



COVID-19 lockdown – Are Austrians finally able to compensate their sleep debt?



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ABSTRACT

In order to control the rapid spread of the COVID-19 pandemic, Austria was put under national lockdown beginning on March 13, 2020, forcing its inhabitants to live in home confinement. The aim of this study was to measure the impact of the lockdown on sleep and dream behavior in Austrian citizens. 77 participants (50 women, $M_{age} = 40.88$ years, $SD_{age} = 13.72$) filled in an online questionnaire during the lockdown between April and May 2020. Sleep quality, sleep quantity, daytime sleepiness, and nightmare frequency were assessed and analyzed in relation to gender, burnout risk, perfectionism and chronotype. Results demonstrated higher subjective sleep quality during lockdown, especially in women. Daytime sleepiness was significantly lower during the lockdown period while sleep duration did not change. Results suggest that sleep issues are less prominent during the COVID-19 lockdown but point to the importance of prevention and treatment of sleep disorders aside from the pandemic. Findings indicate the need for more flexibility in social time structures to relieve those managing tasks from multiple areas of interests such as working mothers. Generalization of results is limited due to small sample size, self-selection bias, and purely subjective measures.

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1. Introduction

In December 2019, a world-wide crisis, the COVID-19 pandemic, originated in Wuhan, China [1]. In order to control the alarmingly fast spread of the SARS-CoV-2 virus, lockdowns have been imposed in several countries. Austria entered its lockdown period on March 13, 2020, with restrictions in social interactions (social distancing), leisure activities, cultural and sports events, with public buildings being closed and people being told to stay and work at home (home office). Unfortunately, the pandemic and the implemented restrictions seem to have tremendous consequences on our emotional and physical well-being [2–5]. For many, due to insufficient knowledge about epidemic diseases and how to avoid infections, the crisis situation resulted in elevated symptoms of anxiety, depression, including post-traumatic stress symptoms and panic attacks [3,6–9]. Besides the threat of being infected, an increasing number of citizens is losing relatives to the pandemic, or losing their jobs and financial security [3]. Additionally, the

lockdown causes a significant change in behavior: less time is spent in daylight, people engage less in sports activities [10] and social interactions as well as leisure activities are reduced to a minimum.

These fears and behavior changes play an important role in the three processes responsible for sleep regulation: the arousal system, the homeostatic sleep drive, and the circadian rhythm [11] and therefore affect the quality and quantity of our sleep. Sleep quality comprises different aspects of sleep such as difficulty initiating and maintaining sleep and the number of nocturnal awakenings [12,13]. Sleep duration is defined as “the amount of time an individual spends in a sleeping state” [14]. The homeostatic sleep drive may be lower after spending less time in fresh air under natural daylight and being less physically active which might have a negative impact on sleep and wellbeing. Furthermore, symptoms of stress and anxiety resulting from the pandemic may lead to an increase in arousal levels or vigilance [15,16], which may cause difficulties falling asleep and increase the number of nocturnal awakenings, in turn shortening sleep and lowering sleep quality. It is also necessary to consider the effects of the third sleep regulating process: the circadian rhythm. Reduced light exposure, irregular wake times and activity patterns may lead to a dysregulation of circadian rhythms and to a worsening in sleep quality. However, many others

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may benefit from the new reality in which they are no longer forced to adhere to strict predetermined schedules. We theorize that the pandemic does not solely have negative impacts on our health but may allow for a sleep-wake schedule in accordance with individually preferred sleep-wake times. Accordingly, studies [2,17] found that social jetlag decreased during the COVID-19 pandemic lockdown, sleep duration increased, and sleep timing was delayed. Findings suggest that sleep duration increased during the lockdown and participants were able to extend their sleeping period as needed and change the timing of their sleep as preferred [18].

These ideas suggest that psychologically burdened subpopulations might experience a decrease in sleep quality, while others experience no change or even an improvement [19]. Reduced sleep quality during COVID-19 pandemic lockdown has been reported specifically in those with elevated symptoms of anxiety and depression [20,21] and in those with low social support [22]. COVID-19 related loneliness when being obliged to live in home confinement or in social isolation was associated with a greater amount of sleep problems [3,9,23] and this association was stronger among elderly adults with more COVID-19 related worries or among those with lower resilience [24]. Xiao et al., [9] showed that medical staff members slept significantly worse during the crisis, with a PSQI-total score of 8.6, which is significantly higher than the cutoff score of 5. Presumably, this sample was additionally burdened by working under time pressure and being constantly exposed to virus infection.

