The Relationship of Sleep and Income on Education

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Abstract / Introduction

The relationship between good health and sleep duration has been clearly established by various meta-analyses and epidemiological studies , although exactly which variables and how much they influence sleep duration has yet to be statistically examined. In this research project, we wanted to focus on the specific differences in sleep among various levels of reported income and education. Although the association between enhanced cognitive performance and sleep duration is clearly evident, a quantification of sleep time among different socioeconomic and education levels was performed to better understand the discrepancies among our levels of treatment.

The National Longitudinal Study of Adolescent to Adult Health, Wave IV (ADDHEALTH) was used as a database in R Studio v3.4.1 to conduct our analysis upon sleep. Adequate sleep optimally impacts mental functioning and therefore impacts students' performance on examinations and ultimately grades received (Zeek, et al. 2015). In youth, more sleep is consistently associated with better grades in school, and sleep quality and quantity are closely related to student learning and academic performance (Asarnow, et al. 2014). Suboptimal sleep duration has a strong association with mortality and morbidity; hence there is a need to more clearly understand the mechanisms involved in regulating sleep duration and patterns and to identify high-risk individuals who are in greatest need of preventive strategies (Bixler, 2009). We hypothesized seeing a negative association between sleep duration and higher levels of education and income. From this information, we hope to raise a greater understanding about sleep health in profession and academic cultures.

Research Questions

- Is there an association between the time someone wakes up and the maximum level of education received?

- Does the addition of income moderate the relationship between gender and highest level of education achieved?

Methods

- •Study began with the public use of ADDHEALTH data WAVE IV
- •ADDHEALTH is a survey based study aimed to start with adolescence
- •WAVE IV was conducted in 2008
- •After accounting for missing data we were left with 5114 respondents
- •Birth years range from 1974-1983, with 1979 being the average
- The time somebody wakes up for work in the morning is used as an estimate for the amount of hours slept, due to the varying nature of when adults go to bed

Table 1. Major variables used for analysis with their N (sample size) and percentage. Quantitative variables contain mean, median, and SD (standard deviation).

