Is There an Association Between Nicotine Usage and Sleep Quality?

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Introduction

- Nicotine dependency and addiction are problems rampant in young adult communities as its already additive effects are amplified by the adolescent brain with adolescents reporting symptoms of dependence at low levels of cigarette consumption compared to adults. (CDC, *Youth and Tobacco Use* 2020)
- Nicotine usage in young adults is an epidemic with the CDC estimating that about 1 of every 13 Americans 17 years old or younger who are alive today will die early as a result of a smoke related illness. (CDC, *Youth and Tobacco Use* 2020)
- Sleep problems affect up to 40% of the general population. An estimated 50 to 70 million Americans suffer chronically from sleep dysregulation which impedes their daily functions and negatively impacts both their short- and long-term health. (Colten, *Extent and health consequences of chronic sleep loss and sleep disorders 1970*)
- Poor sleep negatively affects each aspect of one's life and can cause severe public health problems with mortality, morbidity, performance (in work and school), accidents and injuries, functioning and quality of life, family well-being. (Colten, *Extent and health consequences of chronic sleep loss and sleep disorders 1970*)
- Adolescents need around nine hours of sleep a night, and only 15% of students report getting 8.5 hours or more on school nights. (Colten, *Extent and health consequences of chronic sleep loss and sleep disorders 1970*)

Research Questions

- Is there an association between the number of cigarettes smoked a day and the typical hours of sleep a night received?
- Is there an association between the number of cigarettes smoked a day and the typical hours of sleep a night received when controlling for biological sex?

Methods

Sample

- The data used in this project was drawn from the first wave of the National Longitudinal Study of Adolescent Health, or Add Health, is a nationally representative sample of over 20,000 adolescents in grades 7-12, over multiple racial backgrounds, in the United States.
- N= 6,428, female=3,115 and male= 3,333

Measures

- The number of cigarettes smoked a day was recorded quantitatively.
- The typical sleep hours responses were recorded quantitatively.
- Biological sex was recorded dichotomously with the possible answers being “female” and “male”.

Results

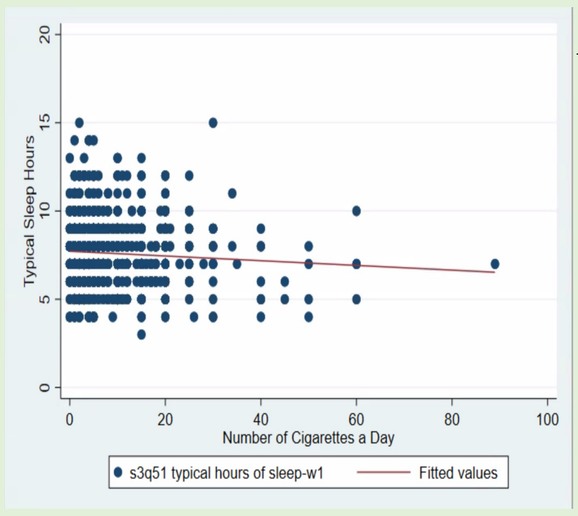
Univariate

- The most frequent response for sleep hours was 8 hours (37.90%).
- 96.67% of respondents reported smoking between 1 and 20 cigarettes per day. The majority of respondents reported smoking 1 cigarette a day (22.32%).
- 48.46% of respondents were female and 51.85% of respondents were male.

Bivariate

- A Pearson correlation test showed that there is a **negative correlation** between the number of cigarettes smoked a day and the typical hour of sleep interviewees received r= -0.37, p=.0039 (Figure 1)
- A linear regression analysis showed that there is a negative association between the number of cigarettes smoked a day and the typical hour of sleep interviewees received p=.004, Beta= -.013, Cl -.022-.043 (Figure 1)
- Generally, the more cigarettes respondents smoked, the less sleep they got.

