SD*) are reported for age. For the rest of the variables, we wrote the frequency of each level of the variable and its percentage.

For the analysis, 24-hour diaries of 113 Havana workers were collected in August 2020. The age range was from 17 to 75 years, with an average of 41.95 (*SD* = 13.15). Table 1 shows that both genders were predominantly of white skin color, with higher education, and were in stable unions or married. There was no predominance of people with children or older adults under their care. Women rated their general health state as good, while men reported it as good and very good. Among women, there was a predominance of no hypertension record, while practically half of men had presented this condition.

Instrument

The *Activity Diaries and Self-Reported Stress Survey* (Valdés et al., 2022) is a paper-pencil survey with four-item blocks: sociodemographic and control variables, time-use diary, self-reported stress in daily activities, and the sleep quality the day after the diary recollection.

The sociodemographic and control variables were age, gender, skin color, educational level, marital relationship, and having children under 14 years or people over 65 years under care. Respondents evaluated their general health status and answered if in the last five years any health professional had reported that they were hypertensive.

Each day, participants logged their activities during the day on a time-use grid. Days were divided into 15 minutes time slots, from 6:00 a.m. onwards, in which participants described their activities. In addition, interviewers asked *where* (e.g., inside the house, at work) and *with whom* (e.g., alone, with children, with a partner) the respondents spent time during the activities.

Self-reported stress was measured in three activities randomly selected by the interviewer. For each of these activities, they were asked “From zero to six, with zero meaning that you were not stressed at all and six meaning that you were very stressed, how stressed did you feel during the activity?”. The average of their responses constitutes our overall stress measure (Cronbach's $\alpha = .74$).

In addition, respondents were asked: “How well-rested did you feel when you woke up today?”. The next day they had to rate the well-rested feeling as very (4), enough (3), a little (2), or not at all (1).

More details on the design and implementation of this survey can be found in Valdés et al. (2021).

Procedure

Approval from the Research Ethics Committee of the Faculty of Chemistry of the University of Havana, Cuba, was obtained before data collection (Agreement No. 204, 2020).

Interviewers contacted respondents to get their consent. Then, they gathered sociodemographic variables and guided the respondents on filling out the diary grid the next day. Two days later, the interviewers got the diary information by writing a description of the action and then coding it. If more than one activity took place in a time slot (e.g., watching TV for 30 minutes and having dinner for 15 minutes), we assigned the activity more minutes in the interval. Then, the interviewer randomly selected three activities and applied the Self-Reported Stress Scale. In addition, they asked the respondents' to rate their level of rest after they woke up that day.

Coding

We coded the descriptions of the actions at each time slot in the diaries using a typology adapted from the Multinational Time-Use Survey (MTUS) (Valdés et al., 2021). Given the wide variety of reported activities (49) and the low recurrence of some of them, we grouped them into eight clusters, according to their frequency, description, and relevance: sleeping, studying,

personal needs, leisure and religious activities, household chores, work, travel, and missing data (more details in Valdés et al., 2021).

Data analysis

The data were manually stored in Microsoft Excel spreadsheets. We verified the quality of the data digitization for 20% of the sample.

The first part of the analysis was mainly descriptive. Stratified analyses were performed focusing on the relationship between gender and age, skin color, educational level, marital relationship, whether the respondent had children under 14 years old or people over 65 years old under their care, general health status, and hypertension record. Means and standard deviations were reported.

In the second part, we performed a sequence analysis (Cornwell, 2015) on activities, roles, and settings arrays. We computed the mean times of being at home, with children, at leisure, on personal needs, on housework, at work, and sleeping. We created ordered indicators of activities, roles, and settings for each 15-minute interval in the diary day. Each interval (starting at 6:00 a.m. and ending at 6:00 a.m. the next day) was coded into eight activity groups by their initial letters in Spanish: sleeping (D), studying (E), personal needs (N), leisure and religious activities (O), housework (Q), work (T), travel (V), and missing data (NA). In addition, the number of switches in activities, settings, and social roles were computed. We examined the frequencies and concentrations of these sequences, which were plotted using activity distribution graphs (chronograms) by gender (Gabadinho et al., 2011). Each code corresponds to a color in the plots.