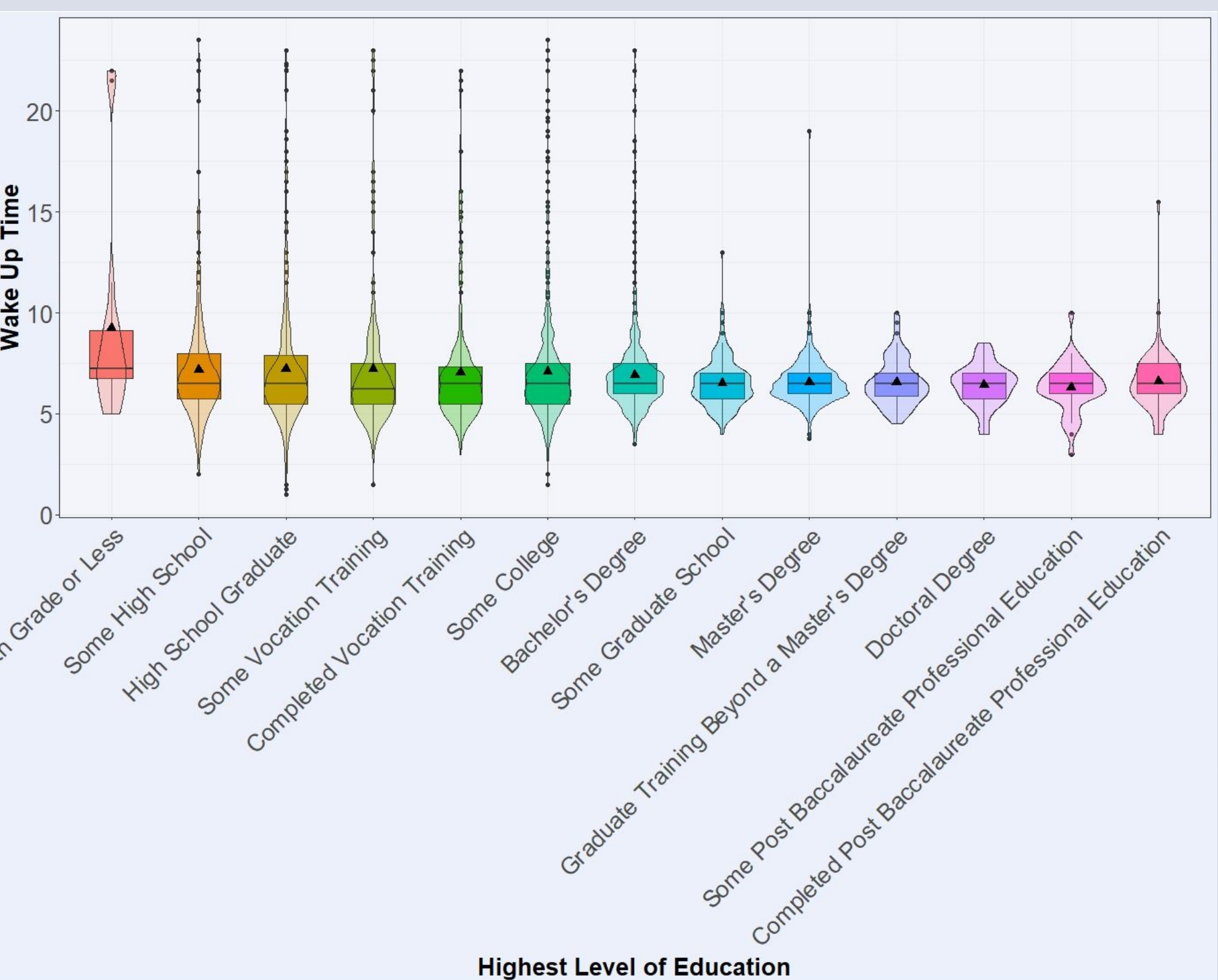|		N	%
Income	Less than $50K	2186	46
	$50K or More	2575	54
Gender	Male	3147	48
	Female	3356	52
		N	
Highest Level of Education Earned		5114	
	Mean	Median	Quartile Range
Wake Up Time	7:01 am	6:30 am	q1= 5:45 am q3= 7:30 am

