

Sleep Health and Lifestyle Analysis Project

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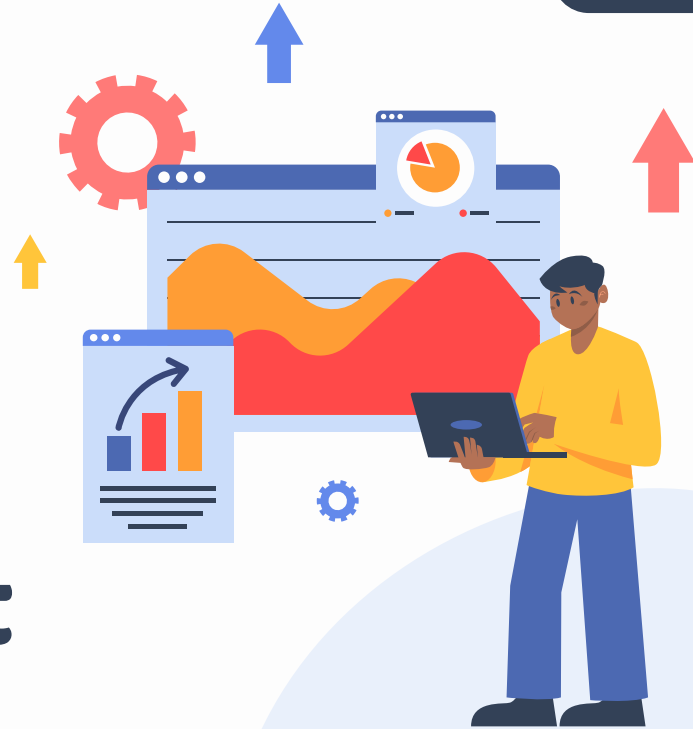


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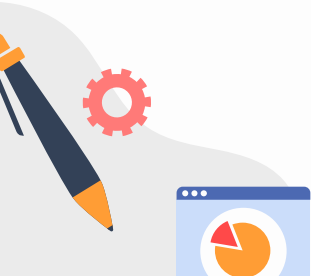


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01

Introduction About Dataset and Project

Project Topic

Nowadays, in modern society, it's common to see people take part in busy, endless "gear". It's sadly to say that material life of human has been improved significantly, otherwise it reverse for health and mental life. Especially, sleep health has been reduced.

Why we come up with this topic:

- To explore relationship between lifestyle and sleep health
- To understand any hidden causes that lead to reduce sleep health in term of lifestyle
- Driven by our group's personal interest on health problem





02

Multiple Linear Regression (With Category Variable)



Methodology

In this section, we want to investigate on relationship that to what extent physical activity level and sleep disorder impact on sleep quality.



Idea

In this section, we want to investigate on relationship that to what extent physical activity level and sleep disorder impact on sleep quality. To be specific, we want to know whether how present/absent of sleep disorder could impact to sleep quality in scale of (1-10)



Statistic

Field of knowledge from statistic that multiple regression with joint of category variable.

- Dependent variable:sleep quality.
- Independent variable:physical activity level
- Category variable: sleep disorder



