



Deposited via The University of Sheffield.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/127111/>

Version: Accepted Version

Proceedings Paper:

Matthews, R. and Reynolds, C.J. (2017) The market value of sleep: using economic input-output analysis to shift society's views on sleep loss. In: Sleep Medicine. 14th World Sleep Congress, 07-11 Oct 2017, Prague, Czech Republic. Elsevier, e215-e215. ISSN: 1389-9457. EISSN: 1878-5506.

<https://doi.org/10.1016/j.sleep.2017.11.629>

Article available under the terms of the CC-BY-NC-ND licence
(<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

Reuse

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND) licence. This licence only allows you to download this work and share it with others as long as you credit the authors, but you can't change the article in any way or use it commercially. More information and the full terms of the licence here: <https://creativecommons.org/licenses/>

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

Title: THE MARKET VALUE OF SLEEP: USING ECONOMIC INPUT-OUTPUT ANALYSIS TO SHIFT SOCIETY'S VIEWS ON SLEEP LOSS

Author(s): R. Matthews^{1,2,3}, C. Reynolds⁴

Institute(s): ¹*Department of Clinical Neuroscience, Karolinska Institute, ²Stress Research Institute, Stockholm University, Stockholm, Sweden, ³Appleton Institute, Adelaide, Australia, ⁴Department of Geography, University of Sheffield, Sheffield, United Kingdom*

Text: Introduction:

Modern society is driven by economic profit and output. Sleep loss is considered to impact profit and output via fatigue related accidents. However, the consequences of sleep loss are not limited to these short term performance decrements. Sleep loss also impacts physical and mental health, contributing to the prevalence of many diseases and social issues. These burden society with increased medical and social welfare costs. Fatigue Risk Management Systems and prescriptive legislation do not directly address these consequences. Sleep education programs do aim to address these issues but to initiate wide reaching change to society's relationship with sleep what may be needed is a complete shift to how society values sleep. Thus, as a call to arms to other sleep scientists to creatively consider ways of shifting society's views on sleep, we posed a series novel questions.

Given that modern society is driven by economic profit and output we asked 'Could sleep loss be factored into the economy, could we assign a monetary value to sleep loss, and could sleep loss be linked to industry output?' Furthermore, if we could do this, how would it look, what would the market value of a minute of sleep be, and how would this price differ between industries?

Materials and methods:

Data collected in the Australian Bureau of Statistics' 2011-12 Australian Health Survey was used for analysis. Economic Input-Output (IO) analysis was chosen to calculate a cost 'footprints' of production within 19 industry sectors of the Australian economy. Next, sleep loss was considered a 'recourse' of an industry's production which allowed for the calculation of the value of a minute of sleep, and the amount of sleep lost per dollar spent on products in each industry.

Results:

Calculating the dollar amount associated with sleep duration allowed for comparisons of the price that each sector would pay for sleep at the current market value. The industry sector that valued the sleep of its employees the highest were Real Estate (\$465 dollars earned per minute slept) and Manufacturing (\$285), with the lowest being Health (\$6).

The amount of sleep lost per dollar spent within each Australian industry was also calculated. The largest sleep loss impacts were found in the Transport industry sector, where every thousand dollars spent resulted in 86 minutes of lost sleep. In total, Australian household consumption is responsible for 16 billion minutes of sleep lost per year, with the Manufacturing sector contributing the largest amount: 3.1 billion minutes (19%) of lost sleep.

Conclusions:

These metrics identify industries that have moderate sleep loss in their workforce, as well as others industries that have a well slept workforce but have prevalent sleep loss in their supply chain. The findings can be used to encourage consumers and businesses to reevaluate sleep, and work towards a well-rested, healthy, and safe society. While we are not advocating for a 'sleep tax' to be imposed on industries, we are advocating for creative ways to challenge society's largely poor relationship with sleep.