Results
Bivariate Analysis

Figure 1. A bivariate violin box plot visualizing levels of education on the X-axis and wake-up time on the Y-axis.
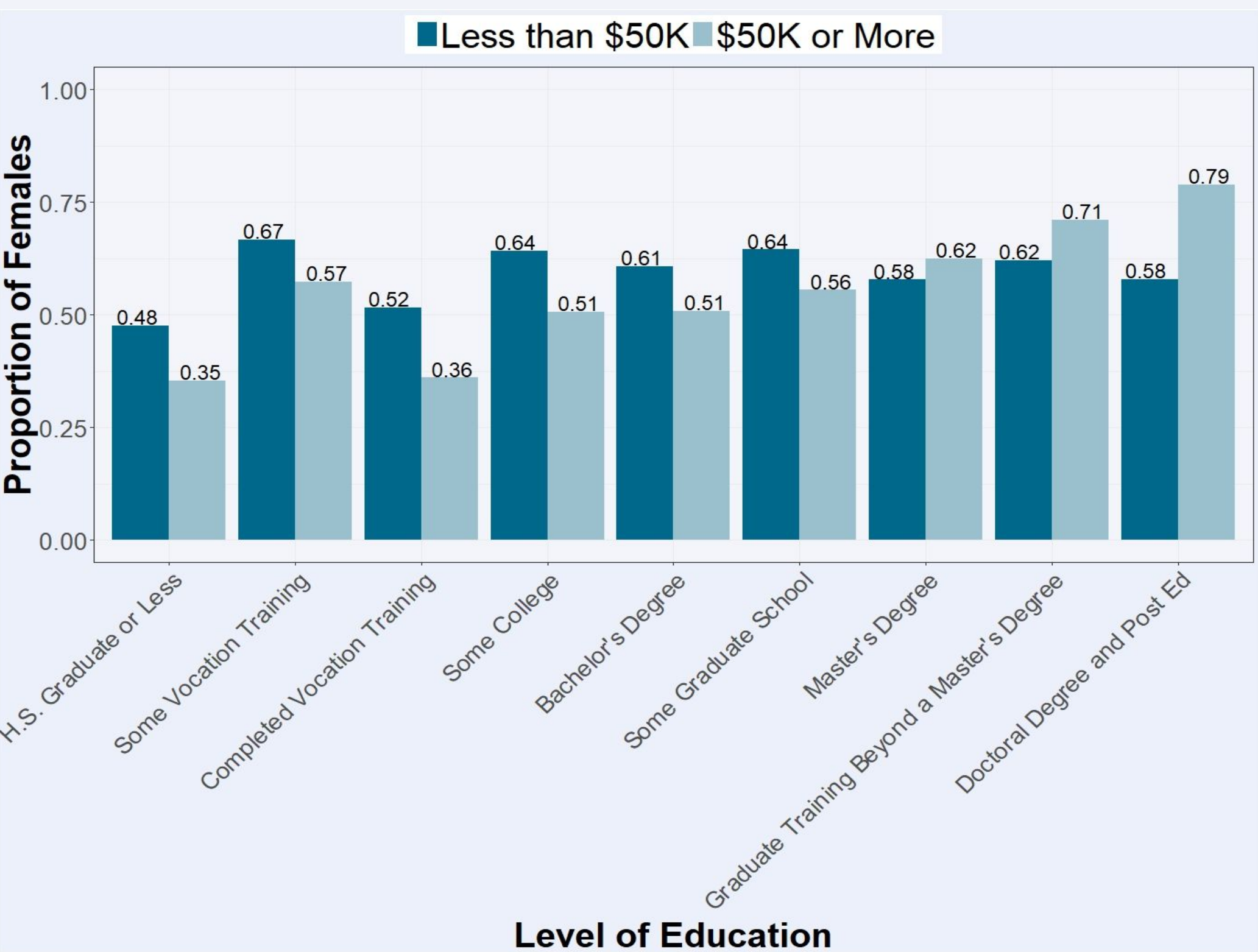
Moderation Analysis

Figure 2. A multivariable grouped bar graph explaining the level of education received among females that make less than $50,000 a year compared to those that make $50,000 or more.

Discussion

Bivariate Discussion
- The explanatory variable is highest education level that one has received and the response variable is the time a person wakes up on week days or work days.

- An ANOVA test was conducted between these variables and found a statistically significant correlation (p-value <0.0001). We can reject the fact that there's not a relationship between the time people wake up during work days and the level of education they have received.

- Looking at the violin plot, there's a slight difference in the highest average wake up time versus those who have received a lower education degree than those who have received higher education degrees.

Moderation Discussion
- The explanatory variable is highest level of education achieved and the response is the proportion of females. The moderator being tested is household income. Specifically those people that make less than $50K or $50K or more per year.

- A Chi Square analysis revealed that the relationship between gender and highest level of education achieved is significant in both the original and stratified model (p-value in original model is <0.0001 and p-values on both income categories in the stratified model is <0.0001).

Implications

- The implications that ours and other research suggests is a statistically significant lack of sleep within professional and academic communities (R Studio Team, 2015) that needs to be addressed.

- Sleep deprivation is a dangerously overlooked epidemic within these cultures and should be addressed on various fronts (Bixler, 2009).

- A smarter, more sleep-aware working culture is important for creating healthier and more sustainable lifestyles that will promote greater efficiency and productivity and ultimately a brighter future.

References

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