



The Relationship between Sleep Disturbance and Mental Health

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INTRODUCTION

Sleep disturbance is a symptom that is commonly encountered in many psychiatric illnesses that affects their progression. Morbidity studies have demonstrated that insomnia and sleep disturbance, characterized by difficulty falling asleep and/or staying asleep, are associated with an increased risk of major depressive disorder (MDD) and anxiety disorders (Baglioni, C., 2011). Studies show that people who have trouble sleeping are more likely to be negatively impacted health wise. The general field consensus is that further research and replication is needed, specifically towards deciding if sleep disturbances can be a cause of mental health problems, or just a factor that makes pre-existing disorders even worse. A broader age range also needs to be included in future studies, as most currently only involve young adults. With so many correlations between mental health issues and sleep quality, it seems pertinent to start analyzing sleep patterns and figure out methods to improve sleep quality among those with and without mental health issues alike.

Being young adults in college, we chose topics from Addhealth that are relatable. Trouble sleeping, or unhealthy sleep patterns are probably the most common occurrence besides anxiety and depression for students, which is what led us to asking ourselves, “How do certain sleep patterns affect a person? Are sleep issues related to mental health issues like depression, and can certain sleep patterns be a precursor to bipolar disorder, or do they just exacerbate them?” The data available within the Addhealth survey and our own curiosity led us to question:

“Is there a relationship between sleep disturbance and mental health, namely depression?” (We hypothesize yes)

SAMPLE CHARACTERISTICS

- ❖ This research uses the National Longitudinal Study of Adolescent to Adult Health (Addhealth), a study of a nationally representative sample of adolescents grade 7-12 in the U.S. during the 1994-95 school year.
- ❖ The survey has followed respondents “into young adulthood with 4 in-home interviews, the most recent completed in 2008.” Our data is from Wave IV, the 2008 survey.

Table 1. Characteristics of key variables

Variable		Variable	
Trouble Falling Asleep Frequency N=5,145(79%)	47.4% Never in 4 weeks	Snore, N=5,053 (77%)	51.4% do, 48.6% don't
	18.8% < Once a week	Depression N=5,113(78.6%)	29.3% Depressed, 70.7% Never or Rarely
	18.0% 1-2 times/week	Age, N= 6,503(100%)	30.5 yrs (sd=1.58)
	8.0% 3-4 times/week	Gender, , N= 6,503(100%)	48.4% M, 51.6% F
	8.1% 5+ times/week	Smoking Status, N=5,057(77.8%)	63.3% Non, 36.7% Smoker
Trouble Staying Asleep Frequency N=5,067(77.9%)	44.2% Never in 4 weeks	Functional Ability related to Tiredness, N= 4,267(65%)	65.6% at least sometimes too tired to function, 34.4% never or rarely
	17.1% < Once a week		
	17.1% 1-2 times/week		
	9.9% 3-4 times/week		
	11.8% 5+ times/week		

- ❖ **Depression Variable:** Combined two variables, one asking if participant is diagnosed depressed, the other being a scale of frequency of feeling depressed that month. If score > 2, the participant is depressed.

ANALYSIS METHODS

- ❖ Some ordinal categorical variables were split into binary categories for testing purposes, such as turning a sleep disturbance or mental health question into “event/non-event”.
- ❖ All of the mental health, personality, and sleep variables we used for research were categorical.

Moderation Testing:

- ❖ We tested the relationship between trouble staying asleep and depression, and the relationship between trouble falling asleep and ability to function the next day, considering snoring/not snoring, gender, and smoking/not smoking as potential moderators.
- ❖ We did not test the relationship between trouble falling asleep and depression with the potential moderators, as we assumed we would get the same results as the moderation test for trouble staying asleep and depression, since the two relationships are almost identical.

Confounder Testing:

- ❖ We tested the relationship between trouble falling asleep and depression, and the relationship between ability to function after poor sleep and depression, considering smoking status as a confounder.
- ❖ Like with moderation, we did not test smoking as a confounder on the relationship between trouble staying asleep and depression, for the same reason as before.

