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Desynchronized daily activity rhythms and gender related psychological well-being of Moroccan university students during the quarantine-isolation

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Abstract:

BACKGROUND: The disturbance of students' biological and academic rhythms induced by the Coronavirus generated considerable challenges that had an influence on their psychological well-being. This study aims to highlight the daily rhythm desynchronization and examine the mental health of Moroccan students who were impacted, notably females, in the context of the COVID-19 pandemic.

METHODS AND MATERIAL: A cross-sectional online survey was conducted in May 2020 at ten Moroccan faculties including 312 students with an average age of 22 ± 1.70 years old, processed according to a random sampling. A Daily Activities Biorhythm Questionnaire was used to assess the students' daily activities time use and duration, while the PTSD Symptom Scale, Hamilton Scale, Worry Domains Questionnaire, and Visual Analog Mood State Scale were used to assess their mental health. A statistical analysis used both Chi-square and t test to evaluate the relationship between females and males as two independent groups to the studied variables.

RESULTS: Based on individual gender differences, a significant disruption emerged in the daily time use and duration of activities during home confinement. Besides, females were more likely to experience psychological issues notably anxiety (2.04 ± 0.49), physical tiredness (2.11 ± 0.39), sadness ($p < .05$), and posttraumatic stress disorder ($p < .01$). In contrast, there is a strong correlation between males' concern of declining employment ($p < .05$) and their worry of declining family budgets (2.10 ± 1.39).

CONCLUSIONS: As an emerging behavior for a new risk factor, the daily activities rhythm of Moroccan university students have been altered and mental health difficulties have appeared due to the quarantine isolation. This might influence their overall academic performance and psychological balance. In this instance, psychological assistance is highly recommended.

Keywords:

Daily activity rhythms, gender, posttraumatic stress disorder, psychological well-being, sleep

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Introduction

People's new lifestyle under lockdown was a serious problem. Human conduct has been pushed to alter, regardless of age or gender. Later, new behaviors start to emerge. Some of these habits bring about a change in the rhythm of daily activities,[1] while the mental health of both women and men was damaged.[2,3] This also includes school children and university students who have been framed by school and university rhythms before the COVID-19 pandemic. Except that this was no longer the case when the full lockdown interrupted the

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normal flow of students' biological rhythms. Instead, they adopted a stressed-out and anxious way of life.[4,5] However, isolation from social life[6] and remote schooling were among the most common reasons for this anxiety. Daily activities rhythms notably, sleep, daylight exposure, meals' scheduling, physical activity, remote studies, and screen exposure were affected by the new students' behaviors. A study confirmed that sleep quality worsened with respect to both sleep timing and duration between before and during COVID-19 emergency.[7-9] This was mainly related to the misalignment between endogenous circadian clock and social time.[10] Sleep quality deterioration as well as physical activity and screen time were associated with higher losses in outdoor daylight exposure. The latter was caused by social restrictions according to Korman *et al*. 2021.[11] Furthermore, a study has confirmed that interrupted daily routine of work and staying at home instead, including digital education, working from home, and limiting outdoor and gym activity, caused an emotional destabilization.

Staying at home during the confinement has also led to boredom and sedentary behaviors as risk factors for health.[12,13] Meanwhile, sedentary behavior has declined while physical activity has decreased during quarantine. People who are no longer physically active have become more numerous.[14] Screen time as a passive sedentary behavior, potentially explains its association with mental health.[6] Remote examinations were another stressor that students had to deal with in addition to staying at home. Due to the fact that this was a first-time experience, the latter were more stressful for the students than the on-campus exams.[15]

A recent study showed that post-traumatic stress disorder, as a stress-related psychiatric disorder is more common in women than in men, especially when exposed to persistent stress.[16] The reason why the current study aimed to compare between the two genders in their relation to stress, anxiety, depression, and daily activities rhythm variations: time use and duration in the case of COVID-19 pandemic as a real-life illustration of a persistent stress.

A considerable literature has grown around the deteriorated mental health and the new sedentary lifestyle during the lockdown. However, a number of critical questions remain about the effect of endogenous circadian clock misalignment on young adults' efficiency. The main hypothesis of our study is that social distancing and staying at home for a long period during lockdown as a persistent stressor have desynchronized daily activities rhythms and impaired psychological well-being among university students, more so in females than in males. The crucial query is at what point is this possible to be true according to a gender-based approach.

To our knowledge, no study has assessed the gender differences of daily activities rhythms: time use and duration, and mental health issues in university students during the COVID-19 pandemic in Morocco. This is why the current study aimed to fill the gap by evaluating the psychological well-being and comparing students' activities rhythms in order to reveal gender difference behavioral changes in reaction to a new danger.

Materials and Methods

Study design and setting

The present research is a cross-sectional study conducted on Moroccan university students according to a comparative approach that aims to compare the differences of desynchronized daily activities rhythms: time use and duration, and mental health issues of university students between the two genders as new behaviors responses for a new risk situation. The different tests were addressed to a sample coming from different Moroccan cities in the lockdown period. Due to the sanitary conditions imposing home confinement, remote contact was the only way to reach students. For this reason, the tests' digitalization was a necessity in order to conduct the study at this critical period.

