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The unintended consequences of COVID-19 pandemic in Argentina: the case of sleep disorders during lockdown

https://doi.org/10.1515/ajmedh-2023-0007
Received March 20, 2023; accepted November 20, 2023;
published online January 1, 2024

Abstract

Objectives: This study aims to explore the unintended consequences of the COVID-19 lockdown in Argentina by assessing sleep disorders developed during quarantine and analyzing the interplay between gender and social gradients of health with sleep disorders.
Methods: The study adopted a cross-sectional design by drawing data from the Argentinian Social Debt The study adopted a cross-sectional design by drawing data from the Argentinian Social Debt COVID-19 Survey (n=500) carried out in the Metropolitan Area of Buenos Aires in May 2020. COVID-19 survey (n=500) carried out in the Metropolitan Area of Buenos Aires in May 2020. Descriptive and correlational analyses were carried out using SPSS (version 25) to describe the occurrence of sleep disorders produced during quarantine.
Results: The results show that during lockdown the local population presented a lower quality of sleep. Among the analysed groups, women and the youngest group were the most affected ($p<0.005$). Furthermore, although the four socioeconomic groups examined in this study have all suffered sleep disorders during lockdown, the respondents with lower socioeconomic status are found to have been more affected than the others.
Conclusions: The correlational analysis indicates that a lower socio-occupational stratum corresponds to a higher degree of changes in the circadian rhythm during the lockdown period. The main contribution of this study lies in illustrating, from a local perspective, one aspect of the unintended consequences of the COVID-19 pandemic and lockdowns on sleep health. Additionally, it serves to inform local health policies about the importance of considering human health as an integral process, without prioritizing the biological sphere over other aspects.

Keywords: sleep disorders; COVID-19 pandemic; lockdown; unintended consequences; Argentina

Introduction

The COVID-19 pandemic posed multiple and unprecedented challenges to the field of public health, both globally and locally. For this reason, state interventions and international organizations have generally focused on responding to and fighting COVID-19. By prioritizing the management of COVID-19, other diseases or health conditions have been neglected, constituting "unintended consequences" [1] that have been partially envisioned.

Indeed, some authors address the concept of "syndemic" to re-account for this double face of the current pandemic. Introduced by the anthropologist Merrill Singer in the 1990s, this concept is defined as "a set of closely intertwined and mutual enhancing health problems that significantly affect the overall health status of a population within the context of a perpetuating configuration of noxious social conditions" [2]. Applied to the current context, this concept highlights the coexistence and interaction of two categories of disease within specific populations: infection with SARS-CoV-2 and an array of non-communicable diseases. According to Horton, "these conditions are clustering within social groups according to patterns of inequality deeply embedded in our societies" [3].

In addition, the concept of unintended consequences, originally popularized as unanticipated or unforeseen consequences by the American sociologist Robert Merton in the 1930s [3], refers to the "consequences which result from behavior initiated for other purposes" [4]. From a social research perspective, De Wet

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emphasizes the absence of unintended or unanticipated consequences, positing instead the existence of phenomena that elude the researcher's observation. In this sense, "a predetermined spectrum of reactions is always bound to happen as the result of any action, irrespective whether the scientist intended it to happen through the manipulation of variables or not". In this regard, an appeared consequence "should rather be called an unobserved consequence, as the scientist did not know that this consequence was to appear – hence its unintended status" [5]. Considering the specific case of lockdowns during the COVID-19 pandemics, Williams and Ghani argue that this kind of device "can raise health risks, although unintentionally, and those risks are not always readily intuitive" [6]. Additionally, Turcotte-Tremblay et al. suggest that there are mitigation measures to these unintended consequences of COVID-19 lockdowns. In this sense, the authors claim that studying these mitigation measures "is not only possible but also necessary to assess their overall value" [7].

In the Argentinian context, the Commission of Medical Directors (CEDIM) and the Association of Clinics and Sanatoriums (ADECRA) [8] carried out a joint study in the city of Buenos Aires in April 2020. This study aimed, among other objectives, to warn about the risk of complications and excess deaths due to the lack of diagnosis and timely treatment of major diseases. In order to assess the impact of the pandemic on medical treatments, 32 institutions with general hospitalization and intensive therapy services were surveyed. Taking consultations for acute coronary syndromes, stroke, chemotherapy benefits as indicators, the study revealed that, in comparison to the same period of the previous year, the vast majority of these indicators had fallen between 50 and 75 %. In the same way, a national survey, carried out by the Institute of Cardiovascular Medicine of the Italian Hospital in the city of Buenos Aires, revealed similar results. Out of 6.176 responses, half of the people who needed medical attention during quarantine did not consult a doctor, and the majority did not do so due to fear or lack of access to the health system. Furthermore, one fifth of the respondents found it difficult to obtain prescriptions for medication and 5 % abandoned at least one medication. Other problems including an increase in alcohol consumption, blood pressure and body weight were also revealed in the study. According to the researchers, all these results were even more worrying among respondents with a higher unemployment rate, a lower educational status, and those without health insurance [9]. Similarly, in May 2020, the Argentinian Foundation of Cardiology surveyed 1.500 patients with cardiovascular disease residing in the Metropolitan Area of Buenos Aires (AMBA). It was found that 25 % of the patients required medical attention for their cardiovascular disease during quarantine and, among other complications, more than half of those who required medical attention could not have access to it (57.9 %) [10]. Additionally, Bozovich et al. detail the results of a retrospective survey carried out in April 2020 in 31 private health centers in Argentina [11]. The study focused on exploring the consequences of the COVID-19 pandemic on the medical attention of non-communicable diseases. Through interannual comparisons, a general decrease in consultations, diagnostic studies and therapeutic interventions was revealed. The non-communicable diseases mainly reported in the study were cancer and cardiovascular and cerebrovascular diseases (the three main causes of death in the country).

