Research Article

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Circadian Rhythm, Schedule Flexibility and Well-Being among Ivorian Workers in the Private Sector

Kolotcholoma Issouf Soro*, **Michel K. Gbagbo**

Department of Sociology, Peleforo Gon Coulibaly University, Korhogo, Ivory Coast

*Author for correspondence: soroissouf@upgc.ci

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Abstract

The present work linked circadian rhythm, schedule flexibility and well-being at work among Ivorian workers in the private sector. To achieve this objective, data was collected from 98 employees of all genders and specialties using field surveys using questionnaires in three private companies. These participants were divided according to the circadian morning-evening cycle and time flexibility.

The analysis of the results made it possible to confirm the effect of the circadian cycle and time flexibility on well-being at work. It appears that the phase of the circadian rhythm of the morning chronotypes is in harmony with professional calendars. This category of employees would thus be less exposed to ill-being and consequently predisposed to obtain high performance in the company compared to evening workers and employees with rigid schedules. This work therefore suggests allowing time flexibility according to the circadian rhythm for the well-being of employees.

Keywords: Circadian rhythm • Time flexibility • Well-being at work • Private companies • Ivory Coast

Introduction

Business issues are multiple and varied, including aspects related to the labor market, the economy, compensation, hiring, and time management. All of these issues contribute to improving well-being at work and, by extension, to the company's performance. Well-being at work is therefore a major issue for the company, assessed individually by the worker based on cognitive and affective determinants, emotional skills are necessary to adapt to changing activity situations and to react to stress, particularly in so-called "emotional" professions such as helping relationships.

The chronobiological approach offers an interesting perspective to explain well-being at work, based on the distribution of individuals according to their circadian cycle. Morning people, who go to bed early (before 10 p.m.) and wake up naturally (before 7 a.m.) with an early peak of alertness, contrast with evening individuals, who go to bed late (after midnight) and have difficulty getting up in the morning, their peak of alertness being later. This individual variation can affect well-being at work, especially in Ivorian companies where flexible hours are often absent. Common difficulties such as absenteeism, lateness, insomnia and illness suggest a mismatch between work schedules and the various circadian rhythms of employees. This mismatch could negatively influence well-being at work, highlighting the importance of examining the link between circadian cycle, flexible hours and well-being in the private sector. The research question of this study is: How do the circadian cycle and time flexibility influence the well-being at work of private sector employees in Côte d'Ivoire? The objective is to determine the impact of the circadian cycle and time flexibility on the well-being at work of private sector employees in Côte d'Ivoire. Our proposition is that the circadian cycle and time flexibility would influence well-being at work.

To answer this question, we adopted a quantitative approach. A sample of 98 employees from the Ivorian private sector was selected. A structured questionnaire was

developed to collect information on the circadian cycle, perceived time flexibility and well-being at work of the participants. The main variables studied include the type of circadian cycle (morning, evening), time flexibility within the company, and the various aspects of well-being at work (satisfaction, stress, performance, etc.). The data collected will be analyzed using appropriate statistical techniques to identify relationships and correlations between the variables studied.

The article will be structured as follows: A presentation of the context, the issues and the research question; a detailed description of the methodology used; a presentation and analysis of the results obtained; and finally, an interpretation of the results, with practical and theoretical implications, and recommendations for companies. It will end with a conclusion.

Issue

Well-being at work encompasses several aspects of professional life, organized into three dimensions: The quality and safety of the work environment, the work climate and the organization of work. According to Buffet et al., well-being is located at the intersection of two areas: Safety and health at work, and innovation for the work environment. The latter includes five elements: Work organization (autonomy), human resources management (employability), employee relations (involvement), ergonomics (comfort) and professional time management (work-life balance). Professional time management, aiming for a balance between private and professional life, is therefore crucial for workers' well-being.

Work is defined as a human activity aimed at producing goods or services, usually paid, and organized within the framework of a company or organization.

The circadian cycle is a biological rhythm of approximately 24 hours that regulates physiological processes in living beings, including humans. This cycle influences sleep, alertness, body temperature, and various hormonal functions. It is determined by an internal clock located in the suprachiasmatic nucleus of the hypothalamus and is influenced by external factors such as light and darkness).