Study participants and sampling

Students had to take part in the online survey by using Google forms and emails, according to their convenience. However, they should had meet the study's selection criteria. The participants were included in the study only if they were beyond the first academic year, as at that point a transition from the school rhythm to the university rhythm takes place; mentally and physically free of any diseases; carrying studies remotely; and engaged in moderate or vigorous physical activity. The ideal sample size of 196 university students was calculated by taking into account a 5% margin of error at a 95% significance level of the total N = 400. However, 88 of them were removed from the study because they did not meet the inclusion criteria; making a total of 312 participants (67.7% of whom were females) with a mean age of 22 ± 1.70 years old. These students come from ten Moroccan Cities, notably Casablanca, Marrakech, Kenitra, Rabat, Sidi Kacem, Tanger, Tetouan, Agadir, Sefrou, and Guelmim. However, 55.8% of them were from Casablanca and the outskirts, one of the most contaminated cities in Morocco during the lockdown.

The current research was conducted in May 2020, a period when students were converted to remote studies, and both university rhythm and hourly volume have changed.

Data collection tool and technique

Sociodemographic data and daily activities rhythms: time and duration

The first and second authors of this paper designed the Daily Activities Questionnaire. It generally consists of 57 items and assesses four dimensions: socio-demographic characteristics (age, gender, study level and city if confinement), sleep (duration, difficulties and satisfaction), daily activities (time and duration) including, courses review, online academic courses, housework, TV or web, nap, physical activity and phone call; and mealtimes (Breakfast, lunch and dinner).

Posttraumatic stress disorder

To assess the posttraumatic stress, we used the PTSD Symptom Scale—Self-Report Version (PSS-SR) (Weathers F.W. *et al*., 1993)[17]. The scale contains 17 items that diagnose PTSD according to DSM-III-R criteria, rated on a 5-point Likert scale ranging from "not at all" to "extremely" and assess the severity of PTSD symptom by measuring three subscales: repetition, avoidance, neurovegetative hyperactivity.[18] The psychometric characteristics showed that the test–retest reliability was .96; the internal consistency (alpha coefficient) was .97 and a kappa of .65 between the PTDS and the SCID for the convergence validity.[19]

Anxiety and depressive tendencies

To measure psychic and somatic anxiety and depression, we used the Hamilton Scale (HDRS-17) (Hamilton.M, 1957).[20] Also called HDRS-17, this scale has 21 items, of which only 17 are used for the total severity score. For the scale's validity, Bech *et al*. (1975) reported an interrater reliability of .88 for global assessments[21]. This establishes an upper limit for the validity that can be measured using this method. While the scale's inter-rater reliability for the total score ranged from .87 to .95, and reliability for individual items ranged from .45 to .78.[22]

Concerns and worries

The Worry Domains Questionnaire (WDQ) was established by Tallis *et al*.[23] in 1992 includes 25 items to measure worry content. The total score of the WDQ is the sum of the scores of the five subscales, namely Relationships, Lack of Confidence, Aimless Future, Work, and Financial. Thus, WDQ scores are systematically associated with performance on cognitive tests.

Mood states

Besides, Mood states were measured using visual analog mood state scale (VAMS) (Huskinsson, 1974). It is a scale that measures seven visual analogue mood scales representing the following mood states: sad, afraid, angry, tired, energetic, happy, and confused; "using 10-cm vertical" lines.[24] For each circadian variable connected to students' psychological situations by gender, values were described using percentages, means, standard deviations, and *p* values. The Chi Square test and the t test were used to assess the association of each studied variable with the two independent groups: males and females in a comparative perspective. The level of significance was set at .05. The data were analyzed using SPSS 28 (IBM, IC, Chicago, IL, USA).

Ethical considerations

The students who agreed to participate in the study were told of its objective and asked for their informed consent before the data collection process began. The institutional ethical approval was also acquired at this time.

Results

Sleep biorhythm

The unusual situation that students had faced has had an impact on their circadian variables of which sleep-wake cycle takes part. According to the findings in Table 1, the majority of students sleep after 12 a.m., with around half sleeping after 2 a.m. In terms of waking up time, a considerable percentage of

Table 1: Sleep biorhythm according to gender during lockdown. Data are presented in frequencies and percentages

Parameters		Gender						
		Female		Male		Total		Chi-2 test
		n	%	*n*	%	*n*	%	*p*
Sleep time	Before 10 p.m	2	0.6%	1	0.3%	3	1.0%	ns
	10 p.m -12 a.m.	15	4.8%	7	2.2%	22	7.1%	ns
	12 - 2 a.m	91	29.2%	47	15.1%	138	44.2%	ns
	After 2 a.m	94	30.1%	55	17.6%	149	47.8%	ns
Waking up time	Before 8 am	5	1.6%	4	1.3%	9	2.9%	ns
	8 - 10 a.m	41	13.1%	20	6.4%	61	19.6%	ns
	10 - 12 p.m	88	28.2%	38	12.2%	126	40.4%	ns
	After 12 p.m	68	21.8%	48	15.4%	116	37.2%	ns
Sleep dissatisfaction		180	57.7%	74	23.7%	254	81.4%	.001***
Sleep difficulties		146	46.8%	59	18.9%	205	65.7%	.001***