In order to quantify the potential consequences of reduced control and care for cardiovascular diseases, a predictive study was conducted. Based on the high prevalence and fatality of cardiovascular diseases in Argentina, the researchers estimated that, during the period from April to October 2020, a decrease in the control of cardiovascular risk factors and/or a reduction in the effectiveness of their care could lead to up to 10.500 preventable new cases of this type of disease [12].

It should be clarified that the decrease in the number of medical consultations during the pandemic is a phenomenon not only exclusive to Argentina, but also reported at the international level. For example, in the case of the United States, the impact of the pandemic on cardiovascular disease care as well as challenges of telemedicine in managing the sexual and reproductive health of youth population are reported [13, 14]. In Europe, researchers address the cases of Spain [15], Italy [16, 17], and Austria [18] in terms of the impact of COVID-19 on the control and management of cardiovascular diseases. In the same field, the work of Deerberg-Wittram and Knothe [19] in Germany is based on the particular experience of a hospital and revealed the general decrease in consultations for emergencies. In the Asian continent, several studies focus on this topic. For instance, Tam et al. [20] conducted a study in Hong Kong addressing the impact of COVID-19 on cardiovascular disease care, while Wang and Zhang [21] investigated the effects on cancer patients across 31 Chinese provinces. Relevant papers can also be found in Indian literature which address, for instance, the collateral damage of the pandemic [22] or the impact of lockdown on ophthalmological practice [23].

Regarding sleep disorders in the context of the pandemic, some local studies, albeit not very numerous, can be found that account for this situation. One of the most relevant is the "Survey of Perception and Attitudes of the Population. Impact of the COVID-19 pandemic and the measures

adopted by the government on daily life", carried out in August 2020 by UNICEF [24]. In the study, 46 % of households with children up to 6 years of age stated that the children had suffered sleep disorders during the lockdown. Additionally, the Observatory of Applied Social Psychology of the University of Buenos Aires carried out a national survey and published a technical report on the psychological impact of quarantine and the COVID-19 pandemic in Argentina. In addition to describing an increase in the percentage of participants with sleep disturbances, the authors warn about the interrelation between problems related to sleep and the risk of developing mental disorders [25]. Other studies have addressed the problem of sleep disorders in the context of quarantine among university students [26], children [27] and health personnel [28] instead of the general population. Finally, although the studies carried out by Etchevers et al. [29] and Rodriguez Ceberio et al. [30] address the anxiety problems triggered in the context of the prolonged quarantine implemented by the Argentine government during the COVID-19 pandemic, they tangentially describe the sleep disorders associated with anxious symptomatology produced in this context.

In addition, numerous studies can be found worldwide that account for sleep disorders during the pandemic. Among them, the studies carried out in Brazil [31, 32], Colombia [33] and Peru [34] stand out from the American continent. In the European context, there are similar studies made in France [35], Italy [36, 37], and the United Kingdom [38]. Regarding the Asian continent, in addition to some countries such as Nepal [39] or India [40], many Chinese researchers, such as Fu et al. [41] and Huang and Zhao [42], have published articles on this matter achieving similar results about the high impact of COVID- 19 pandemic and lockdown measures on the sleep health of the local population.

Regarding this study, we aim to specifically investigate the unintended consequences of the COVID-19 pandemic in Argentina, with a focus on sleep disorders, understood as a range of conditions that affect the normal pattern, quality, and duration of sleep, which can lead to daytime fatigue, impaired functioning, and overall reduced quality of life. The increase of sleep disorders during lockdown highlights the need to explore the ways in which the unintended consequences of COVID-19, particularly the effects of quarantine as a state response, unfolded in Argentina. Moreover, this study attempts to assess sleep disorders produced during the quarantine by analyzing the intertwinement of age, gender and social gradients of health with sleep disorders, based on the hypothesis that women, the elderly, and the lowest socioeconomic stratum had suffered the most from this type of disorder.

Materials and methods

The study adopted a cross-sectional design by drawing data from the Argentinian Social Debt COVID-19 survey (EDSA - COVID-19). The survey was carried out in urbanized AMBA private households, with a total sample size of 500 cases. The sampling procedure was double-stage. The selection of the sample radios within each agglomerate and stratum was random and weighed by the number of households in each radio. Secondly, each household was randomly selected through systematic sampling, while the individuals within each household were selected through a system of sex and age quotas.

Participants answered to the EDSA - COVID-19 survey during strict COVID-19 lockdown in May 2020. Regarding ethical considerations, all the participants signed an informed consent and responded the survey voluntarily and anonymously.

The EDSA-COVID-19 is a standardized multipurpose self-report measure that includes direct questions and abbreviated scales. In this study, direct questions were used to assess sleep quality during the previous month. Participants answered by using a four-point Likert scale ranging from "very good" to "very poor" sleep quality. A deficit in sleep quality was considered as poor or very poor sleep quality during the previous month. The alteration in sleep time during the strict lockdown was also inquired through a direct question with three answer options: "slept more than before," "slept less than before," "slept as much as before." Additionally, the EDSA-COVID-19 survey included a five-item scale to assess the occurrence of sleep disorders during the quarantine. Participants answered with "yes" or "no" for each of the items corresponding to five sleeping disorders: "modified time to go to bed and wake up," "started waking up several times a night," "began to have nightmares," "slept during the day and did not sleep at night," "started taking any medication or took more than before to sleep better."