Studies have found that women are particularly vulnerable to the worries and fears associated with COVID-19, isolation and loneliness due to home confinement, and additional stress that comes along with additional obligations such as taking care of relatives or educating children [25–28]. However, the gap between men and women regarding perceived stress, sleep quality, insomnia and depression symptoms, and anxiety seems to decrease in the course of the lockdown [29].

We are considering high Perfectionism scores, defined as having high personal standards and high concern over mistakes, as an additional risk factor for developing low sleep quality during the lockdown. Perfectionism has been shown to be a predisposing factor for insomnia and sleep disturbances [30]. In the context of the diathesis-stress model, this personality construct can be understood as a source of vulnerability that is activated in stressful situations [31]. We theorize that the current global health crisis exacerbates already existing high levels of stress among perfectionists with negative consequences on their subjective sleep quality.

The effects of the pandemic lockdown on sleep quality may also be moderated by individual Burnout risk, which is triggered by emotional, physical, and mental exhaustion due to prolonged stress at work and characterized by exhaustion, cynicism, and feelings of reduced professional ability [32]. Burnout is not an illness itself but may promote other psychological disorders. While those working on the front lines and being directly confronted with the SARS-CoV-2 virus showed more somatic symptoms and higher burnout risks [33] we assume that most Austrians have less social obligations during the lockdown, more time for recreation, and more flexibility in their daily time structures. For those suffering from Burnout, the lockdown might present an opportunity to slow down and give sleep the space it needs.

Adolescents reported to have a 2-h shift in sleep-wake rhythms, better sleep quality, and lower daytime sleepiness during lockdown compared to regular school-time schedules [34]. Since adolescents are typically later chronotypes [35], this supports the hypothesis that lockdown restrictions allow for an adaptation to the individually preferred sleep-wake rhythm. Horne and Östberg, [35] defined early (individuals who tend to go to bed and get up earlier than

others), late (individuals who tend to go to bed later and sleep longer), and intermediate chronotypes. Usually, late chronotypes tend to suffer from social jetlag, since social obligations are in misalignment with biologically preferred sleep times [36] and during lockdown this mismatch decreases [2]. Gao & Scullin, [19] showed that overall sleep quality in the USA improved during the pandemic.

The possibility to sleep longer in the mornings also allows for an increase in Rapid-Eye-Movement (REM) sleep, since the occurrence of REM sleep phases increases throughout the night and mostly occur in the last hours before we awake in the morning. This may increase dream recall, or the ability to remember a dream, and might also increase the occurrence of dreams. Several studies support the tendency that longer sleep periods and more arousals may enhance dream recall frequency [15,16,37]. Very little external stimuli are experienced during the lockdown and therefore, our daily lives offer less material for our dream worlds. With less external input, we tend to turn inwards and integrate more feelings, memories, and subconscious processes in our dreams. Therefore, dreams may be more emotional and project our fears and worries that we experience during the day. Emotionally intense dreams and events are typically remembered better. Therefore, we expect dream recall to increase during the lockdown.

It is important to consider the framework in which lockdown restrictions are implemented. We suggest that most Austrians who were forced to live in home confinement due to COVID-19 were able to preserve work, education, and communication via digital means [38] and were not completely isolated from their social network. In this study, we assume that individuals not directly confronted with COVID-19 infection or suffering from prior psychological disorders, may even benefit from the lockdown by compensating an accumulated sleep debt as a result of experiencing greater freedom in their daily time structures. Former findings lead to the assumption that the COVID-19 lockdowns are associated with a change in sleep quality, sleep duration, daytime sleepiness and dream recall and we hypothesize that healthy individuals will report an improvement in sleep quality, lower daytime sleepiness and longer sleep duration, as well as higher dream recall frequency. This study is the first to explore the impact of the national pandemic lockdown on sleep, daytime sleepiness and dream recall frequency in relation to gender in an Austrian sample. It further aims to close existing research gaps by considering the effects of individual chronotype, burnout and perfectionism scores during the COVID-19 lockdown period.