Final Model: Also included income(categories with smallest being less than \$5,000 annually and max being \$150,000+) and BMI to be tested for their effect on the relationship between sleep disturbance and depression.

RESULTS

- ❖ **Our results support the hypothesis that there is a relationship between sleep quality and mental health, namely depression.**
- ❖ **Those who are struggling to sleep 3-4 times/week are 3.57 times more likely to be depressed, and 3.7 times more likely for 5+ times/week. These results are similar to odds ratios from Baglioni (2011).**
- ❖ **We’ve concluded that frequent sleep disturbance plays a significant role in determining depression, we see that as one struggles to fall/stay asleep more often and sleep quality declines, the likelihood that one will begin to become depressive and lose ability to function as a result significantly increases as well.**
 - ❖ This comes after controlling for the effect that smoking, gender, BMI, income, and other sleep factors like snoring also have on the relationship through a multivariable model.

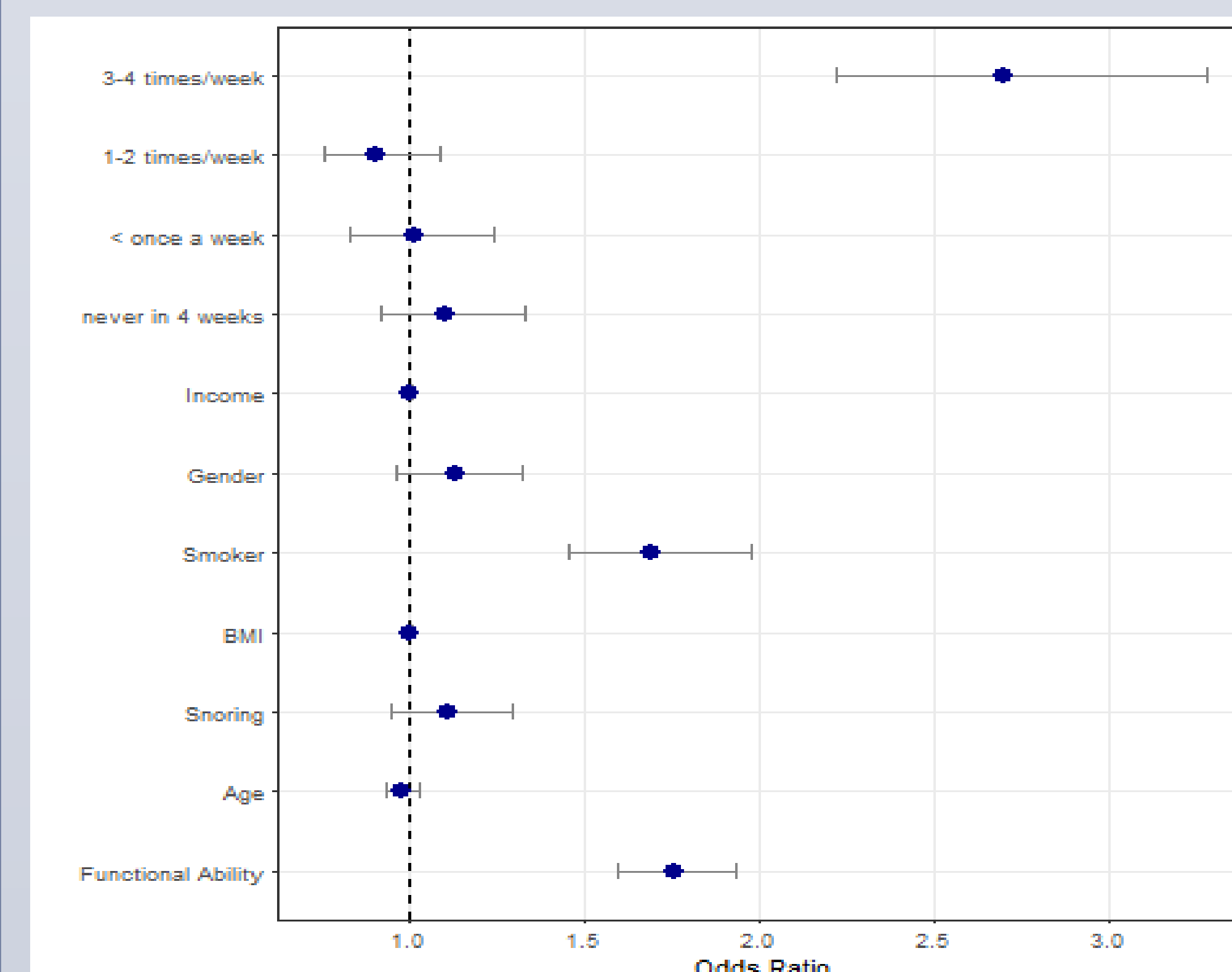


Figure 1. Odds ratios for the 5+ times/week sleep disturbance-depression model

- ❖ Snoring and gender were very clearly NOT moderators, having no impact at all on the test statistics ran.
- ❖ Smoking seemed to have some moderating effect, but not enough to warrant controlling for (p values still < .0001, differences in proportions didn’t change relationship direction and/or strength).
- ❖ Although smoking status was NOT a confounder since all relationships were still significant and strong when controlling for it, we found that being a smoker is almost as strong of a predictor for depression as some sleep variables (1.86 times more likely to be depressed if a smoker).
- ❖ From the logistic model, large (insignificant, all at least > .13) p-values for age, snoring, BMI, and the 3 least-frequent sleep disturbances suggests that those variables are not associated with changes in the probability of being depressed. Gender was almost significant (p=.06).
- ❖ Income, perceived functional ability, and smoking were two variables with significant p-values (< .0001), we can conclude that changes in income or smoking habit can change the probability of being depressed.

