



No holding back

a novel perspective on the relationship between sleep loss and prejudice

Holding, Benjamin C.

Published in:
Sleep

DOI:
[10.1093/sleep/zsaa126](https://doi.org/10.1093/sleep/zsaa126)

Publication date:
2021

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):

Holding, B. C. (2021). No holding back: a novel perspective on the relationship between sleep loss and prejudice. *Sleep*, *44*(1), 1-3. <https://doi.org/10.1093/sleep/zsaa126>



JOURNAL CLUB TRAINEE REVIEW

No holding back: a novel perspective on the relationship between sleep loss and prejudice

Benjamin C. Holding^{*,[e](#)}

Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden

*Corresponding author. Benjamin C. Holding, Department of Clinical Neuroscience, Karolinska Institutet, 171 77 Stockholm, Sweden. Email: benjamin.holding@ki.se.

In an increasingly globalized and diverse world, it is perhaps no surprise that intergroup tensions and conflicts continue to be an important political issue. It remains crucial for researchers to investigate how prejudice and stereotypes develop, how they cognitively and behaviorally manifest, and ultimately what we can do to reduce them. An increasing body of work suggests that sleep has an important part to play in all of these topics.

Evidence has shown that sleep loss (and resultant sleepiness) are important predictors of cognition, motivation, and behaviors [1–3]. With sleep loss having such a broad range of impacts, it is logical, though perhaps not intuitive, that sleep loss has consequences for how we understand and respond to social information. Indeed, a number of reviews have now highlighted the depths that sleep loss reaches into our social lives [4–6].

One of the areas that sleep appears to influence is how we interpret social information, especially regarding social groups [7]. Already 30 years ago, a study found that participants were more likely to make stereotypical judgments at non-optimal times of day [8]. It was concluded that as sleepiness increases, it reduces the motivation and/or ability to process complex information, causing the individual to rely on cognitive shortcuts such as stereotypes. Later evidence continued to reveal similar effects. In a multi-study article [9], a positive correlation was repeatedly observed between sleepiness and prejudice (measured using diverse measures of stereotypes and racism). Interestingly, this correlation was moderated by the extent of implicit (i.e. non-conscious) bias towards a person. In individuals that tested as holding less implicit biases towards a specific outgroup, the effect of sleepiness was less strong. The theory proposed to explain this moderation effect was that insufficient sleep reduces inhibitory control, and that only individuals that need to control strong implicit biases are impacted by reduced inhibitory ability.

Adding another layer of complexity, implicit bias can also be impacted by sleep loss. Alkozei and colleagues [10] measured the effect of chronic sleep restriction (4 hours per night over 3 weeks) on scores on the Implicit Associations Test (IAT) [11]. The IAT assesses implicit stereotypical attitudes by assessing the speed at which certain words (Alkozei et al. used Arab-Muslim names) are associated with other words (Alkozei et al. used positive and negative valenced words). The results showed that implicit bias became stronger in the sleep-restricted condition. This finding was corroborated by a separate study conducted in police officers where day-to-day variation in sleep duration predicted implicit bias scores [12].

Overall, evidence suggests that sleep loss leads to increased intergroup bias and prejudicial behavioral responses. We also see that the extent of this association depends on the size of implicit bias towards the outgroup, and that implicit bias may be increased following sleep loss.

Zhang and colleagues [13] take a novel perspective on the relationship between sleep loss and intergroup bias. The authors introduce findings from social psychology revealing that even when implicit bias towards the outgroup is high, sharing a common social identity can reduce how much one stereotypes the behaviors of the outgroup. The context of the paper is the prejudice commonly expressed in Hong Kong against Mainland Chinese. While the two are technically the same country, Hong Kong has an independent political and cultural history. This has led to the Hong Kong population commonly holding prejudicial attitudes regarding the Mainlanders. However, there are variations in how much the Hong Kong population see themselves as Chinese. The authors suggest that people from Hong Kong, who also see themselves as Chinese, would report lower

Submitted: 16 March, 2020; Revised: 22 June, 2020

© Sleep Research Society 2020. Published by Oxford University Press on behalf of the Sleep Research Society.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

outwards prejudice to Mainlanders. Zhang et al. proposes that the buffering effect of common ingroup will be decreased following sleep loss. Therefore, rather than focusing on the effect of sleep loss on changing implicit bias (though it does assess this), the emphasis of the study is on the changing ability to exert self-control over implicit bias. The authors argue that sleep deprivation would decrease the ability to exert self-control over implicit bias, but that this should only happen to those who are motivated to hold their biases back (i.e. those who identify more as Chinese).