Descriptive analyses were carried out using the SPSS program (version 25) to describe sleep quality and the occurrence of sleep disorders produced during the quarantine. Results for each of the categorical variables are shown as percentage. These analyses were performed for the whole sample and according specifically to gender, age and socio-occupational status. In order to achieve the research objectives, the variables included "deficit of sleep quality", "alteration in sleep times", "changes in circadian rhythm", "parasomnias", "sleeping medication", "sleep disruption", and "alteration in the sleep phase". The study also involved running chi-square test (χ^2) with the purpose of analyzing the correlation between sociodemographic variables (i.e., gender, age groups and socio-occupational stratum) and quality and sleep disorders. The statistical significance level was assumed as $p<0.05$.

Results

During quarantine period, as it can be seen in Figure 1, almost 35 % of the people are reported having a fairly poor or very poor quality of sleep. Taking into consideration the variables of age, socio-occupational stratum and gender (Figure 2), it can be seen that the groups that indicate a deficit of sleep quality during strict lockdown are the age group from 35 to 59 years old, the marginal worker, and female (over male with a slight difference of 3.1 points). However, as it can be seen in Table 1, none of these differences were statistically significant (p>0.005).

Regarding sleep quantity, 6 out of 10 people showed some sleep alteration regarding the amount of time spent on sleeping per day. More specifically, 28 % slept less than before the quarantine, and 33 % slept more comparing to the previous period. Only 39 % reported sleeping the same number of hours as before (Figure 3).

Considering the differences between genders, it is noteworthy that women declared that they slept less than men. Furthermore, 33.5 % of the women reported sleeping less than before the lockdown, while 36.5 % of the surveyed men indicated that they slept more during that period (Figure 4).

With respect to age criterion, the most affected group during quarantine was the one corresponding to 18–34 years old, with 67.9 % reporting some sleep disorder related to sleep quantity. Among them, 44.2 % reported sleeping less, and 23.7 % reported sleeping more than they did before the quarantine (Figure 5).

Considering socio-occupational stratum, in average 6 in 10 showed some sleep disorder in each category. The most affected ones appear to be the non-professional group with 64.6 % in terms of sleep quantity issues (Figure 6).

As it can be seen in Table 2, the Chi-Square tests show that there is a statistically significant association between

Table 1: Prevalence of deficit of sleep quality during strict lockdown by socio-occupational stratum, age and gender. (n=500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		1.477	0.688
Middle professional	30.8		
Middle non-professional	37.8		
Integrated worker	31.6		
Marginal worker	40.6		
Age group		2.977	0.395
18–34 years old	29.7		
35–59 years old	41.0		
60–74 years old	30.5		
75 years old or more	36.6		
Gender		1.241	0.265
Male	33.1		
Female	36.2		
TOTAL	34.7		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Figure 1: General proportion of deficit of sleep quality during strict lockdown. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Figure 2: Deficit of sleep quality during strict lockdown by socio-occupational stratum, age and gender. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

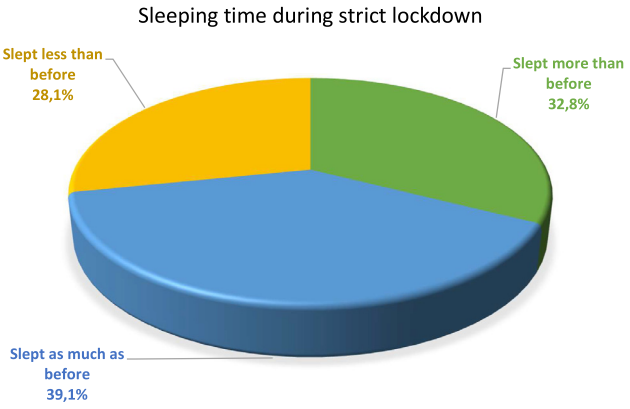

Figure 3: Alteration in sleep times during lockdown. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

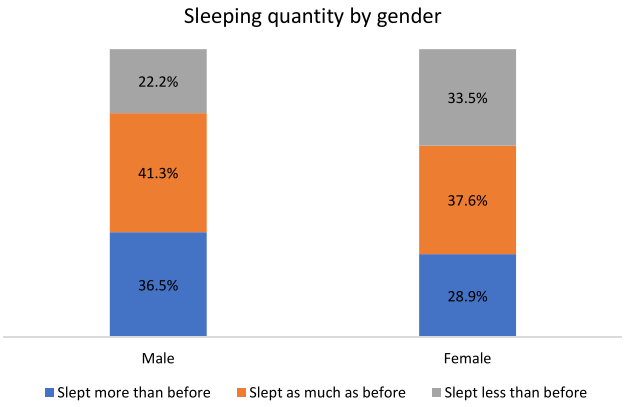

Figure 4: Comparison of the alteration in sleep times by gender. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

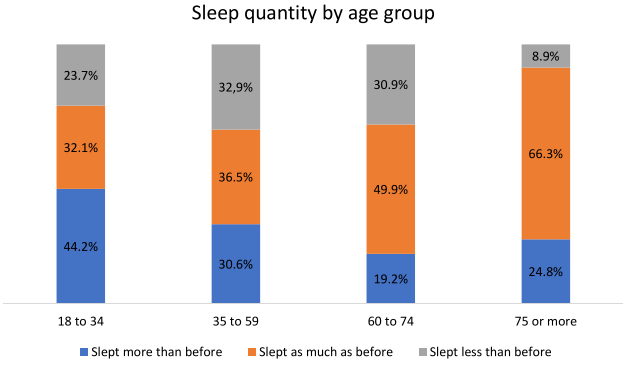

Figure 5: Alteration in sleep times by age group. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