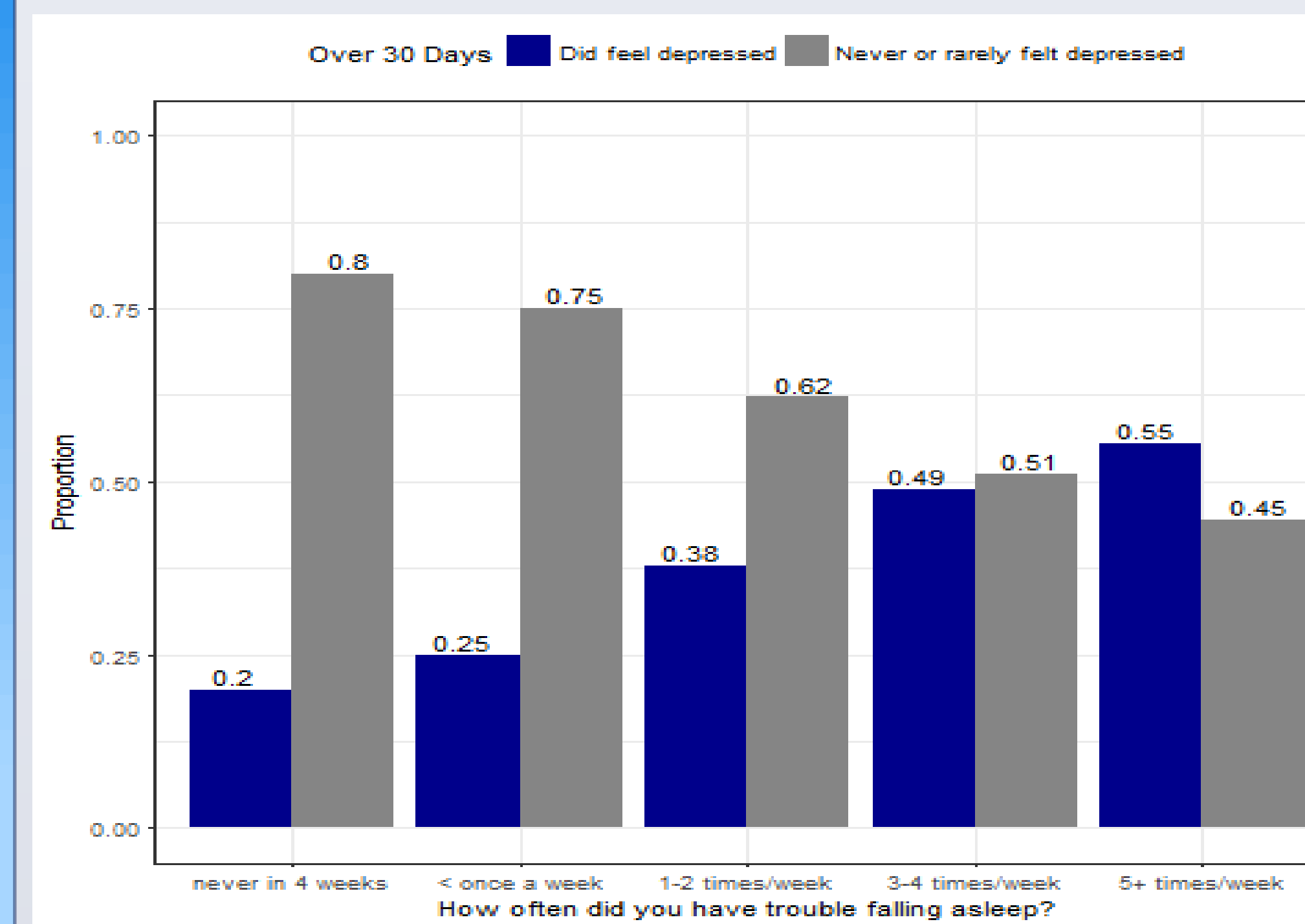


Figure 2. Proportion of depression by sleep disturbance frequency (p < .0001)

