



Prevalence of sleep disturbance among Chinese healthcare professionals increases Eastward—caution with position in time zone

ARTICLE INFO

Keywords:

DST
Sleep deprivation
Position in time zone
Time zone offset
Daylight saving time
Daily rhythms

ABSTRACT

We analyze data of the prevalence of sleep disturbance among Chinese healthcare professionals and maintain that they increase Eastward, refining previous results. We suggest that position in time zone is a valid explanatory metric only after daily rhythms have been uniformed. On a more general note, this finding suggest that daylight saving time might help reduce sleep disturbance.

Borisenkov [1] took data by Qiu et al. [2] on the prevalence of sleep disturbance among Chinese healthcare professionals and contrasted them with the position in time zone (PTZ, longitude offset relative to the Beijing meridian, 115°E) to report that “when moving away from the Beijing meridian by 10° to the left or right, there is an increase in the frequency of detection of sleep disturbances by 6.5 %”. Later, Johnson and Malow [3] used this result as one evidence of the chronic hazards associated with daylight saving time (DST), a shift to the left (Westward) of the time zone. However, we want to highlight that results from Ref. [1] actually show an increase of the prevalence when moving away to the right (Eastward) of the Beijing meridian, so that DST would reduce the hazards.

Borisenkov [1] fits the prevalence of sleep disturbance to a cubic polynomial. His fitting solution is not monotonic: prevalence increases East and West of the Beijing meridian, where the prevalence is minimal (optimal). Yet, all meridians are equal; a prime meridian just signals a reference; no outcome can be associated with it. In other words, only a monotonic trend where the prevalence increases or decreases with PTZ would be meaningful.

PTZ is a nice explanatory variable as long as the daily rhythms are similar in the dataset, like is the case in USA [4] and Russia [5], but not in the Central European Time zone—that extends ~ 33° degrees from Poland and North Macedonia (East) to Spain (West)—, where the presumed impact of PTZ is mitigated by a gradient of daily rhythms that

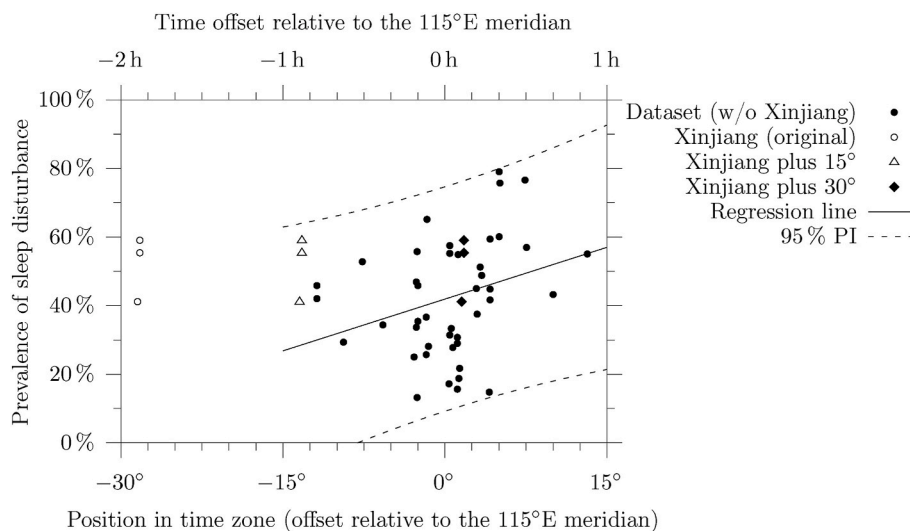


Fig. 1. The association of position in time zone vs the prevalence of the sleep disturbance in healthcare professionals in China. For the original data the association brings $p = 0.79$ and the null hypothesis “prevalence does not depend on position in time zone” sustains at the standard level of significance $\alpha = 0.05$. If Xinjiang data are moved 15°, or 1 h phase delay, then $p = 0.31$. If Xinjiang data were moved 30°, then $p = 0.044$; $R^2 = 0.09$ and the null hypothesis would not sustain. The slope would be 0.15 basis points of increase in the prevalence per 15° of change to the East. The regression line and the 95 % prediction interval are shown.

<https://doi.org/10.1016/j.sleep.2024.11.021>

Received 27 March 2024; Received in revised form 9 October 2024; Accepted 11 November 2024

Available online 13 November 2024

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shows early activity on the East side and late activity on the West side, following Earth's rotation [6]. China –60° wide East to West— likely shows the same pattern. We understand that life in the Xinjiang region is delayed relative to life in Beijing, following the delay in solar ephemerides. In Ref. [1, Fig. 1B], this would move Xinjiang data 15° to the East per 1 h delay, which brings a slight increase of the prevalence in sleep disturbance Eastward, as shown in Fig. 1.

CRedit authorship contribution statement

José María Martín-Olalla: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jorge Mira:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was not funded. Fig. 1B in Ref. [1] was digitized with WebPlotDigitizer 4.17 online version <https://apps.automeris.io/wpd/>. Code can be accessed in <https://github.com/automeris-io/WebPlotDigitizer/releases>.

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José María Martín-Olalla*

Universidad de Sevilla, Facultad de Física, Departamento de Física de la Materia Condensada, ES41012, Sevilla, Spain

Jorge Mira

Universidade de Santiago de Compostela, Facultade de Física, Departamento de Física Aplicada and iMATUS, ES15782, Santiago de Compostela, Spain
E-mail address: jorge.mira@usc.es.

* Corresponding author.

E-mail address: olalla@us.es (J.M. Martín-Olalla).