Finding

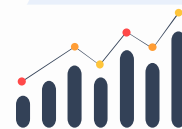
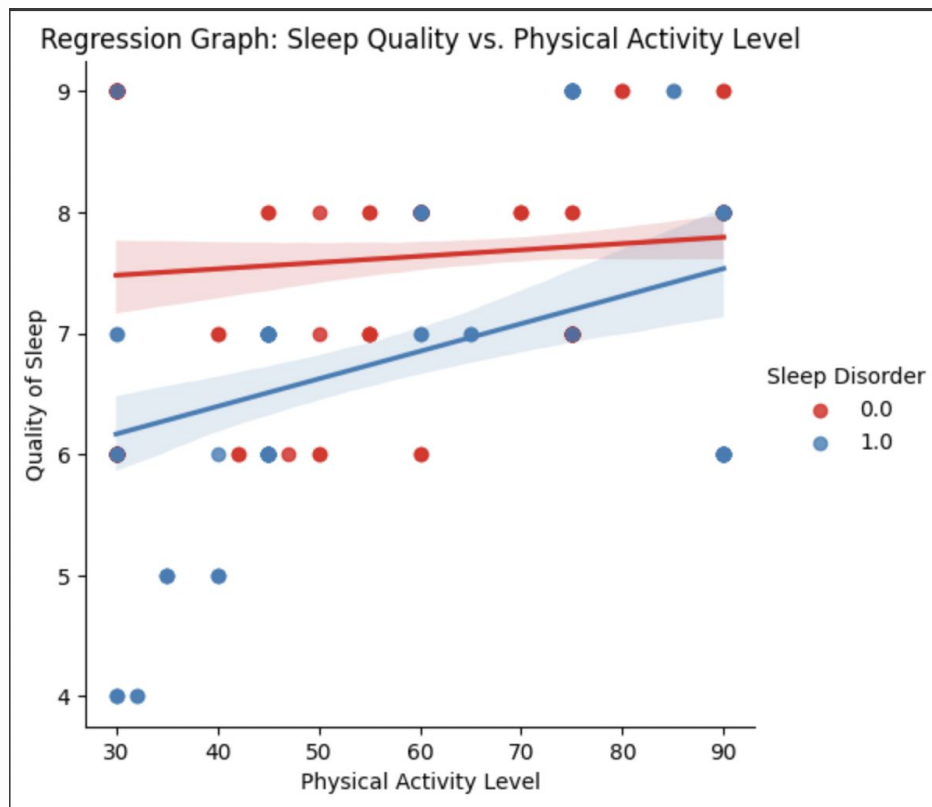
- Run OLS Regression Result that show coefficients of Physical Activity Level and Sleep Disorder on Sleep Quality
- Regression equation = $6.9075 + \text{PhysicalLevel} \times 0.0124 - \text{SleepDisorder} \times 0.7911$
 - For every 1 level change in Physical Activity Level result in increase 0.0124 in term of quality of sleep
 - If Sleep Disorder is appear (Insomnia, Sleep Apnea), the sleep quality reduce by 0.7911. Otherwise, if Sleep Disorder absent, the sleep quality are not going to be affected by Sleep Disorder coefficient

OLS Regression Results						
Dep. Variable:	Quality of Sleep	R-squared:	0.143			
Model:	OLS	Adj. R-squared:	0.138			
Method:	Least Squares	F-statistic:	30.95			
Date:	Tue, 03 Dec 2024	Prob (F-statistic):	3.71e-13			
Time:	17:36:50	Log-Likelihood:	-568.57			
No. Observations:	374	AIC:	1143.			
Df Residuals:	371	BIC:	1155.			
Df Model:	2					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	6.9075	0.177	38.997	0.000	6.559	7.256
Physical Activity Level	0.0124	0.003	4.476	0.000	0.007	0.018
Sleep Disorder	-0.7911	0.117	-6.767	0.000	-1.021	-0.561
Omnibus:	23.302	Durbin-Watson:	0.426			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	12.189			
Skew:	0.260	Prob(JB):	0.00226			
Kurtosis:	2.284	Cond. No.	196.			



Finding

- Run `sns.lmplot` show the beside regression Graph that Physical Activity Level as independent variable, Quality of Sleep as dependent variable and Sleep Disorder as category variables.
- It support for the regression coefficients that:
 1. Present of sleep disorder result in lower Quality of Sleep Level.
 2. As Physical Activity Level increase, the quality of sleep increase doesn't matter sleep disorder present or not. However, the effect is much more significant within present of Sleep Disorder group





Further Research

I found out that both Physical Activity Level and Sleep Disorder has effect on Quality of Sleep. There are some majority causes:

- 1** Physical activity can help in improve quality of sleep because it increases the production of melatonin, a hormone that regulates sleep-wake cycles
Physical activity helps to regulate body temperature, which is necessary
- 2** for falling asleep, as an increase in body temperature during physical activity aids the eventual drop 30-90 minutes post-exercises, facilitating easier sleepiness
- 3** The repeated awakenings associated with sleep apnea disorder make typical, restorative sleep impossible





03

Visualization (Clustered Columns Chart)



Methodology

In this section, we want to investigate on how Quality of Sleep and Stress Level across Age. Furthermore, looking for any pattern, trend.