The article consists of two separate studies. The first is a cross-sectional study of 171 participants. Habitual sleep was measured using the Pittsburgh Sleep Quality Index (PSQI) [14], asking participants about their average sleep over the prior month. Only the sleep duration item was used for the analyses, potentially a proxy of poor validity since responses were only given in hours and did not account for sleep latency or awakenings. It is also a shame that other aspects of the PSQI were not reported such as sleep quality or daytime dysfunction. While the authors report that previous research has “mostly focused on the deprivation of sleep time instead of disturbance of sleep quality,” it would nonetheless be interesting to know whether related constructs also show a similar pattern of results. Participants reported how much they identified as “Chinese” on a seven-item questionnaire and completed two measures of prejudice. Firstly, measuring explicit prejudice, the Behaviour Attribution Bias Task [15] required participants to report whether certain positive/negative behaviors (e.g. “defended a friend who had been insulted”) were conducted by Mainland Chinese or Hong Kong people. Secondly, implicit prejudice was measured using a modified version of the IAT [11].

Study 2 was a between-subjects total sleep deprivation experiment in 67 participants (control $N = 34$). It was not clear from the paper how the assignment of conditions occurred, and if not randomized, this could be a source of bias in the results. The measures used were identical to those in Study 1.

The results of Study 1 revealed that all participants showed an implicit bias against Chinese Mainlanders, and that this score was not correlated with sleep duration. Investigation of the scores on the Behaviour Attribution Bias Task revealed that there was a general explicit prejudice against Chinese Mainlanders. However, greater self-identity as Chinese appeared to reduce the prejudicial bias against Mainlanders. Most crucially, the association between self-identity and prejudice was reduced if participants had shorter sleep duration.

The results of Study 2 again revealed that participants showed an implicit bias against Chinese mainlanders and was similar both before and after sleep deprivation. Scores on the Behaviour Attribution Bias Task showed a general bias against Mainland Chinese. Similar to Study 1, the extent of this bias was predicted by one's Chinese self-identity. Again, the crucial result was that this association was moderated by sleep condition (though missing the $p = 0.05$ threshold - a red flag for a non-robust effect). Following the pattern seen in Study 1, Chinese identity was a negative predictor of the bias score only in the control group. In sleep-deprived participants, Chinese identity no longer seemed to reduce explicit prejudice.

Overall, the authors observe that sleep loss leads to a reduced buffering effect of common ingroup identity against intergroup bias. In explaining the mechanism of this effect, the authors lean on two theories. Firstly, the authors cite “consistent” evidence

that negative emotional reactivity is increased due to a decrease in connectivity between the prefrontal cortex and amygdala. However, despite the original study being well cited [16], studies are not always able to replicate this finding [17]. The authors also introduce ego-depletion as a potential mechanism for the effect, where sleep deprivation reduces the ability to deplete mental resources. While this may be true, the concept is diffuse and indeed well debated [18], and its usefulness as an explanatory theory of the sleep loss effect is questionable. Nonetheless, the evidence showing that inhibition control is decreased following sleep loss appears robust [19], so the question mark relates more to the mechanism of self-control rather than the effect.

A further issue specific for Study 1 is that being a habitual long or short sleepers (the sleep questionnaire asked participants about their sleep on average over the previous month) does not necessarily represent differences in sleep sufficiency. It is very possible that differences between habitual long and short sleepers have a dispositional etiology. Perhaps a more valid method would have been to ask participants about their sleep duration on the night prior to testing. It also makes their conclusion, “how much one sleeps every day (habitual sleep) may shape the nature of intergroup bias” (Zhang et al. [13], p. 8), more problematic since the effects of day-to-day sleep have not been tested. Additionally, there was no reported control for participant insomnia or mental health state, providing a further avenue for confounding bias in the data for Study 1.

There are also important problems to consider with both the implicit and explicit measures of intergroup bias used in the study. The IAT is increasingly criticized within social psychology, with one of the main criticisms being that it is a poor predictor of real-world behavior [20]. Though since no better alternatives exist, it seems pragmatic to continue to utilize the measures that exist (even with their drawbacks). The Behaviour Attribution Bias Task suffers from the problem that it is a zero-sum task. By attributing less negative behaviors to Mainland Chinese, one must attribute them instead to Hong Kong people. The direction of effects could therefore be the reversed, such that sleep loss in high Chinese-identifying participants is instead increasing a negative bias against Hong Kong people. A similar thought experiment is that perhaps the effect is driven by low Chinese-identifying participants becoming less biased following sleep loss. Scatter plots of the linear relationship between the bias scores and sleep length in both studies highlight this as a possibility.

The study has a number of strengths that are worthwhile highlighting. It was beneficial that the authors had conducted post hoc power analyses to show that both studies had enough power to show medium-sized effects, though it was initially unclear what effect size would have been expected in this study. Another strength was that the authors also included binomial models in the supplement, which was a useful way of highlighting the sensitivity of the results.