2. Materials and methods

2.1. Procedure and sample

This study aimed to assess the change in sleep quality, sleep duration, daytime sleepiness and dream recall frequency during the COVID-19 lockdown in Austria. The project was carried out over a period of two months (02.04.2020–26.05.2020) and questionnaires were made available online via www.schlafcoaching.org. Participants were recruited via social media and word-of-mouth recommendations. Each participant filled in two questionnaires: one with information about their current health status during the lockdown, the other one was filled in on the same day, retrospectively providing information about their health status on March 11, 2020, before the beginning of the lockdown in Austria. The final sample consisted of 77 participants (50 women, $M_{age} = 40.88$ years, $SD_{age} = 13.72$). Job titles ranged widely, with 14 students, 10 psychologists and 10 “employees” forming the biggest clusters. Only two indicated to work in shifts.

2.2. Questionnaires

2.2.1. Sleep quality and duration

The *Pittsburgh Sleep Quality Index* (PSQI); Buysse et al., [39] comprises 18 items enquiring subjective sleep quality, sleep disorders, habitual sleep times, sleep latency, sleep duration, sleep medication and daytime sleepiness. Higher item scores indicate lower sleep quality. Item scores are added up to a sum score from 0 to 21 with sum scores >5 indicating poor sleep quality. The instrument has been shown to have sufficient reliability (Cronbach's $\alpha = 0.83$) and validity (ability to discriminate patients from controls) [39].

2.2.2. Daytime sleepiness

The *Epworth Sleepiness Scale* (ESS; (Murray W. Johns, [40])) assesses the chance of dozing off or falling asleep while engaged in eight daily activities. Respondents rate the likelihood on a 4-point Likert scale from 0 to 3. The ESS sum score ranges from 0 to 24 and gives an estimate of the overall sleep propensity, with scores >10 indicating pathological daytime sleepiness. Reliability (Cronbach's $\alpha = 0.82$) and validity of the ESS have been shown to be good (eg, Refs. [41,42]).

2.2.3. Dream quality and frequency

Dream recall frequency was also assessed with the *Dreamland Questionnaire* (DL-Q) by the items "Did you dream last night" and "How many dreams of last night do you remember?". This questionnaire has been proven useful in different samples and studies and has been shown to be a reliable and valid tool in dream research since 1997 (see Ref. [43]). One item of the PSQI that is typically used for the calculation of sleep efficiency asks how often one awakens as a result of a nightmare and is used as an additional indicator for dream frequency [39].

The following items were part of a questionnaire that has proven useful in the investigation of shift and non-shift workers over the last five years (eg, Ref. [44]).

2.2.4. Chronotype

Circadian phase preferences for sleep-timing and physical activities within a 24-h period are determined by chronotypes. The individual chronotype was assessed by one item asking for: "Are you rather: (1) a morning type, (2) an evening type, (3) a mixture of both (intermediate type). This one-item assessment is based on the Morningness-Eveningness Questionnaire [35] and used in order to allow for a quick assessment of the individual chronotype.

2.2.5. Perfectionism

Perfectionism is defined as having high personal standards and high concern over mistakes. Perfectionism was assessed with the following two items rated on a 4-point scale from 1 ("not at all true") to 3 ("definitely true"):

- (1) Do you think you are a perfectionist?
- (2) Do others think you are a perfectionist?

2.2.6. Burnout

Burnout is characterized by exhaustion, cynicism, and feelings of reduced professional ability [32]. Burnout risk was assessed with two items rated on a 4-point scale from 1 ("not at all true") to 3 ("definitely true"):

- (1) Do you often feel out of energy?
- (2) Do you sometimes feel as if not quite yourself/beside yourself?

2.2.7. Additional questions

Additional questions assessed demographic information, shift schedules, chronic sleep problems, and if those have a negative impact on their subjective life quality.