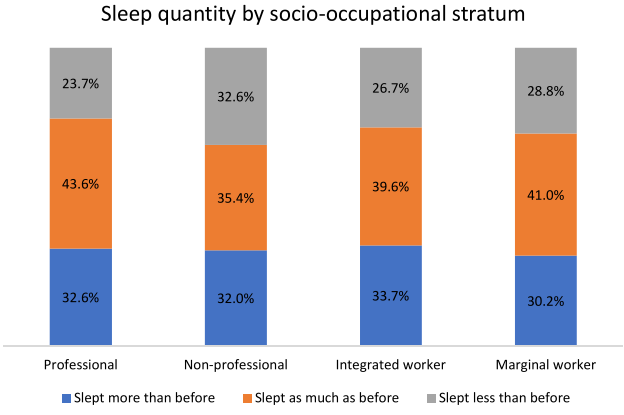

Figure 6: Alteration in sleep times by socio-occupational stratum. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

alteration in sleep times during strict lockdown with the variables of age and gender as for both cases the p-value is smaller than the level of significance ($p<0.05$). However, the association with socio-occupational stratum is statistically insignificant ($p>0.05$).

Table 2: Prevalence of alteration in sleep times during strict lockdown by socio-occupational stratum, age and gender. (n=500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		0.422	0.999
Middle professional	56.4		
Middle non-professional	64.6		
Integrated worker	60.4		
Marginal worker	59.0		
Age group		23.957	0.001
18–34 years old	67.9		
35–59 years old	63.5		
60–74 years old	50.1		
75 years old or more	33.7		
Gender		10.365	0.006
Male	58.7		
Female	62.4		
TOTAL	60.8		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Considering changes in circadian rhythm, although all socio-occupational groups seem to have presented changes in this area, the non-professional one is still the most affected. It can also be assumed that the younger groups, especially people from 18 to 34 years old, have also experienced alterations in their circadian rhythm, changing bedtime and wake-up times on weekdays. Regarding gender, both males and females have not showed a marked difference (Figure 7).

In addition to this descriptive analysis, as seen in Table 3, the chi-square test shows that there is a significant association between changes in circadian rhythm and age ($p<0.001$), as well as socio-occupational stratum ($p<0.05$), but not with gender ($p=0.84$).

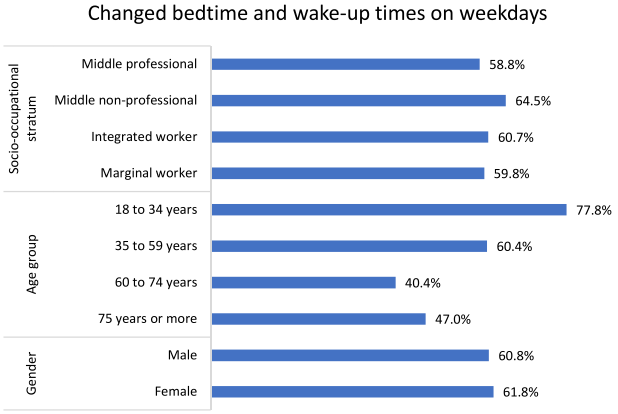

Figure 7: Changes in circadian rhythm during strict lockdown by socio-occupational stratum, age group and gender. Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Table 3: Prevalence of changes in circadian rhythm in the lockdown period by socio-occupational stratum, age and gender (n=500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		11.66	0.009
Middle professional	58.8		
Middle non-professional	64.5		
Integrated worker	60.7		
Marginal worker	59.8		
Age group		18.43	0.000
18–34 years old	77.8		
35–59 years old	60.4		
60–74 years old	40.4		
75 years old or more	47.0		
Gender		0.04	0.836
Male	60.8		
Female	61.8		
TOTAL	61.3		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Table 4: Prevalence of sleep disruptions during strict lockdown by socio-occupational stratum, age group and gender. (n = 500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		2.22	0.527
Middle professional	38.2		
Middle non-professional	44.6		
Integrated worker	46.7		
Marginal worker	49.2		
Age groups		3.26	0.353
18–34 years old	40.8		
35–59 years old	51.6		
60–74 years old	43.9		
75 years old or more	27.0		
Gender		2.69	0.10
Male	41.6		
Female	48.2		
TOTAL	45.2		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Considering sleep disruptions, both the lowest strata groups and the middle non-professional group exhibited a higher occurrence of this type of disorder. In terms of age groups, the most affected were individuals aged 35 to 59, with every second person reporting waking up several times a night. Females were also more affected than males, with 5 in 10, rather than 4 in 10 (Table 4). From a general perspective, a significant number of households (45.2 %) reported experiencing issues in this area. However, as it can be assumed from the Chi-square tests, none of the predictor variables present a significant association with this outcome variable as all of them have a p-value greater than 0.05.