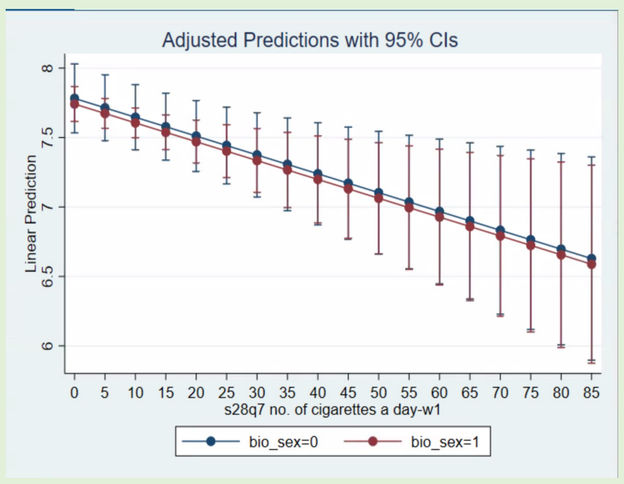
Figure 1. Typical Nightly Hours of Sleep by Amount Cigarettes Smoked Daily



Multivariate

- After controlling for biological sex there is a significant association between the number of cigarettes smoked a day and the typical hours of sleep received per night, despite being a small difference (Beta=0.-.0134, p=0.004, Cl=-.23- .045. (Figure 2)
- This adjusted predictions graph reveals that while there is little difference in the amount of sleep someone gets if they smoke between one cigarette and a pack of cigarettes a day, there *is* more than a 10% reduction in sleep when 85 or about four packs are smoked a day.

Figure 2. Adjusted Predictions: Typical Nightly Hours of Sleep by Amount Cigarettes Smoked Daily by Biological Sex



Discussion

- These results align with my literature review. It appears that through multiple populations, there is consistent evidence that the number of cigarettes smoked a day **does** affect the amount of sleep one gets per night.
- This research could be expanded by looking into the association between sleep and other types of nicotine products like e-cigarettes, nicotine gum and patches, tobacco, vapes, etc. A limitation of this study is that there are several unregulated ingredients in cigarettes. Perhaps if other nicotine products were researched it would be easier to conclude that nicotine is consistently the factor that causes this association.

Colten, H. (1970, January 01). Extent and health consequences of chronic sleep loss and sleep disorders. Retrieved March 19, 2021, from https://www.ncbi.nlm.nih.gov/books/NBK19961/
Dugas EN;Sylvestre MP;O'Loughlin EK;Brunet J;Kakinami L;Constantin E;O'Loughlin J;. (2016, October 25). Nicotine dependence and sleep quality in young adults. Retrieved March 19, 2021, from https://pubmed.ncbi.nlm.nih.gov/27816041/
Goriounova, N., & Mansvelder, H. (2012, December 1). Short- and long-term consequences of nicotine exposure during adolescence for prefrontal cortex neuronal network function. Retrieved March 19, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3543069/
Home. (n.d.). Retrieved March 21, 2021, from https://addhealth.cpc.unc.edu/
Homeostasis. (n.d.). Retrieved March 19, 2021, from httpswd://www.britannica.com/science/homeostasis
Hu, M., Kandel, D. B., & Davies, M. (2011). The American Journal of public Health (AJPH) from the American public Health Association (apha) publications. Retrieved March 19, 2021, from https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2004.057232
I S Sobczak, A., A, C., & J Stewart, A. (2019, August 28). Changes in plasma free fatty acids associated with type-2 diabetes. Retrieved March 20, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6770316/
Kutlu, M., Parikh, V., & GoBlindaueruld, T. (2015). Nicotine addiction and psychiatric disorders. Retrieved March 20, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5755398/
Mishra, A., Chaturvedi, P., Datta, S., Sinukumar, S., Joshi, P., & Garg, A. (2015). Harmful effects of nicotine. Retrieved March 19, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4363846/
Nicotine dependence. (2020, March 14). Retrieved March 19, 2021, from https://www.mayoclinic.org/diseases-conditions/nicotine-dependence/symptoms-causes/syc-20351584
Nicotine. (2020, December 1). Retrieved March 19, 2021, from https://adf.org.au/drug-facts/nicotine/
Products, C. (2020, August 28). Nicotine: The addictive chemical in tobacco products. Retrieved March 19, 2021, from https://www.fda.gov/tobacco-products/health-information/nicotine-addictive-chemical-tobacco-products
Youth and Tobacco Use. (2020, December 16). Retrieved March 19, 2021, from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm
Wiener RC;Waters C;Bhandari R;Trickett Shockey AK;Alshaarawy O;. (2020, February 29). The Association of Sleep Duration and the Use of Electronic Cigarettes, NHANES, 2015-2016. Retrieved March 19, 2021, from https://pubmed.ncbi.nlm.nih.gov/32190389/