Chronotype refers to individual preferences for periods of activity and rest within the circadian cycle. There are several types of chronotypes, of which the morning and evening chronotypes are the most commonly studied.

Morning types tend to go to bed early (before 10 p.m.) and naturally wake up early (before 7 a.m.), with an early peak in alertness. They are often most alert and efficient during the first part of the day.

Evening types prefer to go to bed late (after midnight) and have difficulty getting up in the morning, as their alertness peaks later. They are often more alert and efficient in the late afternoon or evening.

Well-being at work is defined as a positive and dynamic state of mind resulting from the satisfaction of professional needs, including recognition, personal accomplishment, and harmonious social relationships within the work environment. It includes cognitive, emotional, and contextual aspects that influence the worker's overall perception of his or her work environment.

According to chronobiology data, effective professional time management must integrate individuals' circadian rhythms. The circadian rhythm regulates the sleep-wake cycle in collaboration with the homeostatic process of sleep. This biological rhythm aims to synchronize individual physiological processes with the environment, influencing the majority of cognitive functions, such as alertness, executive functions, and attention. This rhythm also impacts general brain functioning, the level of alertness of which is determined by circadian and homeostatic processes of sleep. The accumulation of homeostatic sleep pressure leads to an increase in errors and a gradual slowdown during the day. Thus, cognitive performance is determined by the interaction between circadian and homeostatic sleep processes.

To mitigate these effects, some Human Resources Departments (HRDs) adopt flexible working hours for certain categories of employees, as observed in the companies studied in this work. Flexible working hours are a way of organizing an employee's working time by having them determine "... autonomously and daily, the beginning and end of their work day, while maintaining the principle of mandatory presence during a predetermined and uniform blocked period of time". With this type of formula, employees actually work the same weekly hours recommended by the laws in force, but retain the free choice of determining their start and end time at work.

In Côte d'Ivoire, Decree No. 96-203 of March

7, 1996, in its Article 1, sets the weekly working time at forty hours per week for non-agricultural companies, and forty-eight hours per week for farms, establishments, agricultural companies and similar, up to a limit of two thousand four hundred hours per year. However, it appears that the flexible working hours adopted in the companies studied are based on subjective criteria, not taking into account the circadian rhythm of employees. However, working hours can be linked to employee well-being through work-family balance. The underlying idea is that a high degree of perceived work-family conflict has a negative influence on employee well-being by increasing their stress.

It thus appears that a mismatch between the circadian rhythm and professional schedules could impact the well-being of workers. In this vein, statistics from the National Institute of Sleep and Vigilance suggest that for 56% of French people, sleep problems cause at least one nuisance in the professional context. 8% of them would have been absent at least once from work in the last 12 months due to sleep disorders. 13% would have driven while lacking sleep or in a state of drowsiness in the context of their professional activity and would have risked an accident. Finally, 37% of those surveyed believe that work schedules/rhythms disrupt their sleep rhythm; the repercussions are mainly felt on energy and dynamism, concentration and the ability not to make mistakes.

In observance, there is no statistical data on the impact of working hours on well-being in Côte d'Ivoire, which justifies our study. This focuses on well-being at work in private companies where flexible working hours are not practiced, taking into account circadian rhythms. The internal problems identified during the pre-survey, such as absenteeism, lateness, recurring illnesses, reduced performance and insomnia, seem to be linked to the rigidity of schedules and circadian rhythms. In this sense, rigid working hours appear to be the main factor of weakness in these organizations.

Taking into account employees' individual rhythms, whether morning or evening, is essential in the professional context. Work schedules should be adjusted according to this inter-individual variability in order to avoid employees having to make an additional effort to adapt to schedules that do not correspond to their natural circadian rhythms. Such additional effort can indeed lead to increased fatigue, as well as a decrease in employee reliability and efficiency.

Previous studies have highlighted a mismatch between work schedules and individual circadian rhythms in some companies. Problems such as absenteeism, lateness and performance declines illustrate an often problematic management of work schedules in these organizations. This mismatch is considered by researchers as a factor that can negatively influence well-being at work. In particular, it has been suggested that adapting work schedules to employees' natural rhythms could improve their well-being and performance [1-5].