In the third part of the analysis, we used two-sample *t*-tests to investigate differences by gender in the following variables: the next-day well-rested level, the switching measures, age, overall health status, time at home, time with children, time in leisure, time on personal needs, time on housework, time at work, time sleeping, and reported overall stress level.

For models predicting the next-day well-rested level, we considered variables that are likely to be confounders. Therefore, the fourth part of the analysis focused on the covariation of the next day's well-rested level (as a dependent variable) with demographics, the average time of selected activities, roles, and settings, and the mean self-reported overall stress. For this purpose, we evaluated four ordinary least square regression models (Field et al., 2012). First, we estimated two regression models to predict the next-day well-rested level by gender, considering the mentioned variables, but the switching measures. Then, switching variables were added to these models to determine their effect on the dependent variable.

The intercepts in our regression models represent the average next-day well-rested level for the reference categories (divorced/single/widowed, no dependent children, no dependent elderly, and no record of hypertension).

The ability of predictor variables to improve the prediction of the next-day well-rested level before introducing the switching measures was verified using an analysis of variance (ANOVA).

For all tests, we considered a cut-off of .05 for p values and a 95% confidence interval.

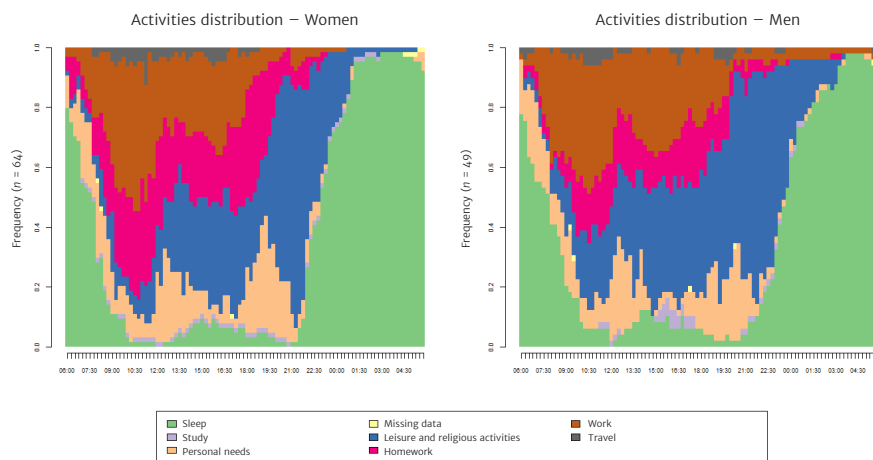
The statistical programming language R and its packages (Field et al., 2012) were used for statistical analyses, and the TraMineR package (Gabadinho et al., 2011) was run for sequence analysis.

Results

The individuals in the sample were socially active. On average, they slept about 8.50 hours a day, spent 5.88 hours on leisure activities, 3.79 hours on work, 2.79 hours on housework, 2.38 hours on personal needs, .37 hours (22.2 minutes) moving from one place to another, and .25 hours (15 minutes) studying. People preferred not to mention their activities for a total of .03 hours (1.8 minutes).

Figure 1

Frequency distribution of activities by gender



For females, a similar trend was observed in Figure 1 (left). They slept 8.64 hours a day, spent 5.30 hours on leisure activities, 3.53 hours on work, 3.40 hours on housework, 2.43 hours on personal needs, .39 hours (23.4 minutes) moving from one place to another, and .27 hours (16.2 minutes) studying. Women preferred not to mention their activities for a total of .04 hours (2.4 minutes).

Figure 1 shows that men slept 8.33 hours a day, dedicated 6.64 hours to leisure activities, 4.12 hours to work, 2.32 hours to personal needs, 1.99 hours to housework, .34 hours (20.4 minutes) moving from one place to another, and .23 hours (13.8 minutes) studying. Men preferred not to mention their activities for a total of .03 hours (1.8 minutes). On average, women spent almost twice as many hours on housework and use one hour less on leisure activities.

Women perform more housework than men do, with two important time slots at midday and around 6:00 p.m., associated with the preparation of meals. Both genders perform their work during the morning hours, although men have another work slot between 4:00 to 6:00 p.m. Men spent more time on leisure than women did.

The participants spent .89 hours accompanied by their children, on average. An appreciable number of microsocial transitions per day were reported (14.65). Respondents reported an average of approximately three (3.31) different settings and nearly eight (8.54) different social roles in their diaries. Some individuals made up to 26 activity and setting switches, with up to 16 role switches occurring.