Table 5: Prevalence of alterations in the sleep phase during strict lockdown by socio-occupational stratum, age group and gender. (n = 500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		2.13	0.546
Middle professional	14.2		
Middle non-professional	21.4		
Integrated worker	27.7		
Marginal worker	36.3		
Age group		36.25	0.000
18–34 years old	37.1		
35–59 years old	20.9		
60–74 years old	18.1		
75 years old or more	10.9		
Gender		0.15	0.700
Male	25.0		
Female	25.5		
TOTAL	25.2		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

In addition, though not as prevalent as sleep disruptions, there were also alterations in the sleep phase (25.2 %), defined as changes in the time of going to bed and waking up on working days (Table 5). The most affected group appears to be the marginal worker group (21 points higher than the middle professional group) and the youngest age group (27 points higher than the eldest). Both males and females reported a relatively low occurrence of this type

Table 6: Prevalence of parasomnias during strict lockdown by socio-occupational stratum, age group and gender. (n=500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		1.424	0.700
Middle professional	22.2		
Middle non-professional	22.4		
Integrated worker	18.8		
Marginal worker	15.0		
Age group		3.962	0.266
18–34 years old	25.2		
35–59 years old	19.6		
60–74 years old	12.4		
75 years old or more	13.9		
Gender		3.837	0.050
Male	16.6		
Female	22.4		
TOTAL	19.7		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

of alteration. Further analysis reveals that only age groups exhibit a significant association with this outcome variable ($p<0.001$).

The percentage of individuals reporting the onset of nightmares during the quarantine was higher among the youngest group (1 in 4) and women (6 points higher than men). Both middle strata (professional and non-professional) reported a higher occurrence of this sleep issue compared to the lowest strata (Table 6). Among these predictor variables, only gender demonstrates a significant association with being affected by parasomnias ($p\leq0.05$).

In terms of sleep habits modified during the strict lockdown, a small proportion of households reported starting to take any medicine or more than before to improve sleep (4.8 %). However, women doubled this percentage compared to men, and the age group from 60 to 74 years old nearly doubled the youngest group (Table 7). Among the socio-occupational stratum groups, the middle non-professional group reported taking less sleeping medication (1.8 %). Once again, only gender shows a significant association with this outcome variable ($p\leq0.05$).

Finally, the correlational analysis displayed in Table 8 indicates that age is associated with modifications in the sleep phase during strict lockdown. Specifically, as age decreases, there is an increase in the reported alterations in bedtime. Moreover, in terms of changes in the circadian rhythm, a younger age is linked to a higher likelihood of sleeping during the day rather than at night. Additionally, as the socio-occupational stratum decreases there is an increase in changes in the circadian rhythm during this period.

Table 7: Percentage of people who started taking some medicine or taking more than before to sleep better during strict lockdown, by socio-occupational stratum, age group and gender. (n=500 respondents).

Variables	Percentage	χ^2	p-Value
Socio-occupational stratum		3.412	0.332
Middle professional	5.9		
Middle non-professional	1.8		
Integrated worker	6.2		
Marginal worker	5.3		
Age group		3.090	0.378
18–34 years old	3.8		
35–59 years old	4.9		
60–74 years old	6.0		
75 years old or more	5.0		
Gender		5.45	0.020
Male	3.2		
Female	6.1		
TOTAL	4.8		

Source: EDSA-COVID-19 survey, Observatory of the Argentine Social Debt, UCA.

Table 8: Correlation of variables with age and socio-occupational stratum (n=500 respondents).

		S-D	AST	CCS	P	SM	SD	ASP	AG	SOS
Sleep Dichotomous (S-D)	χ^2	1	0.442[a]	0.195[a]	0.255[a]	0.105[b]	0.421[a]	0.161[a]	0.001	0.053
Sig. (bilat.)		0.000	0.000	0.000	0.020	0.000	0.000	0.989	0.239	
Alteration in sleep times (AST)	χ^2	0.442[a]	1	0.001	0.065	0.083	0.235[a]	−0.116[b]	0.088	0.022
Sig. (bilat.)	0.000		0.982	0.149	0.065	0.000	0.011	0.051	0.632	
Changes in Circadian Sleep (CCS)	χ^2	0.195[a]	0.001	1	0.159[a]	0.122[a]	0.297[a]	0.275[a]	−0.178[a]	0.152[a]
Sig. (bilat.)	0.000	0.982		0.000	0.007	0.000	0.000	0.000	0.001	
Parasomnias (P)	χ^2	0.255[a]	0.065	0.159[a]	1	0.181[a]	0.301[a]	0.170[a]	−0.074	−0.053
Sig. (bilat.)	0.000	0.149	0.000		0.000	0.000	0.000	0.101	0.240	
Sleeping medication (SM)	χ^2	0.105[b]	0.083	0.122[a]	0.181[a]	1	0.131[a]	0.042	0.078	−0.016
Sig. (bilat.)	0.020	0.065	0.007	0.000		0.004	0.355	0.084	0.731	
Sleep disruptions (SD)	χ^2	0.421[a]	0.235[a]	0.297[a]	0.301[a]	0.131[a]	1	0.164[a]	0.007	0.066
Sig. (bilat.)	0.000	0.000	0.000	0.000	0.004		0.000	0.879	0.147	
Alterations in the sleep phase (ASP)	χ^2	0.161[a]	−0.116[b]	0.275[a]	0.170[a]	0.042	0.164[a]	1	−0.263[a]	−0.012
Sig. (bilat.)	0.000	0.011	0.000	0.000	0.355	0.000		0.000	0.797	
Age groups (AG)	χ^2	0.001	0.088	0.178[a]	−0.074	0.078	0.007	−0.263[a]	1	−0.082
Sig. (bilat.)	0.989	0.051	0.000	0.101	0.084	0.879	0.000		0.070	
Socio-Occup. Strata (SOS)	χ^2	0.053	0.022	0.152[a]	−0.053	−0.016	0.066	−0.012	−0.082	1
Sig. (bilat.)	0.239	0.632	0.001	0.240	0.731	0.147	0.797	0.070		

[a]The correlation is significant at the level 0.01 (bilateral). [b]The correlation is significant at the level 0.05 (bilateral). Source: EDSA Agenda for Equity (2017–2025), Observatory of the Argentine Social Debt, UCA.