***Highly significant (p<.001); **Very significant (p<.01); *significant (p<.05)

students wake up between 10 a.m. and 12 p.m., while many others get up after 12 p.m. The majority of participants report being unsatisfied with their sleep and having difficulty falling asleep at night because of this new routine. However, females showed higher significance when associated with sleep dissatisfaction (chi2 = 22,438, df = 1, p <.001) and difficulty of sleeping (chi2 = 10,982, df = 1, p <.001).

Daily activities biorhythm: Time and duration

The most active periods are, respectively, from 3 p.m. to 7 p.m. and from 10 p.m. to after midnight. For the first period, 26.5% of students prefer to do one of the following activities: Academic study, online academic courses, household chores, TV or web use, napping, physical activity, phone calls, and others. While for the second one, 28.7% of students prefer to do so knowing that this range of time is considered a nighttime period.

From Figure 1, it seems that during the period from 3 p.m. to 7 p.m., students are more active compared to other time slots during the day. Four of the eight activities are much more prevalent during this period: 36.4% do their academic studies; 34.6% attend their online academic courses; 63% nap; and 37.2% engage in physical activity.

Gender has had a very significant effect on household chores tasks (chi-2 = 18.241, df = 5, p <.01). While 31.6% of students preferred to do them between 3 p.m. and 7 p.m., 43.2% preferred the period between 10 a.m. and 3 p.m. instead, and the female gender was significant (p <.05) when compared to the male's. Nevertheless, for this same activity, the association of the males with the period from 10 p.m. to midnight is highly significant (p <.001) compared to the female's.

For the periods ranging from 7 p.m. to 10 p.m., students were more likely to engage in leisure activities such as physical activity or phone calls, represented by 21.3% and 25.9%, respectively. Gender has had a significant effect on physical activity (chi-2 = 12.258, df = 5, p <.05). This was manifested in the periods before 10 a.m. when the association of females with this variable was very significant (p <.01) compared to males; and in the period from 10 p.m. to midnight when the association of males with the same variable is significant (p <.05) compared to females. Regarding napping, the association of the