Table 2 shows the next-day well-rested level, stress, switching, and control variables by gender. The mean level of rest the next day was 3.24 ($SD = .91$), which shows a low mean level in the sample for this variable. Slightly more than half of the sample (52.21%) reported feeling very rested the day after obtaining the diary. This variable did not present statistically significant differences by gender.

Women spent 1.27 hours accompanied by their children, on average, compared to .39 hours for men ($t[78.29] = 2.08, p < .05, CI\ 95\% = [.04, 1.72]$). Female respondents reported an average of three (3.19) different environments and slightly more than nine (9.37) different social roles in their diaries, outperforming males on the latter variable.

Women suffered more role switches ($t[105.25] = 2.59, p < .05, CI\ 95\% = [.45, 3.40]$) and spent more hours on housework ($t[108.96] = 3.56, p < .001, CI\ 95\% = [.62, 2.19]$) than men. In turn, men spent more time on leisure activities ($t[87.16] = -2.336, p < .05, CI\ 95\% = [-2.47, -.20]$) than women.

Table 2

Description of stress variables, the next-day well-rested level, switches, and control variables used, by gender

Variable		Gender			
		Women		Men	
		M	SD	M	SD
Dependent variable					
Next-day well-rested level	How well-rested did the respondent (R) feel the next day the diary was collected – range: 1–4.	3.34	.88	3.10	.94
Switching measures					
Activity switches	Number of times R switched from one type of activity to another – range: 4–26.	15.06	4.20	14.10	3.91
Setting switches	Number of times R changed its setting – range: 4–26.	3.19	3.11	3.47	3.16
Role switches*	Number of times R changed role – range: 0–16.	9.37	3.99	7.45	3.85
Control variables					
Time at home	Amount of time R spent inside their house during the day (in hours) – range: 0–24.	20.18	4.80	18.87	5.55

Table 2
Description of stress variables, the next-day well-rested level, switches, and control variables used, by gender

Variable		Gender			
		Women		Men	
		M	SD	M	SD
Time with children*	Amount of time R spent with children during the day (in hours) – range: 0-16.	1.27	3.18	.39	.99
Time on leisure*	Amount of time R spent on leisure activities during the day (in hours) – range: 0.75-13.25.	5.30	2.54	6.64	3.32
Time on personal needs	Amount of time R spent on activities related to personal needs during the day (in hours) – range: 1-6.75.	2.43	1.04	2.32	0.71
Time on housework***	Amount of time R spent doing household chores during the day (in hours) – range: 0-8.75.	3.40	2.24	1.99	1.96
Time at work	Amount of time R spent working during the day (in hours) – range: 0-14.5.	3.53	3.87	4.12	4.07
Time sleeping	Amount of time R spent sleeping during the day (in hours) – range: 3.25-14.25.	8.64	2.04	8.33	2.13
Reported overall stress level	The mean of R's three self-reported stress levels, each ranging from zero (low) to six (high) – range: 0-4.33.	.86	.96	.88	1.08

Note. **p* < .05, ***p* < .01, ****p* < .001.

Table 3 shows the results of the multivariate regression analysis predicting the next-day well-rested level of women ($F[14.49] = .78, p = .69$ versus $F[17.46] = .78, p = .70$) and men ($F[14.34] = 1.50, p = .17$ versus $F[17.31] = 1.29, p = .26$), with and without the switching variables. When comparing the regression models in each gender, it was found that although switching variables increased the explained variance of the models, they did not do so statistically significantly (female: $F[3, 47] = 3.16, p = .31$; male: $F[3, 32] = 1.39, p = .62$).