Discussion

In light of the present study, it is possible to observe that during the COVID-19 pandemic quarantine, there have been alterations not only in the amount of sleep among the population but also in sleep quality. These results are supported by other studies conducted worldwide [29, 31, 37, 39–44]. Regarding the particularities of the population surveyed by the ODSA, the following differences could be observed:

On the one hand, those aged from 18 to 34 were the most affected, with 68 % reporting sleep disorders in terms of sleep quantity. Among them, 44.7 % reported sleeping less than before, the difference of which is statistically significant ($p=0.001$). Contrary to the findings from pre-pandemic studies, e.g. the ones carried out by D'Hyver de las Desesa [45] or Keisuke [46], in which older adults were identified as most affected by sleep disorders, this study finds that the restrictive measures imposed on everyday life in response to COVID-19 have had a lesser impact upon the elderly than on younger individuals in terms of sleep disturbances. In other words, those under the age of 35 reported the highest rate of shorter sleep time, a pattern that differs from the usual scenario under normal circumstances. This younger group was also the most affected by alterations in their circadian rhythm, as they changed bedtime and wake-up times on weekdays (17.4 points over the following age group, and 30.8 points over the eldest). This difference was statistically significant ($p<0.001$). In addition to this, the age group from 18 to 34 years old suffered more from alterations in the sleep than the other age groups. 34 % reported modifications in bedtime and wake up times on working days (27 points over the eldest group). A further analysis showed that this difference presents a significant association with this outcome variable ($p<0.001$). The correlational analysis also highlights that, during the strict lockdown, there was a tendency for younger individuals to present alterations in the sleep phase, with age and these modifications showing a positive correlation (the younger the age, the more they modified the time of going to bed). Similar results were found by some studies conducted worldwide, for instance the one carried out by Medina-Ortiz et al. [34].

On the other hand, women reported sleeping less compared to men. In a statistical sense, 33.5 % of women reported sleeping less during the lockdown, while 36.5 % of men in the survey reported sleeping more, and these differences were statistically significant ($p=0.006$). It is also important to note that women suffered more from nightmares during the lockdown than men (22.4 % and 16.6 % respectively). Similarly, a significant number of women started taking sleeping medicine or increased their intake compared to before to improve sleep, doubling the rate observed in men (6.1 % and 3.2 % respectively). Both differences were statistically significant ($p<0.05$). These differences by gender were also found in other studies addressing sleep disorders carried out during the COVID-19 pandemic, such as those conducted by Bigalke et al. [47], and Salfi et al. [48].

Finally, the lower strata presented more alterations in almost all sleep patterns while the middle professional group was the least affected by sleep disorders. Yet, the difference is not statistically significant, except for changes in circadian rhythm ($p=0.009$). Sleep disorders associated with the circadian rhythm involve either difficulty in falling asleep, waking up during the sleep cycle or waking up too early, and being unable to fall back asleep. In the context of the restrictive measures imposed on everyday life during the COVID-19 pandemic, this type of sleep disorders affected the lower strata more than those in the middle professional group. In other words, individuals with a lower socioeconomic status seemingly experienced more sleep disorders due to changes in the circadian rhythm. This notable difference between strata was also evident through correlational analysis, indicating that the lower the stratum (marginal workers), the more pronounced were the changes in circadian rhythm during the strict quarantine.

The results of this study are expected to address a still scarcely explored (and often minimized) facet of COVID-19 management to account for its unintended consequences from a local perspective. In addition, it is important to highlight that this study draws upon a probabilistic sample and data collected during the first period of the pandemic, which constitutes an important contribution to the field of sleep disorders and Covid-19 pandemic studies in Argentina and the region.

Conclusions

Strictly speaking, in terms of this study, the unintended consequences of the restrictive measures imposed on everyday life and the subsequent lockdown in response to COVID-19 have manifested in varied forms. One of these is the impact upon people's sleep quality, which is essential to their physical and mental wellbeing. But examining this problem up close, it can be noticed that the impact upon people's sleep quality is not evenly distributed in society. With regard to sleep quality, the four socioeconomic groups which are included in this study have suffered sleep disorders during the lockdown. Yet, women and younger individuals are found to have been more vulnerable while the poorer are found to have suffered more than the others.

Specific causalities could be speculated by this study. These would include a young generation's lack of experience in dealing with crisis situations, a greater degree of anxiety in women, given that in the Argentinian society they are usually responsible for household and family care activities, and an increased sense of insecurity for those living at the lower strata of society. In this last regard, it is worth mentioning that the lower groups were also the most affected in socio-economic terms in the Argentinian context. This is due to the increase of unemployment rates and the prohibition of staying outside home which restrained several people from working in the streets, doing informal labor, such as cardboard collectors.

In sum, the quality of sleep is a research-worthy subject in public health, and it offers a set of useful indicators to understand gendered circumstances, age-specific experiences, and socioeconomic inequalities in a crisis. In this regard, it would be important for policy makers in the field of public health to bare an integral vision of health (not only as the absence of disease), considering all aspects of human life with its biological, psychological, emotional and sociocultural dimensions. Along the lines of the contribution of Medical Anthropology and its criticism to the "Hegemonic Medical Model" [49], the individual should not be seen as an isolated or decontextualized agent, and the interventions should not be uncritically reproduced considering they are universal and applicable to all populations evenly.

Finally, it is encouraged here to explore in future studies the interrelation between sleep disorders and other associated unintended consequences of COVID-19 pandemic and corresponding lockdowns such as anxious or depressive symptoms, eating disorders, socioeconomic changes (e.g. loss of employment) among many others. In order to get to know the perspectives of people involved in this kind of crisis and to broaden the knowledge produced by academic studies on this topic it would be useful to complement quantitative techniques with others from the social sciences field, such as the ethnographic approach.