Idea

In this section, we want to evaluate on how Quality of Sleep and Stress Level change across Age. Furthermore, we want to observe whether Quality of Sleep and Stress Level affect each other.



Visualization

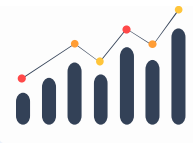
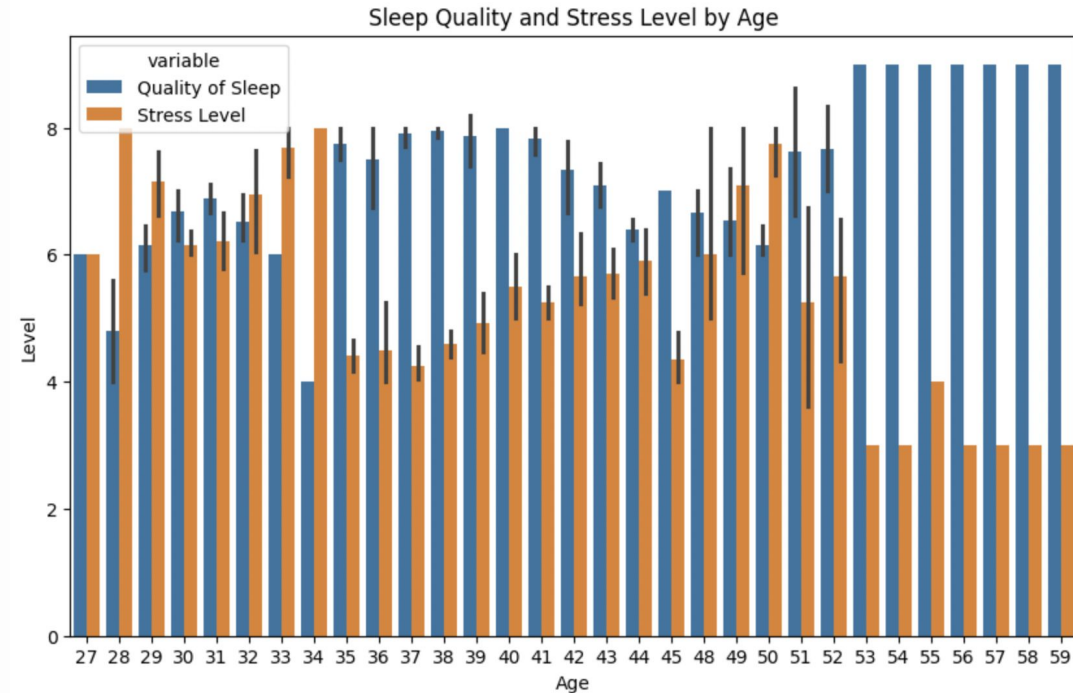
- Conduct Clustered Column Chart in which Age on y-axis, level value of "Quality of Sleep" and "Stress Level" on the x-axis.
- Graph will show both Quality of Sleep and Stress Level respectively for each group of age.