Table 3
Adjusted coefficients and standard errors of regression models predicting the next-day well-rested level by gender

Predictor	Model without switching variables		Model with switching variables	
	Women	Men	Women	Men
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Age	.008 (.010)	.009 (.012)	.009 (.010)	.006 (.013)
Marital status – in stable union/married	.161 (.268)	-.374 (.334)	.101 (.289)	-.299 (.346)
Dependent children	-.151 (.332)	-.284 (.452)	-.273 (.347)	-.304 (.467)
Dependent elderly	.209 (.344)	-.395 (.453)	.104 (.369)	-.452 (.466)
Self-reported health	.042 (.134)	.147 (.209)	.102 (.141)	.074 (.220)
Hypertension record	-.187 (.290)	.341 (.286)	-.146 (.297)	.443 (.307)

Table 3

Adjusted coefficients and standard errors of regression models predicting the next-day well-rested level by gender

Predictor	Model without switching variables		Model with switching variables	
	Women	Men	Women	Men
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Time at home	-.001 (.036)	.0004 (.032)	-.012 (.044)	.007 (.035)
Time with children	.043 (.042)	-.01 (.169)	.039 (.043)	-.008 (.175)
Time on leisure	.063 (.071)	.124 (.135)	.039 (.073)	-.098 (.153)
Time on personal needs	.008 (.130)	.333 (.259)	-.036 (.138)	.457 (.286)
Time on housework	.021 (.076)	-.346 (.144)*	.032 (.081)	-.308 (.155) [^]
Time at work	.069 (.063)	-.77 (.320)	.059 (.064)	-.75 (.34)
Time sleeping	.166 (.075)*	.016 (.132)	.144 (.077) [^]	.045 (.151)
Reported overall stress level	.011 (.144)	.069 (.181)	.013 (.151)	.043 (.187)
Activity switches	-	-	-.035 (.037)	-.007 (.043)
Setting switches	-	-	-.044 (.053)	.046 (.058)
Role switches	-	-	.034 (.038)	-.053 (.043)
Intercept	.635 (1.735)	3.623 (2.539)	1.466 (1.887)	3.296 (3.286)
R ²	0.182	.381	.224	.415

Note. [^] $p < .1$, * $p < .05$, ** $p < .01$.

Columns 1 and 2 of Table 3 show that women reported a positive and statistically significant relationship between the next-day well-rested level and the time sleeping, while men reported a negative and statistically significant relationship between the next-day well-rested level and the number of hours doing household chores. After adding the variables on the switching dynamics – columns 3 and 4 of Table 3 –, these relations also hold by gender.

Although the models are not statistically significant at a cut-off point of .05, they allow us to study the relationship between the variables considered. There is a slightly positive relation between the overall stress and the resting level; this is more accentuated in men. In women, there is a negative relationship between the resting level and activity and setting switches. In turn, men reported a negative relation between the dependent variable and activity and role switches.

Discussion

Our study showed that people presented different behaviors according to their gender depending on the activities and roles played in the settings and their influence on sleep quality and self-reported stress. Stress was a recurrent factor during the lockdown due to the COVID-19 pandemic. Sleep quality was affected by the changes in activities, roles, and settings that people dealt with during the lockdown.

The findings revealed that sleep quality decreases with frequent changes in activities. This means that people who had more changes in their domestic activities were more exposed to fatigue, tension, and irritation caused by insufficient rest and lack of sleep (Van Laethem et al., 2016). In our sample, this was more accentuated for men.

Similarly, it happens with roles and settings switches, in which people are at greater risk of being involved in stressful situations (Cornwell, 2015). This fact was shown by the low average next-day well-rested level in the sample, due to the constant and uninterrupted sequence of roles and settings for the performance of certain activities.

In our sample, differences according to gender were found in the sleep length and the next-day well-rested level. Women tend to perform more hours of housework and frequently switch between different roles and settings. Shopping and carrying out various activities inside and outside the house, together with the need to travel, increase the level of stress, thus causing sleep deprivation (Van Laethem et al., 2016). In addition, women are more dedicated to their jobs, which makes it more difficult for them to coordinate and complete their tasks, causing them much more stress than it would cause men.

Men, in turn, sleep and rest longer. Their dynamics are linked to casual activities and roles that are not so frequent (for instance, fixing breakdowns at home) (Giurge et al., 2021). This result indicates that men are less familiar with housework, and, although the factors may indicate less stress in men, our study cannot assure that they become more relaxed.

Worker stress due to insufficient recovery during sleep is a health risk factor (Van Laethem et al., 2016). People with more work activities are the most stressed and, therefore, have lower sleep quality. These findings contradict the results obtained by Van Laethem et al. (2016).