2.3. Statistical analysis

Results of PSQI, ESS, and all additional questions are presented as means and standard deviations. Data from before the lockdown was compared with that during the lockdown using *t*-tests, since literature suggests that *t*-tests are robust to the violation of the normality assumption if sample size reaches a certain size ($N > 30$) [45,46]. To control whether these effects are gender-specific, Mann-Whitney-*U*-tests were performed ($n < 30$). Regression analyses were conducted to test whether the changes in sleep quality, sleep duration, and daytime sleepiness could be predicted by gender, chronotype, perfectionism or burnout risk. The change was calculated as difference in mean scores (mean score before minus mean score during the lockdown). Paired-sample sign tests were used to compare dream recall frequency before and during the lockdown. For statistical analysis, the threshold for the rejection of the null hypothesis was set to 0.05. All statistical analyses were performed using SPSS-24 (Statistical Package for the Social Science).

3. Results

3.1. Sleep and dream characteristics

Results of *t*-tests comparing PSQI global scores and PSQI subscales before and during the COVID-19 lockdown (see Table 1) showed a significant decrease in the subscale subjective sleep quality ($N = 39$, 14 men) indicating higher subjective sleep quality during the lockdown. When comparing the global PSQI score, no significant change in sleep quality was found. However, the global score before the lockdown is slightly higher than the cut-off score of 5 (although not significant) but improves during the lockdown. The subscale sleep duration did not change significantly due to the lockdown, neither did sleep disorders, sleep latency, sleep efficiency or daytime sleepiness.

Daytime sleepiness assessed with the ESS was significantly lower during the COVID-19 lockdown than before ($t = 2.34$, $p = 0.025$). Sleep issues (additional questions) did not show significant changes ($t = 0.68$, $p = 0.498$), neither did the impact of sleep issues on life quality ($t = 0.57$, $p = 0.570$).

Although participants ($N = 39$) rated the chance of being woken up by a dream slightly higher during the lockdown ($M = 0.82$) than before ($M = 0.74$), these findings did not differ significantly ($t = -0.60$, $p = 0.555$). Results of the DL-Q ($N = 14$) also indicated that dream recall frequency ($z = -1.63$, $p = 0.102$) and the number

Table 1
PSQI scores (means and p-values [*t*-test]) before and during the COVID-19 pandemic lockdown.

PSQI scales	M		t	p
	Before	During		
Global Score	5.15	4.36	1.577	0.123
Subjective Sleep Quality	1.13	0.87	2.039	0.048
Sleep Disorders	1.08	1.08	0.000	1.000
Sleep Duration	0.41	0.18	1.780	0.083
Sleep Latency	1.03	0.92	0.644	0.523
Sleep Efficiency	0.23	0.15	0.723	0.474
Sleep Medication	0.15	0.21	-0.628	0.534
Daytime Sleepiness	1.10	1.00	0.726	0.472

of dreams per night ($z = 0.00, p = 1.00$) did not differ significantly during the lockdown.

3.2. Gender effects

A Mann-Whitney-*U*-Test was calculated to determine whether there were differences in sleep quality between women and men. The distributions differed between both groups (Kolmogorov–Smirnov $p < 0.05$), except for the PSQI global score and daytime sleepiness measured with the ESS (Kolmogorov–Smirnov $p > 0.05$). The influence of the COVID-19 lockdown was not gender-specific in most scales, results can be seen in Table 2, however, there was a statistically significant difference in the subscale subjective sleep quality between both groups, $U = 114.500, Z = -2.040, p = 0.041$, with women reporting a bigger decrease, indicating a positive effect, while men reported a slight increase in subjective sleep quality during the lockdown.

3.3. Chronotypes and burnout risk factors

Nine Participants rated themselves as early chronotypes, 11 as intermediate types, and 19 as late types. On average, participants rated themselves less perfectionist ($M = 1.66$) than they would expect others to ($M = 1.83$). In sum, participants at least sometimes felt out of energy ($M = 1.54$), and less often felt as if beside themselves ($M = 1.18$). *T*-tests were performed to see whether participants differed significantly in burnout risk ($t = 1.47, p = 0.151$) between before and during the lockdown but found no significant changes. Also, no changes were found when looking at each burnout item separately, item 1 ($t = 1.35, p = 0.186$), item 2 ($t = 1.09, p = 0.498$). Men and women did not differ in perfectionism ($Z = -1.08, p = 0.280$) or burnout risk ($Z = -1.82, p = 0.069$). Perfectionism scores correlated positively with the burnout items feeling out of energy ($r = 0.32, p = 0.044$) and feeling beside oneself ($r = 0.43, p = 0.007$).