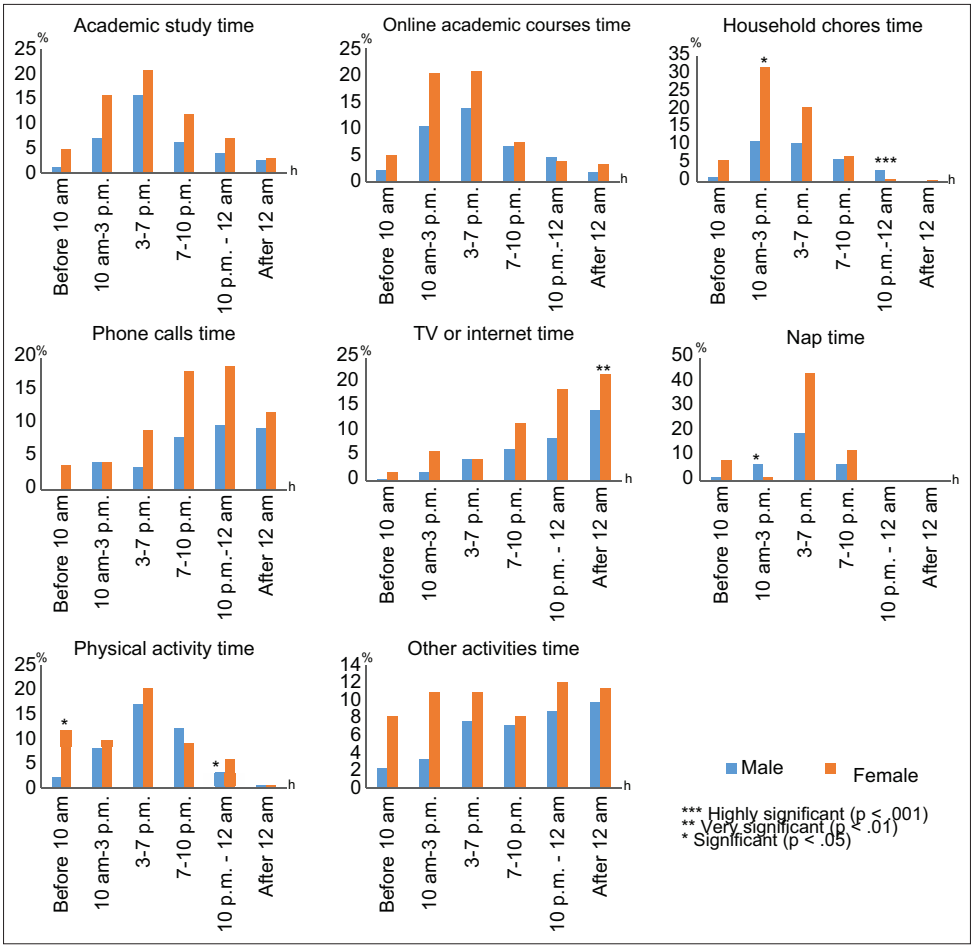

Figure 1: Rates of preferred time ranges of daily activities according to gender

male gender during the period from 10 a.m. to 3 p.m. is significant (p <.05) compared to the female's.

While in the night period, 28.6% of students make their phone calls from 10 p.m. to midnight and 36.1% of students use the web or watch TV after midnight. In this same range of time, 21.2% of students prefer to do other activities.

By giving attention to the duration of daily activities in our sample, we notice that 33.7% of students spend one to two hours on academic studies, versus 9.5% of them who take more than five hours to do it. Furthermore, the association of academic study duration with gender is significant (Chi2 = 14.186, df = 5, p <.05) especially for the two periods ranging from one to two hours when the males were significant compared to females (p <.05), conversely for more than five hours (p <.05).

As shown in Figure 2, few students spend what is considered sufficient time on learning. 46.8% of them spend only one hour or less taking online academic courses. This suggests that remote schooling for students takes less time than academic studies.

However, 50.9% of students spend 30 min to two hours on household chore tasks. The latter has a highly significant association with gender (chi2 = 34.743, df = 5, p <.001). This is particularly evident in the period of less than 30 min, spent by 20.5% of the students and for which the male gender is highly significant compared to the female's (p <.001), conversely for the period ranging from two to three hours (p <.01). The majority of students, represented by a rate of 53.6%, watch TV or use the web for three to five hours or more. Howver, the period of 30 min to one hour is very significant when associated to females (p <.01). Regarding the nap duration, 54.5% of students take it in less than 30 min. Meanwhile, this period was significantly associated to males (p <.05), conversely for the period from 30 min to one hour (p <.05).