Our study aims to deepen this knowledge by exploring more specifically the relationship between circadian rhythm, flexible working hours and well-being at work in the private sector. We seek to demonstrate that adjusting work schedules to employees' circadian cycles can have beneficial effects on both individual well-being and organizational performance.

Theoretically, our research proposes that the adoption of flexible schedules, aligned with circadian cycles, would allow the integration of knowledge on the chronotype and well-being of workers. This would offer valuable guidance for the development of schedules, taking into account the individual characteristics of employees. Practically, this approach could translate into greater employee satisfaction and productivity. Indeed, flexible schedules would promote a better work-life balance, reduce stress and contribute to attracting and retaining talent.

In summary, effective working time management and flexible working hours could not only improve workers' well-being but also promote business growth. Workers' well-being therefore appears to be a key concern, justifying the interest and relevance of our study.

Materials and Methods

To conduct this study, a quantitative methodological approach was adopted in order to collect precise and systematic data on the impact of circadian rhythm and flexible working hours on well-being at work. This approach makes it possible to objectify and quantify the relationships between these variables, thus facilitating a rigorous statistical analysis of the results [6-9].

The field survey was conducted using questionnaires, which allows for the collection of

standardized information from a large sample of participants. The sample consists of 98 workers of different genders and specialties, thus providing a representative diversity of the population studied. Participants were divided according to their circadian rhythm, schedule flexibility, and well-being, as shown in Table 1.

Circadian rhythm		Flexible hours	
Morning	Evening	Yes	No
49	49	49	49

Table 1. Characteristics and distribution of the sample.

This quantitative methodology is justified by the need to accurately measure the effects of circadian cycles and flexible working hours on workers' well-being. Questionnaires allow for the collection of comparable data and the testing of hypotheses on a medium and large scale, thus providing generalizable and statistically significant results.

As part of the assessment of well-being at work, we used the WHO "WHO5" indicator. This indicator is based on five questions, with a score of up to 25, and uses a Likert-type scale. The answers range from "All the time" (5) to "Never" (0) and assess well-being at work.

To assess circadian rhythm, two questionnaires were chosen. The first is the Pittsburgh Sleep Quality Index (PSQI), comprising 19 questions on participants' subjective sleep quality and hypnotic use. These questions are grouped into seven components: Subjective sleep quality, sleep latency, sleep duration, usual sleep efficiency, sleep disturbance, hypnotic use, and daytime dysfunction. The PSQI was used to screen participants individually based on their schedule.

In addition to sleep quality, we wanted to know the participants' circadian rhythm in order to determine their chronotypes. To do this, we used the Horne and Östberg typology questionnaire, consisting of 19 questions. Each question generally offers four answers, corresponding to the different types of chronotypes. The answers are randomly ordered to avoid a fixed response pattern. The scores obtained make it possible to identify the participants' chronotype: "really morning person" (70 to 86), "moderately morning person" (59 to 69), "no particular type" (42 to 58), "moderately evening person" (31 to 41) and "really evening person" (16 to 30).

Results

Circadian rhythm and well-being at work

Table 2 presents the distribution of private sector employees according to their circadian rhythm and their well-being at work. Morning workers with a high level of well-being at work represent 36.73%, while evening workers in the same situation represent 17.35%. The statistical analysis thus shows the significant influence of the circadian rhythm on well-being at work (χ^2 (1.98)=09.22; p<0.001) (Figure 1).

		Well-being at work		Total	Calculated value of *Chi-square*		Calculated probability threshold
		Weak	Pupil				
Circadian rhythm	Mornings	13 (13,27%)	36 (36,73%)	49	09,22	2	0.001
	Vespers	32 (32,65%)	17 (17,35%)	49			
Total		45 (45,92%)	53 (54,08%)	98			

Table 2. Distribution of staff according to pace and well-being at work.