In a broader context, this paper joins a burgeoning research field which is revealing the many important relationships between sleep and human social functioning. However, the field also needs to consider whether effects of total sleep deprivation indeed have meaningful implications for individual social interactions or societal functioning. Assuming lesser sleep loss results in smaller effect sizes, as would be expected following a dose-response model, we would expect a fairly minimal impact of sleep loss on the ability to reduce prejudice (given that Zhang

and colleagues reported a small–medium size effect following total sleep deprivation). The amount of variation in the data (as can be seen in figures 1c and 2a) also exemplify the difficulties in understanding the implications of such studies that do not fall flat in the face of the ecological fallacy. The bottom line is that the field is in dire need of studies that attempt to get closer to the types of sleep disturbance and social behavior in which we are attempting to make conclusions about.

In summary, this paper provides a valuable addition to the research linking sleep loss to prejudicial behaviors, as well as the broader body of work linking sleep to social cognition/behavior. Hopefully, the authors will continue with their work to understand the negative consequences of sleep disturbance so we can understand whether sufficient sleep is a robust method to buffer intergroup bias, especially as it holds potential practical implications.

Conflict of interest statement. None declared.

References

1. Killgore WDS. Effects of sleep deprivation on cognition. *Prog Brain Res.* 2010;**185**:105–129. doi: [10.1016/B978-0-444-53702-7.00007-5](https://doi.org/10.1016/B978-0-444-53702-7.00007-5).
2. Axelsson J, et al. Sleepiness as motivation: a potential mechanism for how sleep deprivation affects behavior. *Sleep.* 2020;**43**(6). doi:[10.1093/sleep/zsz291](https://doi.org/10.1093/sleep/zsz291).
3. Mullins HM, et al. Sleepiness at work: a review and framework of how the physiology of sleepiness impacts the workplace. *J Appl Psychol.* 2014;**99**(6):1096–1112.
4. Holding BC. *Too Tired to Talk? Sleep, Fatigue, and Social Functioning.* Stockholm, Sweden: Karolinska Institutet; 2019. <http://hdl.handle.net/10616/46899>. Accessed March 16, 2020.
5. Gordon AM, et al. The social side of sleep: elucidating the links between sleep and social processes. *Curr Dir Psychol Sci.* 2017;**26**(5):470–475.
6. Beattie L, et al. Social interactions, emotion and sleep: a systematic review and research agenda. *Sleep Med Rev.* 2015;**24**:83–100.
7. Sundelin T, et al. Sleep and social impressions. In: *Sleep, Personality, and Social Behavior.* Cham, Switzerland: Springer International Publishing; 2019: 119–133.
8. Bodenhausen GV. Stereotypes as judgmental heuristics: evidence of circadian variations in discrimination. *Psychol Sci.* 1990;**1**(5):319–322.
9. Ghumman S, et al. Sleep and prejudice: a resource recovery approach. *J Appl Soc Psychol.* 2013;**43**(suppl. 2):E166–E178.
10. Alkozei A, et al. Chronic sleep restriction increases negative implicit attitudes toward Arab muslims. *Sci Rep.* 2017;**7**(1):4285.
11. Greenwald AG, et al. Understanding and using the implicit association test: I. An improved scoring algorithm. *J Pers Soc Psychol.* 2003;**85**(2):197–216.
12. James L. The stability of implicit racial bias in police officers. *Police Q.* 2018;**21**(1):30–52.
13. Zhang J, et al. Sleep deprivation undermines the link between identity and intergroup bias. *Sleep.* 2020;**43**(2). doi:[10.1093/sleep/zsz213](https://doi.org/10.1093/sleep/zsz213)
14. Buysse DJ, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;**28**(2):193–213.
15. Hong YY, et al. Predicting intergroup bias: the interactive effects of implicit theory and social identity. *Pers Soc Psychol Bull.* 2004;**30**(8):1035–1047.
16. Yoo SS, et al. The human emotional brain without sleep—a prefrontal amygdala disconnect. *Curr Biol.* 2007;**17**(20):R877–R878.
17. Tamm S, et al. Sleep restriction caused impaired emotional regulation without detectable brain activation changes—a functional magnetic resonance imaging study. *R Soc Open Sci.* 2019;**6**(3):181704.
18. Frieze M, et al. Is ego depletion real? An analysis of arguments. *Pers Soc Psychol Rev.* 2019;**23**(2):107–131.
19. Lowe CJ, et al. The neurocognitive consequences of sleep restriction: a meta-analytic review. *Neurosci Biobehav Rev.* 2017;**80**:586–604.
20. Oswald FL, et al. Using the IAT to predict ethnic and racial discrimination: small effect sizes of unknown societal significance. *J Pers Soc Psychol.* 2015;**108**(4):562–571.