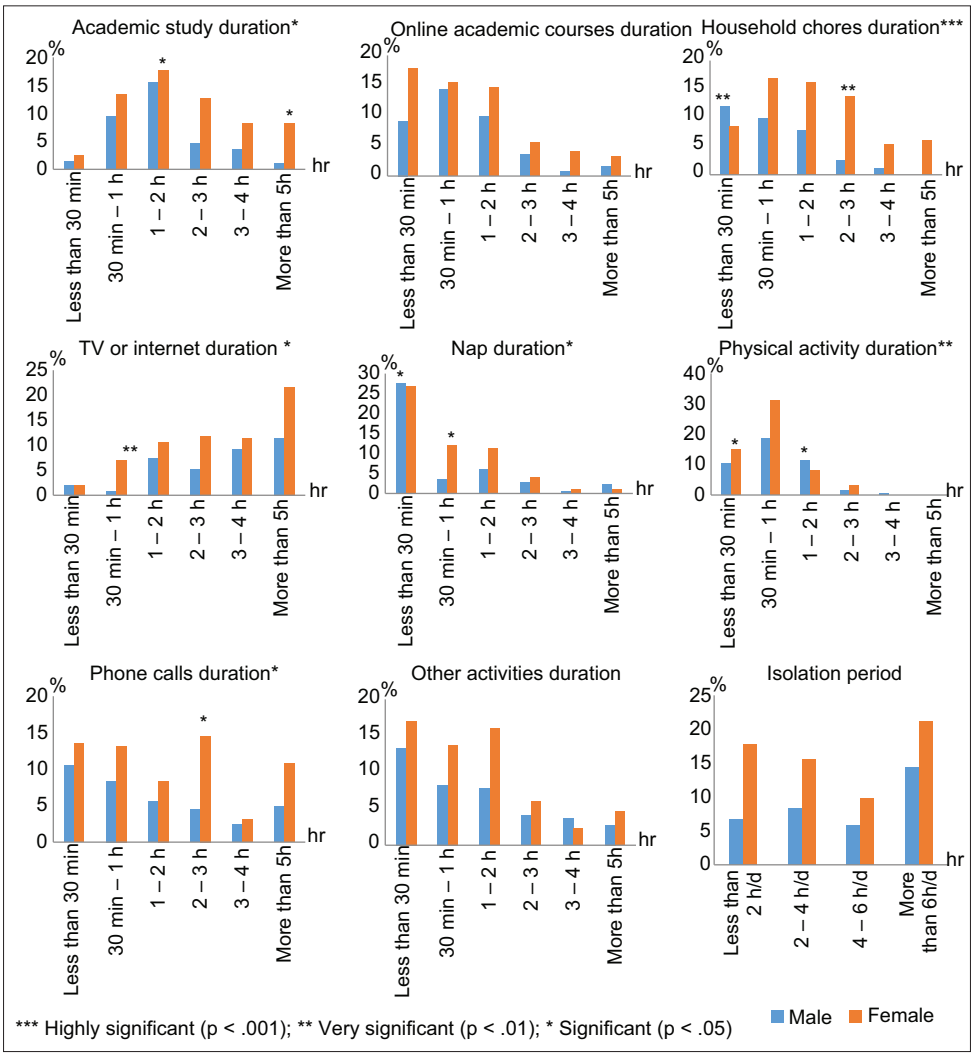

Figure 2: Rates of devoted periods for daily activities according to gender

Physical activity, on its part, was practiced by 50% of students for 30 min to one hour during the lockdown. It had a very significant association with gender (chi2 = 12,108, df = 2, p <.005), especially in two time ranges: In less than 30 min when female's rate was significantly higher than the male's (p <.05); and from one to two hours, when male's rate is very significant (p <.01) compared to the female's. The latter, on the other hand, was significantly associated with phone calls in the period between two and three hours (p <.05). Finally, it was noted that 39.7% of students isolated themselves for two to six hours per day from other family members, versus 35.6% who did so for more than six hours per day.

Meals' scheduling

The students' mealtimes are generally organized according to the Moroccan university rhythm that usually started at 8 a.m. and ended around 6 p.m., before the health crisis. After the pandemic, a new style was introduced, which led to a change in mealtimes. The meals are generally delayed about within 2 hours compared to normal meals intake. Before the pandemic, students had to take breakfast between 8 a.m. and 10 a; m., lunch between 12 p.m. and 2 p.m., and dinner between 8 p.m. and 10 p.m. However, results showed that meals scheduling during the day has changed. Moreover, the association of male gender with dinner time during the pandemic is significant (p <.05) compared to the female's. This might explain how males embrace a nocturnal rhythm more than females.

Mood states

The mean of students' mood states on a scale ranging from zero to four comes to measure the degree of these states experienced during the lockdown. As shown in Table 2, anxiety due to the pandemic is more prominent in females. Similarly, for physical weariness, conversely to the male's. The latter felt more sleepiness (2.22 ± 0.35 vs 1.94 ± 0.41) and higher vigor than females does (1.60 ± 0.16 vs 1.34 ± 0.22).

Depressive tendencies, concerns, and worry domains

The newly imposed rhythm of life have been converted into post-traumatic stress in the first place. This stress is manifested in three variables, two of which are significantly associated to females: the repetition of images, videos, and information about the pandemic (p <.01), and the neurovegetative hyperactivity (p <.001). Females have also experienced mofe discomfort (p <.001) compared to males during the confinement.

According to the Hamilton Depression Scale, the psychological state of our sample have demonstrated depressive tendencies related to the fourteen variables shown in Table 3. However, females have exhibited more sadness (p <.05), more disturbances to fall asleep (p <.01) as well as more difficulties in going back to sleep in the middle of the night (p <.05). They have also suffered from severe psychic (p <.01) and somatic (p <.001) anxiety. This have had physiological consequences when gastrointestinal symptoms have been highly associated with females (p <.001). Nonetheless, the male gender suffered from morning insomnia manifested in a difficulty falling back asleep after an early wake-up, given the highly significant association (p <.001). Furthermore, males were found to have a significant association with weight gain (p <.05).

From the results obtained in Table 4, we can clearly see that students are worried about both their studies and their personal and family conditions: most of the variables exceed the mean of 2.0, which means that worry dominates the vast majority of the sample. The need for peers (2.47 ± 1.35) explains the importance of the interactive relationship with the other. On the personal side, university students are marked by a fear of decreasing family budgets (2.10 ± 1.39), which is significantly associated with the male gender (p <.05). While in the professional side, they are marked by a fear of decreasing employment (2.03 ± 1.39). Academically, there were prominent worries about

Table 2: Means and standard deviations of mood states variables according to gender during home confinement

Parameters	Gender						
	Female		Male		Total		Chi2 Test
	Mean	sd	Mean	sd	Mean	sd	*p*
Anxiety	2.04	0.49	1.15	0.28	1.72	0.48	.001***
Vigour	1.34	0.22	1.60	0.16	1.43	0.21	ns
Sleepiness	1.94	0.41	2.22	0.35	2.04	0.39	ns
Shape	1.22	0.23	1.83	0.39	1.44	0.32	.001***
Physical weariness	2.11	0.39	1.75	0.55	1.98	0.45	.039*
Good humor	1.43	0.22	1.85	0.30	1.57	0.27	.005**
Clumsiness	1.21	0.30	1.25	0.43	1.22	0.34	ns
Subjective vigilance	49.85	11.98	50.32	6.03	50.02	7.02	.001***
General mood states	49.32	11.68	49.41	9.60	49.35	10.65	ns

***Highly significant (p<.001); **Very significant (p<.01); *significant (p<.05)

Table 3: Depressive tendencies' variables presented in means, standard deviations and *p* values during home confinement