Research ethics: Not applicable.
Informed consent: Informed consent was obtained from all individuals included in this study.
Author contributions: The authors have accepted responsibility for the entire content of this manuscript and approved its submission.
Competing interests: The authors state no conflict of interest.
Research funding: None declared.
Data availability: Not applicable.

References

1. Merton R. The unanticipated consequences of purposive social action. Am Sociol Rev 1936;1:894—904.
2. Singer M. A dose of drugs, a touch of violence, a case of AIDS: conceptualizing the SAVA syndemic. Free Inq Creat Sociol 1996;24:99—110.
3. Horton R. Offline: COVID-19 is not a pandemic. Lancet 2020;396:874.
4. Giddens A. Sociology. Cambridge: Polity Press; 1993.
5. De Wet S. Unintended Consequences: a conceptual revisit from a social research perspective. In: 75th Jubilee of a Sociological Idea. Gdansk, Poland: Gdansk University; 2011.
6. Williams R, Ghani K. The unintended health consequences of lockdown (CSAS working paper 21-12). Arlington (US): George Mason University's Antonin Scalia Law School, Center for the Study of Administrative State; 2021.
7. Turcotte-Tremblay A, Gali-Gali I, Ridde V. The unintended consequences of COVID-19 mitigation measures matter: practical guidance for investigating them. BMC Med Res Methodol 2021;21:1—17.
8. Bozovich G, Sala Mercado J, Alves de Lima A, Fosco MJ. La epidemia por coronavirus no elimina ni posterga otras enfermedades. El desafío de no caer en desatención [The coronavirus epidemic does not eliminate or postpone other diseases. The challenge of not falling into neglect]. Buenos Aires: Commission of medical Directors (CEDIM)/Association of Clinics and Sanatoriums. (ADECRA); 2020:7 p.
9. Bluro IM, Piñeiro DJ, Estada JL. Cardiovascular pandemic in Argentina. Global Heart 2020;15:15—18.
10. González SM, Tartaglione F, Babio GR, Schiavone MJ, Gelpi FC, Angrisani MA, et al. Risks of cardiovascular disease patients in times of COVID-19. A survey of the Argentine Foundation of Cardiology. Rev Argent Cardiol 2020;88:212—16.
11. Bozovich G, Alves de Lima A, Fosco M, Burgos L, Martínez R, Dupuy de Lome R, et al. Daño colateral de la Pandemia por COVID-19 en Centros Privados de Salud de Argentina. [Collateral Damage of the COVID-19 Pandemic in Private Health Centers in Argentina]. Medicina Buenos Aires 2020;80:37—41.
12. Lamelas P, Botto F, Pedernera G, De Lima A, Costabel J, Belardi J. Cardiovascular disease in times of COVID-19. Medicina 2020;80:248—52.
13. Garberich R, Jaffer F, Stefanescu Schmidt A, Dixon S, Rade J, Smith T, et al. Impact of COVID-19 pandemic on STEMI care: an expanded analysis from the United States. Catheter Cardiovasc Interv 2021;98:217—22.
14. Wong L, Hawkins J, Langness S, Murrell K, Iris P, Sammann A. Where are all the patients? Addressing COVID-19 fear to encourage sick patients to seek emergency care. NEJM Catal 2020;1—12. https://doi.org/10.1056/CAT.20.0193.
15. Rodríguez-Leor O, Cid-Álvarez B, Ojeda S, Martín-Moreiras J, Ramón Rumoroso J, López-Palop R, et al. Impact of the COVID-19 pandemic on interventional cardiology activity in Spain. Interv Cardiol 2020;2:82—9.
16. Baldi E, Sechi G, Mare C, Canevari F, Brancaglione A, Primi R, et al. Out-of-hospital cardiac arrest during the COVID-19 outbreak in Italy. N Eng J Med 2020;383:496—8.