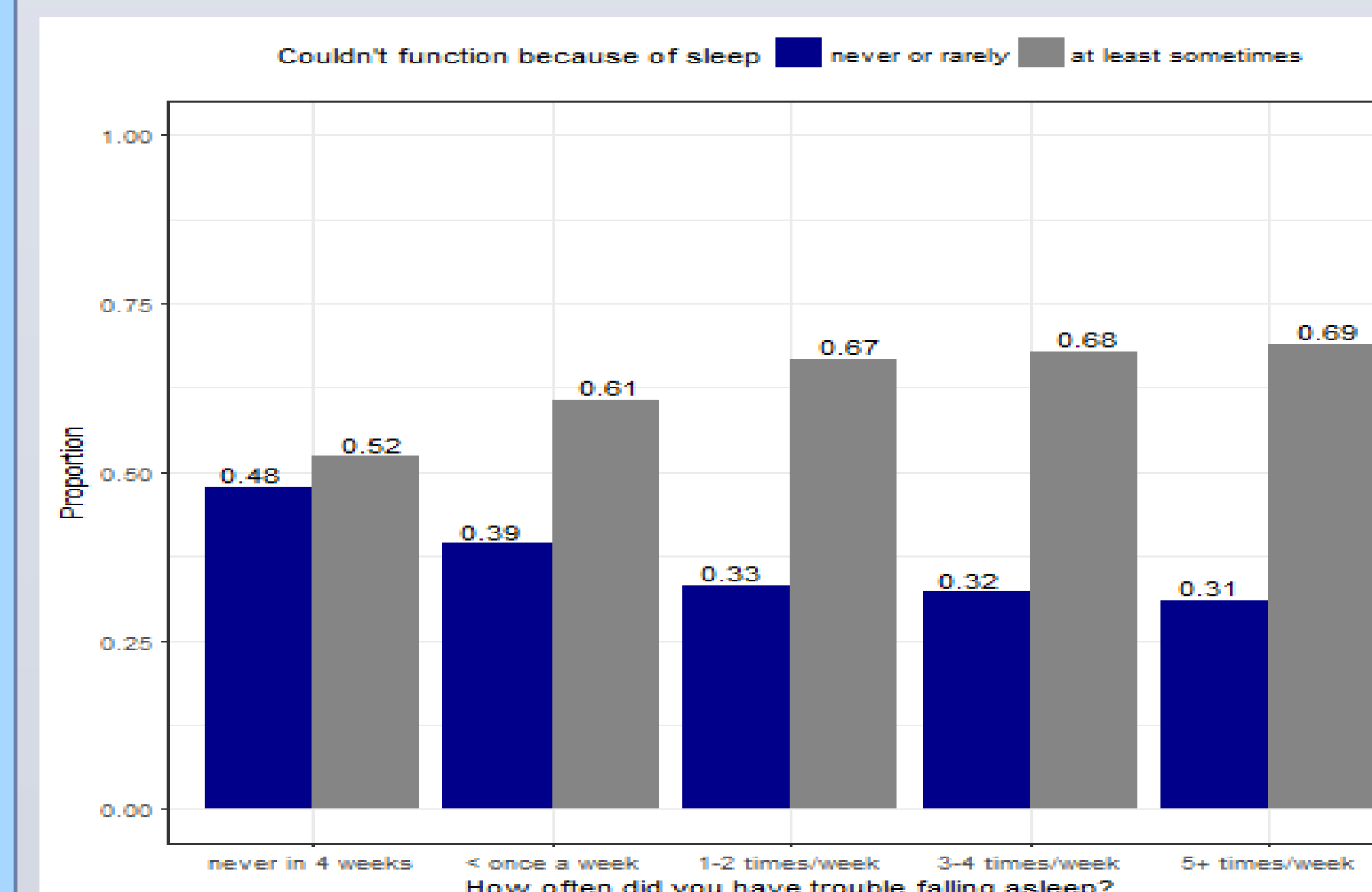


Figure 3. Proportion of reported malaise by sleep disturbance frequency (p < .0001)

- ❖ Figures 2 and 3 show that depression increased 35% from no sleep disturbance to 5+ times/week, and functional ability decreased 17%.
- ❖ Differences in depression were significant across all levels of disturbance aside from 3-4 times/week vs 5+. The same goes for functional ability except 1-2 times/week vs. 3-4 times, and 3-4 times vs. 5+.

DISCUSSION

- ❖ While there are other factors that play as much or more of a role in leading to depression, and we can’t definitively say “if you don’t sleep well you’ll 100% be depressed”, it is clear that the more poorly you sleep, the more you will feel out of shape mentally in more ways than one.

- ❖ From Nyer, M., et al. (2013) and “Sleep and Mental Health” we learned that this relationship between sleep and depression may go both ways, as people who already have depression tend to exhibit worse symptoms and functional impairment when struggling to get quality sleep, and that treating sleep disorders can alleviate symptoms of mental health diseases.

- ❖ We have come to the same conclusion as Dag, B., & Kutlu, F. Y. (2017), controlling for the same factors, though they used much more advanced methods of scoring sleep quality (Pittsburgh Sleep Quality Index) and depression (Beck Depression Inventory).

- ❖ While there are certainly other factors, like income, smoking, and possibly gender, that can play as much of a role in predicting depression, and we can’t definitively say “If you don’t get good sleep you WILL be depressed”, it is clear that the more you struggle to sleep, the more you will feel out of shape mentally in more ways than one.

IMPLICATIONS

- ❖ These results can be used to inform the work of other researchers on this subject and to build evidence proving this relationship, so that more medical effort and public awareness can be put towards improving people’s sleep patterns and keeping them mentally fit.

Limitations:

- ❖ There was limited qualitative sleep data, we would have liked to work with more. The format of the quantitative sleep data was basic sleep/wake times.
- ❖ The mental health section had many interesting questions for participants, like “How often were you bothered by things that usually don’t?”, but only a few of them could be clearly related back to a specific mental health issue like depression.
- ❖ Since as many as 40 percent of those with depression can trace it to a genetic link, we would have loved to test for family history of mental illness as a predictor/confounder of the sleep~depression relationship. No such variables existed.

Future Research:

- ❖ Gather more data creating survey questions about sleep patterns. An ideal method would be using an effective field tested-and-approved survey like the Pittsburgh Sleep Quality Index (PSQI).
- ❖ Include more quantitative testing with addhealth variables having to do with sleep. Determine how much sleep length also affects mental health issues.
- ❖ Test sleep disturbance’s relationship with addhealth personality/behavior questions for significance as well.
- ❖ Work to distinguish the difference between sleep’s effect on depression, and depression’s effect on sleep. As of now this is cloudy in even the best research.

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