	Gender						
	Females		Males		Total		*t* test
	Mean	sd	Mean	sd	Mean	sd	*p*
Post-traumatic stress scale							
Repetition-PCLS	1.64	1.20	1.20	1.20	1.49	1.22	.002**
Avoidance-PCLS	2.15	1.44	1.86	1.38	2.05	1.43	ns
Neurovegetative hyperactivity	2.00	1.39	1.37	1.33	1.78	1.40	.001***
Avoidance behavioral test							
Avoidance	21.46	14.45	18.64	13.80	20.46	14.26	ns
Discomfort	17.91	11.59	12.11	11.37	15.87	11.83	.001***
Scale of Hamilton depressive tendency							
Depressed mood	2.00	1.40	1.65	1.38	1.87	1.40	.035*
Guilt	1.43	1.14	1.31	1.10	1.38	1.14	ns
Despair	.99	.45	.95	.40	.97	.42	ns
Insomnia	1.58	1.16	1.15	1.10	1.43	1.12	.013*
nocturnal insomnia	1.70	1.29	1.20	1.08	1.53	1.25	.005**
Morning Insomnia	.87	.60	1.39	.56	1.05	.58	.001***
Loss of interest in academic studies	2.29	1.58	2.10	1.55	2.22	1.57	ns
Decreased academic study Efficacy	1.67	1.45	1.83	1.43	1.73	1.44	ns
Slowness	2.13	1.42	1.97	1.41	2.07	1.41	ns
Agitation	1.45	1.38	1.56	1.42	1.49	1.29	ns
Psychic Anxiety	1.79	1.49	1.33	1.41	1.63	1.48	.004**
Somatic Anxiety	1.68	1.44	1.05	1.31	1.46	1.33	.001***
Gastrointestinal Symptoms	1.60	1.44	1.01	.94	1.39	1.23	.001***
Hypochondria	1.76	1.40	1.88	1.49	1.80	1.43	ns
Weight loss	.98	1.33	.88	1.31	.95	.53	ns
Weight gain	.96	1.32	1.41	1.49	1.12	1.01	.006**

***Highly significant (p<.001); **Very significant (P<.01); *significant (P<.05)

Table 4: Students' concerns and preoccupations during quarantine: data are presented in means and standard deviations

Parameters	Gender						
	Female		Male		Total		*t* test
	Mean	sd	Mean	sd	Mean	sd	*p*
Relationship with others	2.48	1.32	2.45	1.39	2.47	1.35	ns
Lack of trust	1.39	1.29	1.49	1.43	1.43	1.34	ns
Fear of reduced employment	2.02	1.38	2.04	1.41	2.03	1.39	ns
Ineffectiveness at teleworking	1.79	1.41	1.66	1.43	1.74	1.41	.001***
Financial Threat	1.97	1.39	2.34	1.36	2.10	1.39	.047*
Physical threat	1.84	1.37	1.65	1.40	1.77	1.38	ns
Worries about online courses' understanding	2.48	1.48	2.49	1.33	2.48	1.42	ns
Worries about end-of-year exams	2.95	1.39	2.88	1.30	2.92	1.35	ns
Fear of contamination at school	2.57	1.41	2.36	1.27	2.50	1.37	ns
Worries about scheduling remedial classes	2.83	1.34	2.69	1.40	2.78	1.36	.024*
Worries about extending the academic year	2.43	1.59	2.70	1.42	2.52	1.54	ns
Worries about scheduling exams over the summer	2.49	1.56	2.66	1.50	2.55	1.54	.045*

***Highly significant (p<.001); **Very significant (p<.01); *significant (p<.05)

both remote schooling as a first experience of its kind for the Moroccan population and university students in particular, and on campus exams. The vast majority of participants showed a fear of contamination in case of the resumption of face-to-face studies, which explains their great concern about the pandemic as a rapidly transmissible disease spread all over the world.

Discussion

In line with expectations, the current study's findings on daily activities rhythms and psychological well-being of university students throughout the lockdown period in connection to gender reveal that significant differences between males and females existed in relation to the

majority of study variables. This supports our hypothesis that home confinement, as a persistent stressor, causes both biorhythm desynchronization (when all daily activities duration and time use are disrupted) and mental health issues, with females demonstrating highly significant associations with anxiety, stress, and depression, whereas males were more concerned about the lack of employability that they might face as well as the family financial situation within unforeseen circumstances.

Forced home confinement has definitely affected all the daily activities including sleep patterns. While 47.8% of students have a late bedtime, 37.2% others have a late morning wake-up. This has also been shown in recent studies regarding the benefits and drawbacks of quarantine isolation on sleep timing and duration.[7,8,25] Meanwhile, females in our sample showed a significant association with both sleep dissatisfaction and difficulties of falling asleep ($p < .001$). Previous studies confirmed this finding, noting that complaints of difficulty falling asleep were associated with female gender.[26,27] Therefore, the female population tends to have the highest prevalence of insomnia symptoms.[28] In a study conducted by Cellini *et al.*,[29] female participants showed a decreased sleep quality during lockdown compared to males, as much as female's poor sleepers increased from 39.11% to 58.07%. Our results match widely with the literature as described above.