We also assessed whether perfectionism could predict the size of change in sleep quality, sleep duration and daytime sleepiness. For the performance of the following regression model ($N = 39$), differences of the scores before and during the crisis were calculated as dependent variables. Perfectionism scores did not predict the change in sleep quality, $F(1,37) = 0.28, p = 0.598$, nor in sleep duration, $F(1,37) = 0.361, p = 0.551$, nor in daytime sleepiness, $F(1,37) = -1.90, p = 0.065$. Kruskal–Wallis tests showed that chronotype did not affect the change in sleep quality, $\chi^2(2) = 4.17, p = 0.124$, sleep duration, $\chi^2(2) = 1.67, p = 0.433$, or daytime sleepiness, $\chi^2(2) = 3.27, p = 0.195$. Burnout risk could not predict the changes in sleep quality $F(1,37) = 0.14, p = 0.707$, sleep duration $F(1,37) = 0.01, p = 0.939$, or daytime sleepiness $F(1,37) = 0.71, p = 0.407$.

4. Discussion

This study was the first to analyze the effects of the COVID-19 pandemic lockdown on sleep and dream measures in the Austrian population. Our results indicate that the pandemic lockdown had a significant impact on subjective sleep quality and daytime sleepiness. Subjective sleep quality was higher during the lockdown, but this was only reflected by the PSQI subscale subjective sleep quality and not by the PSQI global score. In accordance with our expectations, participants rated their daytime sleepiness significantly lower than before the lockdown. This is supported by other findings that suggest that more time is available for sleep and more flexibility in social schedules allows for individual sleep adaptation [2]. It is not in line with the finding by the same research group [2] which included Germany, Switzerland, and Austria in the analyses, that overall sleep quality was reduced during the lockdown. Since lockdown measures and restrictions may vary considerably between countries, it is possible that Austrians experienced less feelings of loneliness, isolation, anxiety and imbalance and therefore different effects on sleep quality. Austrian citizens may have experienced less negative effects since they were still able to benefit from daylight and were not strictly confined to their home, which may have given them the opportunity to get enough light during the day and be able to sleep during the night – in comparison with other countries that enforced strict home confinement.

However, sleep duration did not change due to the lockdown situation contrary to former findings [2,18]. We assume that this could be a result of differential reactions to the pandemic lockdown in each participant. While some might have benefitted from more flexible time schedules and less social obligations, others suffer from sleep deprivation as a result of a disruption of circadian rhythms and lower sleep drive resulting from less outdoor activities under natural light irregular activity patterns. The opportunities for athletic activities are limited and fears regarding the SARS-CoV-2 virus may keep those prone to worries awake. As recent surveys have shown, some individuals are more relaxed and finally have more time for work, family and other chores, while others have enormous difficulties keeping it all together (*Coronakrise belastet jeden Zweiten psychisch*, 2020). Factors determining whether someone feels stressed is having children who need to be taken care of, work-related issues, and living alone [3,47].

Gender seems to play a moderating role in the PSQI subscale subjective sleep quality, with women experiencing a positive change and men showing a slight decrease in sleep quality. This is contradictory to the idea that women suffer more from having to cope with child care, home office and fears regarding the virus during the lockdown than men [25,27,28]. This finding suggests that women benefit from the opportunity to organize daily

Table 2
Results of Mann-Whitney-*U* tests comparing the differences (before lockdown - during lockdown) in PSQI and ESS scales between women and men.

PSQI scales	Women (N = 25)	Men (N = 14)	U	Z	p
	Mean Rank	Mean Rank			
Global Score	20.28	19.50	168.00	-0.208	0.835
Subjective Sleep Quality	22.42	15.68	114.50	-2.040	0.041
Sleep Disorders	20.66	18.82	158.50	-0.594	0.553
Sleep Duration	18.48	22.71	137.00	-1.330	0.183
Sleep Latency	19.84	20.29	171.00	-0.126	0.900
Sleep Efficiency	20.78	18.61	155.50	-0.721	0.471
Sleep Medication	20.00	20.00	175.00	0.000	1.000
Daytime Sleepiness	19.84	20.29	171.00	-0.129	0.898
ESS					
Daytime Sleepiness	18.54	22.61	138.50	-1.088	0.276

rhythms themselves because it helps to cope with individual obligations and personalized time management. Former studies indicated that the gap between men and women may get smaller throughout the lockdown [29] and this suggests that it may be necessary to analyze the process from beginning to end of the lockdown more closely.