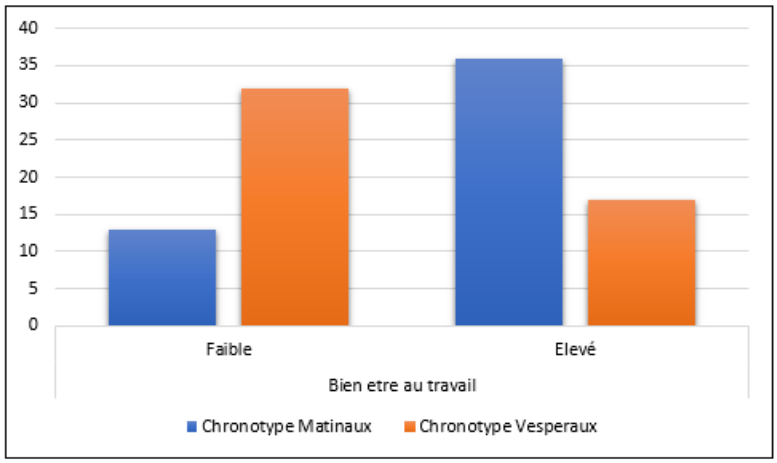

Figure 1. Levels of well-being at work according to pace.

Flexible working hours and well-being at work

Table 3 shows the distribution of workers according to circadian rhythm and well-being at work. Workers who are allowed flexible hours are the most numerous in terms of high well-being at work. They represent 33.67%, while workers with rigid schedules represent 14.28%. The statistical analysis therefore reveals the impact of flexible hours on well-being at work (x^2 (1.98)=12.36; P<0.001) (Figure 2).

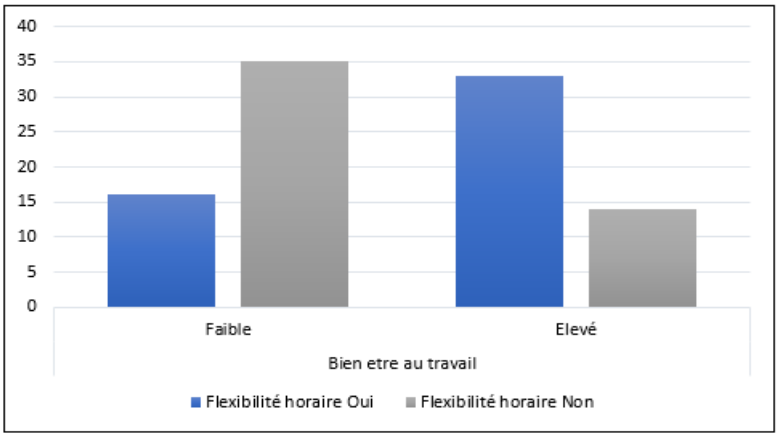

Figure 2. Levels of well-being at work according to flexible working.

		Well-being at work		Total	Calculated value of *chi-square*		Calculated probability threshold
		Weak	Pupil				
Flexible hours	Yes	16 (16, 33%)	33 (33,67%)	49	12, 36	2	0.001
	No	35 (35,71%)	14 (14,28%)	49			
Total		51 (45,92%)	47 (54,08%)	98			

Table 3. Distribution of staff according to flexible working hours and well-being at work.

Analysis of results

The results of our study show a significant relationship between the circadian rhythm of workers and their well-being at work. Table 2 presents a distribution of private sector employees according to their circadian rhythm and their well-being at work. It shows that 36.73% of morning workers have a high level of well-being at work, compared to only 17.35% of evening workers. Statistical analysis confirms this significant influence of the circadian rhythm on well-being at work with a *Chi-square* value of (χ^2(1.98)=09.22; p<0.001).

Table 3 explores the impact of flexible working hours on well-being at work. The results indicate that workers with flexible working hours are more likely to have high well-being at work (33.67%) compared to those with rigid working hours (14.28%). The statistical analysis also reveals a significant difference, with a *Chi-square* value of (χ^2(1.98)=12.36; p<0.001).

Discussion

The results of this study confirm the findings of previous research on the importance of circadian rhythm and schedule flexibility in worker well-being. The distribution of employees according to their circadian rhythm and their level of well-being clearly shows that morning workers benefit more from high well-being, which can be explained by a better synchronization of their work schedules with their natural circadian cycle. This synchronization seems to reduce the additional efforts required to adapt to unnatural schedules, thus reducing fatigue and improving employee reliability and efficiency.