Regarding academics' time use, few information were generated to date, however, there was no significant relationship between the time or duration of online academic courses and gender in our sample. Meanwhile, our participants were significantly associated with academic study duration ($p < .05$); females showed a significant association with periods lasting more than 5 hours ($p < .05$), while males showed a significant association with periods lasting 1 to 2 hours ($p < .05$). This demonstrates that in quarantine period, females spend more time at home studying than males.

This barely converges with Asanov *et al.* study (2020),[30] reporting that the average student spends 4 hours every day on academics and females perform somewhat more schooling than males when it comes to distant learning. The home confinement effect did not only influence the academic studies but also the level of physical activity. A study has demonstrated a significant decrease in the level of activity and the energy expenses comparing the overall physical activity before and during the quarantine-isolation.[31-33] Our results partially converge with Cellini *et al.*, 2020, findings. While female students in our population had a morning preference for physical activity ($p < .01$), they also had a greater level of sedentary behavior than men did. This could refer to the time they allocated for napping: 30 min to 1 hour, against less than 30 min for physical activity. Conversely, males have nighttime preferences. However, they have devoted a greater amount of time for physical activity and a shorter one for napping. It has also been shown that home confinement can reduce physical activity and light exposure while raising stress due to social isolation (e.g., preventing social connection with family and friends) and the inability to engage in pleasurable activities.[25] Meanwhile, 35.6% of our sample isolate themselves for more than 6 hours per day, another issue that students in Asanov's *et al.* study (2020)[30] have also corroborated.

Our participants' time use has also revealed gender differences in household chores. When female students accorded 2 to 3 hours in the middle of the day, male students dedicated less than 30 minutes at the end of the day. It is another point in common between the two samples when compared to Asanov's research. Females do more housework than males.[30]

It is noteworthy that domestic responsibilities have increased because of the changing lifestyle that has led to additional everyday activities at home. This might explain why students spend much more time on domestic tasks than on the other daily activities assessed. However, it does not explain why females dedicate more time to this pastime than males. According to Croda and Grossbard (2021), subjects with less bargaining power are the ones who take on the extra household tasks.[34] Nonetheless, families in the Moroccan Kingdom, rely on women to handle home responsibilities as well as children's education. These responsibilities have grown significantly during the quarantine-isolation. Meanwhile, women reported higher household task tension than males all over the world.[35]

With the decline of leisure activities outside the house, gaming, and social networking are on the increase. It is also true for our students, who spend an average of one hour or fewer each day on online education courses while spending greater periods on entertainment sites. Students in our sample had a significant rise in screen exposure by the evening, when 28.6% use their phones to make phone calls and 36.1% use other gadgets to surf the web or watch TV after midnight. This converges with the findings of a research that found a significant increase for time spent in front of a screen throughout the evening.[36] It should be noted, however, that exposure to certain environmental stimuli may act as "desynchronisers" by occurring at the wrong time of day (e.g., late-night screen exposure), which may have a negative impact on sleep-wake patterns such as jet lag syndrome, sleep difficulties, emotional disturbances, and daytime tiredness.[37] Baker and Steemers (2002) claimed a few years ago that artificial light causes stress, fatigue, and

circadian disturbance in building occupants.[38] Good day lighting, on the other hand, has been shown to provide healthier environments,[39] particularly for students.

Under lockdown, some groups may be more vulnerable to food and meal planning than usual.[40] The mealtime's differences between pre and during confinement is clearly noticeable. In our survey, 33.7% of the total sample ate breakfast after midday during confinement compared to either before 8 a.m. or during the 10 a.m. break, before the home confinement. Similarly to lunch that 55.7% of students ate between 2 and 4 p.m. and 26.4% others after 4 p.m. The mealtime's desynchronization might refer to the positive association between sleep length and the first mealtime, as well as social jet lag and main meal timings and screen duration.[41] In the meantime, our population has seen both sleep problems and an increase in screen time.

In fact, the disruption of mealtimes has also had a significant impact on weight gain in our sample particularly among men ($p < .05$). This partially converges with Engin (2017) findings that are not subject to the gender approach but still prove that irregular mealtimes can lead to food clock disruption, a situation that favors weight gain, especially when physical activity is reduced.[42]

People's anxiety has decreased during the COVID-19 quarantine for several reasons, including the possibility of catching the disease and fear of death due to the illness.[43] It is also the same reason why students in our population had great concern about the pandemic. Their fear of contamination in the case of the resumption of face-to-face studies was remarkable, same as the prominent worries they had about their academic studies. These findings are consistent with those of a recent Indian research on the psychological impact of the pandemic on undergraduate medical students.[44]

Our students have also suffered from bad mood during the staying at home period, particularly female students. According to Shuggs and McGregor (2020) about mood, women reported a considerably greater rise than males over time, which may have implications for female mental health.[38] In contrast, male students in our sample were significantly associated with good shape and general good mood during lockdown.