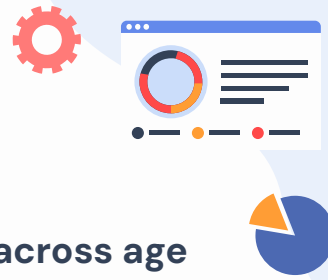




Finding

- Run Visualization by `sns.barplot` show the beside graph.
- Observation from graph that:
 - Before age of 53, it seem like the Quality of Sleep has rise from age 27 to 41 then experience decline before rise again and reach stable after 52.
 - For Stress Level, it's high from 27-34 (peak at 28), decline during 35-48, then arise again around 48-50 then significant reduce and stable after 52.
 - It can be observed that there's not strong correlation relationship between "Quality of Sleep" and "Stress Level" as Quality of Sleep doesn't increase when Stress Level increase vice versa.





Further Research

I found out that has both “Quality of Sleep” and “Stress Level” do different across age and have pattern. There are several main causes:

- 1** For oldest people (after fifties), the body secretes less melatonin which important chemicals can coordinate circadian rhythms thus helps in promoting sleep
- 2** Younger people tending experience more concerning including jobs, families and homes, all of which create stress
- 3** 25-year-olds reported stressors on nearly 50% of days, while 70-year-olds reported stressors on only 30% of days
- 4** Older adults have more resilience than younger adults in the face of stressful events.





04

Visualization (Joint Plot)



Methodology

In this section, we want to investigate on how BMI Category and Daily Steps across Occupation. Furthermore, looking for any pattern, trend.



Idea

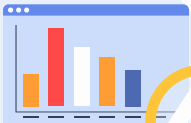
In this section, we want to evaluate on how BMI Category and Daily Steps change across Occupation. Furthermore, we want to observe whether there is correlation relationship between BMI Category and Daily Steps



Visualization

Conduct Joint Plot in which Occupation on x-axis, BMI Category on the y-axis

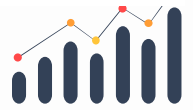
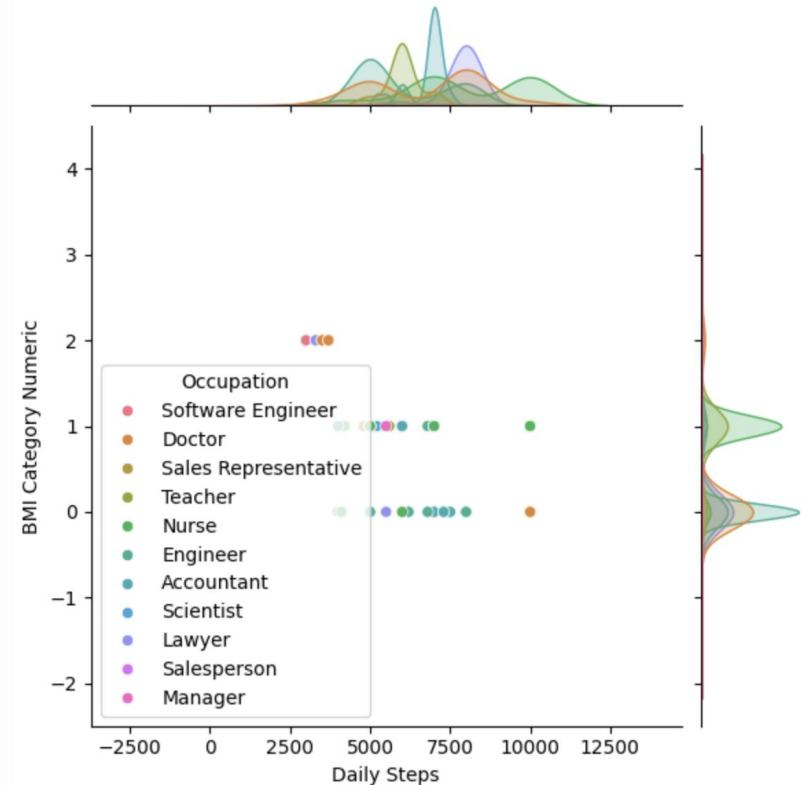
- Convert BMI Category as categorical in to numeric (0 for Normal, 1 for Overweight , and 2 for Obese)
- Graph will show plot and line plot for each Occupations regarding to Daily Steps and BMI Category.