Furthermore, the positive impact of flexible working hours on well-being at work is notable. Employees with flexible working hours are more satisfied and productive, suggesting that the possibility of choosing their schedules according to their personal rhythm promotes a better work-life balance, reduces stress and contributes to greater job satisfaction. These results are consistent with the studies of Frone and O'Driscoll, et al., who highlight the importance of work-family balance in employee well-being.

The study therefore highlights the importance for companies to integrate flexible working hours policies and take into account employees' circadian rhythms. By adjusting work schedules to better match natural circadian cycles, companies can not only improve the well-being of their employees but also increase their productivity and reduce absenteeism and lateness problems. In this, its results confirm the findings of Burke et al. as well as Soro, Kouakou and Meité (Ibid.), indicating that lack of sleep affects cognitive performance and well-being.

The practical implications of these results are clear: Companies should consider implementing more flexible working hours adapted to individual circadian rhythms, as already recommended by Gaggioni et al. and Mongrain, et al.

Such policies could include flexible work schedules or the ability to work shifts, allowing employees to choose time slots that better fit their chronotype.

In conclusion, this study demonstrates that taking into account circadian rhythm and time flexibility is crucial for employee well-being in the private sector. Companies that adapt their time management policies accordingly can expect not only to improve their employees' well-being but also to benefit from increased productivity and better talent retention. These results reinforce the importance of chronobiologically informed time management policies for well-being and work performance.

This study has some limitations, including the relatively small sample size, which may not be fully representative of the diversity of private firms in Côte d'Ivoire. In addition, the use of self-administered questionnaires may introduce response bias, and the lack of longitudinal data limits the ability to establish robust causal relationships between the variables studied. Finally, other contextual factors not considered in this study may also influence well-being at work, suggesting the need for additional research to corroborate and expand on these findings.

Conclusion

This study aimed to explore the impact of circadian rhythm and flexible working hours on the well-being at work of private sector employees in Côte d'Ivoire. The results demonstrated a significant relationship between these variables, thus confirming the initial hypotheses.

Morning workers, whose work schedules are more aligned with their natural circadian cycle, have been shown to report higher levels of well-being at work compared to evening workers. Additionally, flexible working hours have been shown to be a key determinant of well-being, with employees who enjoy flexible working hours

reporting higher satisfaction and productivity.

These findings highlight the importance of incorporating flexible work hours policies and taking into account employees' circadian rhythms to improve their well-being at work. By adjusting work schedules to better match employees' natural cycles, companies can not only improve their workers' quality of life, but also increase their organizational performance.

However, these results open the way to future mixed research that could include larger and more diverse samples in relation to workers' perceptions. They could then better question the long-term impact of circadian rhythms and flexible working hours on the problematic notion of "well-being at work" and its biopsychosocial and performance consequences. Nevertheless, our study reinforces the idea that informed management of working hours, based on chronobiology, is crucial for employee well-being and overall company performance.

References

1. Bryman A. Social research methods. Oxford University Press (2012).
2. Buffet MA, Gervais RL, Liddle M *et al*. Well-being at work: Creating a positive work environment. Publications Office of the European Union, Luxembourg (2013).
3. Burke TM, Scheer FAJL, Ronda JM *et al*. Sleep inertia, sleep homeostatic and circadian influences on higher-order cognitive functions. *J Sleep Res*. 24, 364-371 (2015).
4. Buysse DK, Reynolds CF, Monk TH *et al*. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Res*. 28, 193-213 (1989).
5. Cohen-Charash Y, Spector PE. The role of justice in organizations: A meta-analysis. *Organ Behav Hum Decis Process*. 86, 278-321 (2001).
6. Frone MR. Work-family balance. (2003).
7. Gaggioni G, Maquet P, Schmidt C *et al*. Neuroimaging, cognition, light and circadian rhythms. *Front Syst Neurosci*. 8, 126 (2014).
8. Gendron B.Les compétences émotionnelles en milieu de travail. In: Durand G (ed). Les compétences émotionnelles: Contextes théoriques et champs d'application, 75-91. Dunod, Paris (2006).
9. Horne JA, Östberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. *Int J Chronobiol*. 4, 97-110 (1976).