Percentages of anxiety and depression were noted worldwide, particularly among women and youth.[45] According to the World Health Organization, more than 500 million individuals worldwide suffer from stress-related disorders such as major depressive disorder (MDD), post-traumatic stress disorder (PTSD), and anxiety disorders.[46] In Brazil, post-traumatic distress levels ranged from mild (52%) to severe (18.8%). In Japan, 18.1% had moderate to severe depression and 11.4% had moderate to severe anxiety. In China, the average post-traumatic stress scores were high. An increase of 16.5% in moderate to severe depressive symptoms and 28.8% in moderate to severe anxiety symptoms.[2,47,48] Women, in particular, are two to three times more likely than males to acquire these problems.[49] This was absolutely the case for our population. Female students show a greater susceptibility to suffering from depressive tendencies. They have shown a significant association with sadness ($p < .05$), very significant with post-traumatic stress ($p < .01$) and highly significant with feelings of discomfort ($p < .001$). They also have suffered from nocturnal insomnia and psychic and somatic anxiety more than the male students during lockdown. According to the US National Institute of Mental Health, women have a 60% greater lifetime prevalence of anxiety disorders than males,[50-53] and the onset, severity, clinical course, and treatment response of anxiety disorders differ considerably in women.[54] The National Mental Health Survey of India 2016 demonstrated that women had greater levels of anxiety than men did. This might be due to differences in serotonin processing in the female brain compared to the males, resulting in distinct symptom presentations.[55]

Unemployment and the reduction of family budgets were among the stressful factors for students during the period of confinement. It was actually a kind of fear of the unknown; no one knew what was going to happen in the near or distant future. In Japan, unemployment is actually among the risk factors for depression.[48] In our study, students were most concerned about a decrease in family budget (2.10 ± 1.39), which is strongly related to male gender ($p < .05$), and in employment (2.03 ± 1.39). Zhai and Du (2020) have also demonstrated that the loss of students' on-campus employment during lockdown has resulted in financial difficulties as well as severe mental health consequences.[56]

The present study comes to the service of the behaviorist approach when it is questioned in relation to gender differences in the face of new temporal and psychological constraints, especially persistent risk situations. The results of the present study come to underline the frustration of the female gender more than the male's, and the disengagement of the latter from school and daily household activities against a much more serious commitment to these activities in relation to women. This is to help identify any future anxiety in such a situation by considering appropriate preventive measures.

Limitations and Recommendations

The study's limitations were a real challenge due to a collection of factors in which the participants played a

major role. They do belong to a number of universities, but the two-thirds come from only two institutions. This will limit the ability to generalize the results obtained. Other factors, such as participant selection criteria, may prevent this generalization, leading to the recommendation of conducting research on much larger and diverse samples in terms of gender, age, and fields of study in order to better understand the effects of chronic stress, isolation, and desynchronization of journal activities on the mental health of university students. On the other hand, due to the lack of direct interaction with researchers and the use of self-declared reports, participants' responses over distance may contain more bias. It is worth noting that the pace of life has changed several times during the course of the pandemic, so when comparing results of the same kind, the period of study must be considered. However, I advise future researchers in the field of circadian rhythms of human beings to consider the world's lifestyle changes, which have resulted in significant variations in the pace of daily activities before, during, and after the pandemic.

Conclusion

One of the most remarkable situations that has been able to demonstrate the importance of both the rhythm and the type of daily activities is the COVID-19 pandemic. The individuals abruptly changed from being fully socialized to being somewhat isolated in a smaller and farther-off environment. Leisure pursuits have likewise transitioned from the physical to the digital realm. The latter has had to assert itself not only on the entertainment side but also for academic studies in the complete absence of the human element that consists of instant contact and a deeper understanding of the student's needs and the challenges he faces.

The new way of life immediately caused psychological problems in people in general and university students in particular, especially with the closure of the institutions. They were disoriented and unsure of how to act in their new surroundings. The previous system they were following was destroyed in a sudden, forcing them to immediately embrace a completely new one. As they faced an uncertain future, they lost the consistency as well as the routines that served as markers for their way of life.

As a result, we may infer that the impairment of daily activities is likely to result in mental health issues, which may have an impact not only on university students' academic performance but also on their general well-being and productivity. Additionally, the study's findings specified that women have been significantly more negatively impacted by home confinement than men, which raises the possibility that the alteration of activity biorhythms may be more pronounced in women or that there may be additional coexisting factors that have contributed to the imbalance in women's mental health in particular, such as personality traits or neuroscientific parameters.[57,58]

This makes it necessary for us to pay much closer attention to the students' academic rhythms, including their circadian preferences in relation to their study schedule, study time volume, downtime, free time, and vacations.

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Conflicts of interest

There are no conflicts of interest.

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