Effects of the COVID-19 lockdown on human sleep and rest-activity rhythms

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COVID-19 lockdown is associated with greater conformance to 'natural' sleep-wake cycles, but poorer sleep quality and overall wellbeing.

These adverse effects are potentially amenable to the lifestyle interventions of exercise and sunlight exposure.

Background Facts:

Sleep-wake cycles are affected by intrinsic biological factors and extrinsic (social) factors. Mismatch between these influencers leads to social jetlag and social sleep restriction, both of which have deleterious effects on health, mental wellbeing, and performance. Chronically impaired sleep quality is also associated with increased risk of hypertension and type 2 diabetes, two major risk factors for adverse COVID-19 outcome.

Study Title:

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Hypothesis /Objectives:

Social jetlag (the mismatch that occurs between intrinsic biological rhythms and extrinsic demands on sleep timing due to work, school, etc) and sleep restriction (the shift in sleep time between work days and 'free' days) are both correlated to adverse effects on health, mental wellbeing, and performance. The authors sought to investigate the effects of peak COVID-19 lockdown measures on social and biological rhythms and sleep.

Study Design:

Quasi-experimental design involving a one-time online survey of adults living in Germany, Austria, and Switzerland between March 23 and April 26, 2020, during the peak of COVID-19 lockdown measures.

Outcome Measures:

- Sleep quality (9-part Likert-scale based sleep-quality questionnaire)
- Social sleep restriction (Δ sleep duration from work days to free days)
- Social jetlag (Δ mid-sleep between work days and free days) as determined by the Munich Chronotype Questionnaire*
- Life satisfaction

Summary of Findings:

- 435 valid datasets obtained: 327 (75.2%) women, 104 (23.9%) men, 4 diverse (0.9%)
- Median social jetlag reduced by 13 mins (IQR = −31–17 mins)
- Median social sleep restriction reduced by 25 mins (IQR = −51–5 mins)
- Improved alignment associated with increased median sleep duration of 13 mins (IQR = −25–51 mins)
- Overall sleep quality decreased during the study period by 0.25 points (IQR = −1.6–2.8 points) [scale from 0–25 used, in which higher values indicate poorer sleep quality)
- Participants reported an increase in subjective burden and a decrease in mental and physical wellbeing, which translated to poorer sleep quality and duration
- Participants endorsed spending less time under the open sky than before lockdown

Conclusions:

1. **COVID-19 lockdown in three European countries was associated with improved alignment of intrinsic biological sleep cycles with those typically constructed around extrinsic and social factors**
2. **Better alignment was attributable to an increase in paid work from home, which in turn was associated with increased flexibility of working hours**
3. **Reduced working hours but not leisure time activity during lockdown were further associated with improved alignment of intrinsic and extrinsic sleepwake cycles**

Implications for LM Practice:

The adverse effects of COVID-19 lockdown on sleep quality may be mitigated by lifestyle interventions including exposure to daylight and exercise.

Study Limitations:

- Convenience sample of participants
- Self-report data subject to recall and misperception biases
- External validity / generalizability of study may be compromised by:
  - Female over-representation (75.2%)
  - Young adult over-representation (277 [63.7%] participants between ages 18 and 35)
  - Geographic restriction (3 European countries)
  - Limited enrolment period early on in lockdown
  - Poor representation across socioeconomic strata (23 [5.3%] respondents were of low socioeconomic status, 317 [72.9%] had attained a University education)
- Potential under-estimation of subjective burden and adverse effects on mental wellbeing due to cushioning effect of high socioeconomic status of sample

Associated Indicators

In 435 European adults, COVID-19 lockdown was associated with:

- Improved alignment of intrinsic and extrinsic sleep-wake cycles, leading to reductions in social jetlag and social sleep restriction
- Reduced sleep quality
- Increased sense of burden and decreased physical and mental wellbeing
- Reductions in time spent on outdoor activities under the open sky
- Greater work flexibility and reduced work hours

Single Overriding Communication Objective:

COVID-19 lockdown is associated with changes in sleep patterns, which result in poorer sleep quality, despite better alignment of intrinsic biological rhythms (sleepwake cycle) and socially determined sleep timing and duration. Such changes may be amenable to the lifestyle interventions of increased outdoor activity and sunlight, as well as physical activity.

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