A previous study has demonstrated that frequent switches (of greater or lesser duration) of work activities combined with housework and socialization have caused states of uneasiness, sleepiness, and insomnia, linked to the conditions to which people are subject on a daily basis during the COVID-19 lockdown (Coiro et al., 2021). Poor motivation under these conditions, together with the effects of confinement, lead to stress as a relevant variable (Droit-Volet et al., 2020), to which changes in activities, roles, and environments are key factors.

One of the limitations of the current study is that the variables of sleep and rest cannot be measured accurately by counting down the events; however, this technique allows us to quantify the sleep hours and determine physically who has slept more or less. Regarding rest, the question "How well-rested did you feel when you woke up today?" is an opportunity to measure people's well-being in relation to previously performed activities.

In addition, this research only covered the impact of stress on the rest of the workers and its influence on the quality of sleep. We did not consider in the survey other neurophysiological and psychological variables, which, together with those analyzed, could have an impact on sleep quality. To this end, we recommend examining the relationships between the most common illnesses of workers dealing with work stress and its reflection on their rest and performance. Finally, the joint variation of subjects in activities, roles, and environments was not analyzed. For

example, the microsequence analysis performed did not distinguish whether the work activity was performed at home or outside and with whom it was performed. Therefore, we recommend conducting a multichannel analysis of social microsequences to consider these variations.

Final considerations

With respect to the initial hypotheses, we concluded that men sleep 18.6 minutes less than women do, although this difference was not statistically significant. There was a relationship between rest and the dynamics of change of activity, roles, and settings, without statistical significance. Including the switching variables in the models increased the accuracy of the dependence relationship of the variables on the level of rest. The most stressed people sleep more, although this relationship was not statistically significant. Women rested more than men do, and this could be related to women also sleeping more than men do.

It is recommended for future research to study the dynamics of change in activities, roles, and places and their relationship with stress and the relationship between sleep quality, daily activities, and stress of workers and students, as well as the risk of COVID-19 during daily activities and other indicators of interest.