17. De Filippo O, D'Ascenzo F, Angelini F, Bocchino PP, Conrotto F, Saglietto A, et al. Reduced rate of hospital admissions for ACS during COVID-19 outbreak in Northern Italy. N Eng J Med 2020;383:88—9.
18. Metzler B, Siostrzonek P, Binder R, Bauer A, Reinstadler S. Decline of acute coronary syndrome admissions in Austria since the outbreak of COVID-19: the pandemic response causes cardiac collateral damage. Eur Heart J 2020;41:1852—3.
19. Deerberg-Wittram J, Knothe C. Do not stay at home: we are ready for you. NEJM Catal 2020:1—7. https://doi.org/10.1056/CAT.20.0146.
20. Tam C, Cheung K, Lam S, Wong A, Yung A, Sze M, et al. Impact of coronavirus disease 2019 (COVID-19) outbreak on ST-segment-elevation myocardial infarction care in Hong Kong, China. Circulation 2020;13:e006631.
21. Wang H, Zhang L. Risk of COVID-19 for patients with cancer. Lancet Oncol 2020;21:e181.
22. Dore B. COVID-19: collateral damage of lockdown in India. BMJ 2020;369:m1711.
23. Nair AG, Gandhi RA, Natarajan S. Effect of COVID-19 related lockdown on ophthalmic practice and patient care in India: results of a survey. Indian J Ophthalmol 2020;68:725—30.
24. UNICEF. Survey. of perception and Attitudes of the population. Impact of the COVID-19 pandemic and the measures adopted by the government on daily life; 2020:33 p. Report No. 2. Available from: http://www.psi.uba.ar/opsa/#informes.
25. Etchevers MJ, Garay CJ, Putrino N, Grasso J, Natalí V, Helmich N. Salud Mental en Cuarentena. Relevamiento del impacto psicológico a los 7—11, 50—55 year 115—124 días de cuarentena en población Argentina. [Mental Health in Quarantine. Survey of the psychological impact at 7—11, 50—55 and 115—124 days of quarantine in Argentine population]. Buenos Aires (ARG): University of Buenos Aires, Faculty of Psychology, Observatory of Applied Social Psychology; 2020:42 p. Report No. 7.
26. Scotta A, Cortez M, Miranda A. Insomnia is associated with worry, cognitive avoidance and low academic engagement in Argentinian university students during the COVID-19 social isolation. Psychol Health Med 2020;27:199—214.
27. Fasano M, Padula M, Azrak M, Avico A, Sala M, Andreoli M. Consequences of lockdown during COVID-19 pandemic in lifestyle and emotional state of children in Argentina. Front Pediatr 2021;9:1—7.
28. Giardino D, Huck-Iriart C, Riddick M, Garay A. The endless quarantine: the impact of the COVID-19 outbreak on healthcare workers after three months of mandatory social isolation in Argentina. Sleep Med 2020;76:16—25.
29. Etchevers M, Garay C, Putrino N, Helmich N, Lunansky G. Argentinian mental health during the COVID-19 pandemic. Clinic Psych Eur 2021;3:1—17.
30. Rodriguez Ceberio M, Jones G, Benedicto M. COVID-19: anxiety of trait and status in a selected population of Argentina in a context of extended quarantine. Rev Argent Salud Publica 2021;13:e22.
31. Barros MB, Lima MG, Malta DC, Szwarcwald CL, Azevedo RC, Romero D, et al. Report on sadness/depression, nervousness/anxiety and sleep problems in the Brazilian adult population during the COVID-19 pandemic. Epidemiol Serv Saude 2020;29:1—11.
32. de Sousa E, Silva Ono B, Souza J. Sleep and immunity in times of COVID-19. Rev Assoc Med Bras 2020;66:143—7.
33. Ramírez-Ortiz J, Hernández J, Córdoba F. Effects of social isolation on sleep during the COVID-19 Pandemic. Sleep Sci 2021;14:86—93.
34. Medina-Ortiz O, Araque-Castellanos F, Ruiz-Domínguez L, Riaño-Garzón M, Bermudez V. Trastornos del sueño a consecuencia de la pandemia por COVID-19. Rev Peru Med Exp Salud Publica 2020;37:755—61.
35. Peretti-Watel P, Alleaume C, Léger D, Beck F, Verger P. Anxiety, depression and sleep problems: a second wave of COVID-19. Gen Psychiatry 2020;33:1—4.
36. Marelli S, Castelnuovo A, Somma A, Castronovo V, Mombelli S, Bottoni D, et al. Impact of COVID-19 lockdown on sleep quality in university students and administration staff. J Neur 2021;268:8—15.
37. Gualano M, Lo Moro G, Voglino G, Bert F, Siliquini R. Effects of COVID-19 lockdown on mental health and sleep disturbances in Italy. Int J Environ Res Public Health 2020;17:1—13.
38. Pérez-Carbonell L, Meurling I, Wassermann D, Gnoni V, Leschziner G, Weighall A, et al. Impact of the novel coronavirus (COVID-19) pandemic on sleep. J Thorac Dis 2020;12:S163—75.
39. Chandra A, Karki P, Prakash P, Khadka S. Prevalence of sleep disturbances during COVID-19 pandemic in a Nepalese population: a cross-sectional study. J Sleep Med 2021;18:145—53.
40. Banthiya S, Sharma S, Jahagirdar D, Jahagirdar V, Garg M, Sahadev H. Sleep quality in the Indian adult population during the COVID-19 pandemic. Cureus 2021;13:e17535.
41. Fu W, Wang C, Zou L, Guo Y, Lu Z, Yan S, et al. Psychological health, sleep quality, and coping styles to stress facing the COVID-19 in Wuhan, China. Transl Psychiatry 2020;10:1—9.
42. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res 2020;288:112954.
43. Cheshmehzangi A, Chen H, Su Z, Zou T, Xiang Y, Dawodu A. How does the COVID-19 fuel insomnia? Brain Behav Immun Health 2022;21:100426.
44. Garg K, Goel H, Gupta S. High prevalence of insomnia during COVID-19 pandemic. Sleep Med Dis Int J 2020;4:57—9.
45. D'Hyver de las Desesa C. Alteraciones del sueño en personas adultas mayores [Sleep disorders in elderly people]. Rev Fac Med UNAM 2018;61:33—45.
46. Keisuke S, Masayuki M, Koichi H. Sleep disorders in the elderly: diagnosis and management. J Gen Fam Med 2017;18:61—71.
47. Bigalke J, Greenlund I, Carter J. Sex differences in selfreport anxiety and sleep quality during COVID-19 stay-at-home orders. Biol Sex Differ 2020;11:56.
48. Salfi F, Lauriola M, Amicucci G, Corigliano D, Viselli L, Tempesta D, et al. Gender-related time course of sleep disturbances and psychological symptoms during the COVID-19 lockdown: a longitudinal study on the Italian population. Neurobiol Stress 2020;13:100259.
49. Menéndez E. Modelos de atención de los padecimientos; de exclusiones teóricas y articulaciones prácticas. [Models of care for conditions; of theoretical exclusions and practical articulations]. Cien Saude Colet 2003;8:185—207.