Chronotypes did not differ in their change in sleep quality, quantity or daytime sleepiness as a reaction to the lockdown restrictions. This is contrary to the suggestion that late chronotypes may benefit more from more social flexibility by adapting the sleep-wake rhythms to individually preferred times [2]. Late types tend to suffer from desynchronized circadian rhythms and constant sleep deprivation, which makes them more prone to psychological disorders and emotional and social difficulties [48–50].

Burnout risk did not change during the crisis nor did it moderate the change in sleep quality, sleep duration or daytime sleepiness during the lockdown. Burnout is typically a psychological state that develops over years and may not recover within such a short time.

Even though participants showed an improvement in sleep quality, other studies suggest that depression and anxiety rates as well as loneliness and substance abuse did increase [3,51], putting the findings discussed here into perspective.

4.1. Limitations

This study relies on self-report measures which might have caused biased responses or less accurate results. Findings indicate that subjective and objective measures of time in bed, total sleep time, and sleep latency correlate strongly, but sleep quality, sleep depth, and how rested participants felt upon awakening were not strongly correlated with objective sleep characteristics [52]. In addition, memory effects might have caused distorted estimates of sleep parameters before the crisis, since they were only assessed retrospectively. While short questionnaires have some advantages like consuming less time in assessment and analysis, they might not cover all relevant aspects of a construct. For instance, the individual chronotype used for calculations was merely based on one item asking for a personal estimate. The final sample size used for statistical analyses was rather small and did not allow for more advanced methods such as multilevel modelling. Also, the sample might not represent the population accurately since it is to a large extent self-selected and only those interested in topics such as sleep and dream may have participated in the study. More vulnerable subpopulations such as shift workers are underrepresented and need further investigation. Furthermore, it is impossible to differentiate between effects of the pandemic or the implementation of numerous restrictive measures. For more detailed information regarding psychological impact of the COVID-19 crisis, please refer to the large-scale international survey sent out by the initiative International COVID-19 Sleep Study ICOSS, which was initiated by Colin Espie.

4.2. Practical implications

Our finding that sleep quality increased significantly during the COVID-19 lockdown may open up new perspectives on the discussion on the consequences of lockdowns due to the COVID-19 pandemic. Besides those suffering from the negative consequences of lockdowns, there are others who may benefit from the consequences of working and staying at home in as much they sleep better, longer and more regularly. This is especially relevant since sleep quality is an important indicator for wellbeing and health. Sleep quality promotes health by supporting the immune system [53] which gains importance during the rapid spread of a possibly deadly virus. Another important factor is that good sleep

quality may promote the effectiveness of vaccinations, in this case one against the SARS-CoV-2 virus. Sleep is also crucial for successful emotion regulation [38,54] and insufficient sleep may increase anxiety levels or even cause symptoms of posttraumatic-stress disorder [55,56]. Preventive and curative actions should be taken to avoid sleep deprivation, irregular sleeping schedules, and thus a deterioration of sleep quality.

5. Conclusion

Our findings suggest that while some aspects of psychological health are negatively affected by the COVID-19 lockdown restrictions, the sleep quality of those without prior disorders and access to the internet may actually improve. Austrians may have been able to “catch up” on their sleep during a period where time structures were more flexible. In this study, subjective sleep quality was rated higher whereas daytime sleepiness decreased significantly during the lockdown. Women reported a bigger increase in sleep quality than men. These findings suggest that the lockdown might actually help some of us to structure sleep-wake-rhythms more adequately, without being constantly forced to adhere to socially enforced rhythms. This points to the importance of more flexible work schedules for all, especially those who have to combine tasks from multiple areas of responsibility.

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Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Credit author statement

Brigitte Holzinger: Conceptualization, Methodology, Writing – Reviewing and Editing, Supervision; **Lucille Mayer:** Writing – Original Draft, Writing – Editing, Visualization; **Franziska Nierwetberg:** Data curation, Formal Analysis; **Gerhard Klösch:** Conceptualization, Writing – Reviewing and Editing.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <https://doi.org/10.1016/j.sleepx.2021.100032>.

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