References

- Aguirre, R., & Ferrari, F. (2014). *Las encuestas sobre uso del tiempo y trabajo no remunerado en América Latina y el Caribe: Caminos recorridos y desafíos hacia el futuro* (Vol. 122). Comisión Económica para América Latina y el Caribe (Cepal).
- Álvarez, M., Franco, M. del C., Palmero, Y., Iglesias, M., & Díaz, Y. (2018). *Encuesta Nacional Igualdad de Género: Informe de Resultados*. Centro de Estudios de la Mujer, Centro de Estudios de Población y Desarrollo.
- Barros, M. B. de A., Lima, M. G., Malta, D. C., Szwarcwald, C. L., Azevedo, R. C. S. de, Romero, D., Souza, P. R. B. de, Jr., Azevedo, L. O., Machado, Í. E., Damacena, G. N., Gomes, C. S., Werneck, A. de O., Silva, D. R. P. de., Pina, M. de F. de, & Gracie, R. (2020). Report on sadness/depression, nervousness/anxiety and sleep problems in the Brazilian adult population during the COVID-19 pandemic. *Epidemiologia e Serviços de Saúde: Revista do Sistema Único de Saúde do Brasil*, 29(4), e2020427. <https://doi.org/10.1590/s1679-49742020000400018>
- Barzilay, R., Moore, T. M., Greenberg, D. M., DiDomenico, G. E., Brown, L. A., White, L. K., Gur, R. C., & Gur, R. E. (2020). Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Translational Psychiatry*, 10(1), 291. <https://doi.org/10.1038/s41398-020-00982-4>
- Basner, M., Fomberstein, K. M., Razavi, F. M., Banks, S., William, J. H., Rosa, R. R., & Dinges, D. F. (2007). American time use survey: Sleep time and its relationship to waking activities. *Sleep*, 30(9), 1085–1095. <https://doi.org/10.1093/sleep/30.9.1085>
- Coiro, M. J., Asraf, K., Tzischinsky, O., Hadar-Shoval, D., Tannous-Haddad, L., & Wolfson, A. R. (2021). Sleep quality and COVID-19-related stress in relation to mental health symptoms among Israeli and U.S. adults. *Sleep Health*, 7(2), 127–133. <https://doi.org/10.1016/j.sleh.2021.02.006>
- Cornwell, B. (2013). Switching dynamics and the stress process. *Social Psychology Quarterly*, 76(2), 99–124. <https://doi.org/10.1177/0190272513482133>
- Cornwell, B. (2015). *Social sequence analysis: Methods and applications*. Cambridge University Press. <https://doi.org/10.1017/CBO9781316212530>
- Droit-Volet, S., Gil, S., Martinelli, N., Andant, Clinchamps, M., Parreira, L., Rouffiac, K., Dambrun, M., Huguet, P., Dubuis, B., Pereira, B., Covistress Network, Bouillon, J.-B., & Duthell, F. (2020). Time and Covid-19 stress in the lockdown situation: Time free, “Dying” of boredom and sadness. *PLoS One*, 15(8), e0236465. <https://doi.org/10.1371/journal.pone.0236465>
- Durán, M. de los Á., & Roguero, J. (2010). *La investigación sobre el uso del tiempo*. Centro de Investigaciones Sociológicas.
- Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage.
- Gabadinho, A., Ritschard, G., Müller, N. S., & Studer, M. (2011). Analyzing and visualizing state sequences in R with TraMineR. *Journal of Statistical Software*, 40(4), 1–37. <https://doi.org/10.18637/jss.v040.i04>
- Giurge, L. M., Whillans, A. V., & Yemiscigil, A. (2021). A multicountry perspective on gender differences in time use during COVID-19. *Proceedings of the National Academy of Sciences of the United States of America*, 118(12). <https://doi.org/10.1073/pnas.2018494118>
- Grandner, M. A. (2019). Epidemiology of insufficient sleep and poor sleep quality. In M. A. Grandner (Ed.), *Sleep and health* (pp. 11–20). Elsevier. <https://doi.org/10.1016/B978-0-12-815373-4.00002-2>
- Holding, B. C., Sundelin, T., Schiller, H., Åkerstedt, T., Kecklund, G., & Axelsson, J. (2020). Sleepiness, sleep duration, and human social activity: An investigation into bidirectionality using longitudinal time-use data. *Proceedings of the National Academy of Sciences of the United States of America*, 117(35), 21209–21217. <https://doi.org/10.1073/pnas.2004535117>
- Landry, G. J., Best, J. R., & Liu-Ambrose, T. (2015). Measuring sleep quality in older adults: A comparison using subjective and objective methods. *Frontiers in Aging Neuroscience*, 7, 166. <https://doi.org/10.3389/fnagi.2015.00166>
- McEwen, B. S. (1998). Stress, adaptation, and disease allostasis and allostatic load. *Annals of the New York Academy of Sciences*, 840(1), 33–44. <https://doi.org/10.1111/j.1749-6632.1998.tb09546.x>

- Thoits, P. A. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior*, 51(1_suppl), S41–S53. <https://doi.org/10.1177/0022146510383499>
- Valdés, D., Cairo, K. S., & Pell, S. M. (2021). Uso del tiempo y estrés de trabajadores habaneros durante confinamiento por COVID-19. In M. C. Ferreira & J. T. da Rocha Falcão (Eds.), *Trabalho e saúde: Metamorfoses na produção de mercadorias e serviços, novo perfil da atividade dos trabalhadores e novo perfil da atividade dos trabalhadores e impactos para o bem-estar no trabalho* (pp. 1–18). Editora UFRN.
- Valdés, D., Pell, S. M., Izaguirre, A., Cairo, K. S., Bouza, M. V., Rodríguez, P. de las M., Betancourt, M., González, M., Galindo, A. M., Lorenzo, A., Febles, M. M., & Pría, M. del C. (2022). Actividades diarias y estrés autoreportado durante el confinamiento por COVID-19. La Habana, 2020. *Novedades en Población*, 18(35).
- Van Laethem, M., Beckers, D. G. J., Kompier, M. A. J., Dijksterhuis, A., & Geurts, S. A. E. (2013). Psychosocial work characteristics and sleep quality: A systematic review of longitudinal and intervention research. *Scandinavian Journal of Work, Environment and Health*, 39(6), 535–549. <https://doi.org/10.5271/sjweh.3376>
- Van Laethem, M., Beckers, D. G. J., Van Hooff, M. L. M., Dijksterhuis, A., & Geurts, S. A. E. (2016). Day-to-day relations between stress and sleep and the mediating role of perseverative cognition. *Sleep Medicine*, 24, 71–79. <https://doi.org/10.1016/j.sleep.2016.06.020>

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