Finding

- Run Visualization by sns.jointplot show the beside graph.
- Observation from graph that:
 - Even though nurse tending have higher frequency that have large amount of daily steps (around 10,000), nurse have highest participation fall in Overweight of BMI Category.
 - Software Engineer have not a bad habitat within daily steps at around 5,000-10,000), however only this occupation show noticeable amount of obesity when look at the line plot
 - It seem like pattern in teacher is approachable in which they have low daily steps (about 2,500-6,000) and also considered as group have high frequency in overweight category





Further Finding

- Run correlation matrix to determine whether there is opposite relationship between Daily Steps and BMI Category within Nurse Occupation
- Observe from the matrix:
 - Correlation between Daily Steps and BMI Category is positive. Indicate that as Daily Steps increase, BMI Category also increase (after convert increase mean move toward obese).
 - That support for insight drawn joint plot from previous slides regarding Nurse Occupation

Correlation matrix for Nurse

	Daily Steps	BMI Category
Daily Steps	1.000000	0.479187
BMI Category	0.479187	1.000000





Further Research

I found out that has both “Daily Steps” and “BMI Category” do different across Occupation and sometimes have pattern but sometimes doesn’t. There are several main causes:

1

Even people who work in nurse industry on their feet a lot at work, however because of job-specific that could contribute to poor dietary choices also reduced physical activity level thus lead to high probability of obesity

2

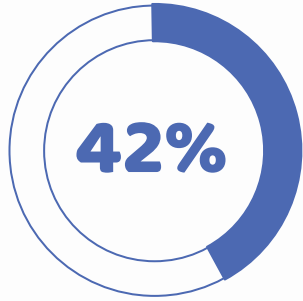
Software Engineer face with a lot of stressed, furthermore the job-specific doesn’t require much physical activities. Because of mental stress, it common leads to overeating and snacking.

3

Similar situation happened with people whose jobs are teacher. Job’s specific that spend long time sitting, not too much physical activity and potential easy access to unhealthy snacks.

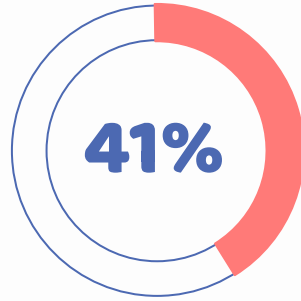


Let's use some percentages!



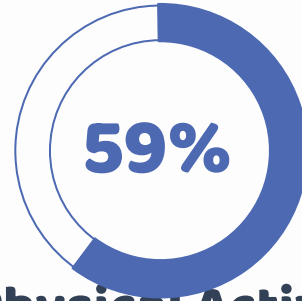
Abnormal BMI

41% of population of this dataset experience abnormal BMI



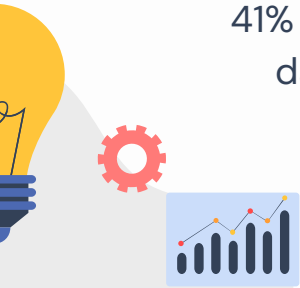
Sleep Disorder

41% of population of this dataset experience sleep disorder



Physical Activity Level

59% of population of this dataset experience over level 50 of physical activity level





Conclusions



Finding 1

There are relationship between sleep disorder and physical activity level affect to quality of sleep. Sleep Disorder does reduce quality of sleep level and Physical Activity Level do increase quality of sleep



Finding 2

There are not adequate evidence to conclude that there is relationship between stress level and quality of sleep across age from 27-59



Finding 3

Daily Steps amount do effect on BMI Category, however there are also exception with some specific occupation such as nurse due to job-specific





Resources

Aging and sleep. (2023). Retrieved from <https://www.sleepfoundation.org/aging-and-sleep>

Alnawwar, M. A., Alraddadi, M. I., Algethmi, R. A., Salem, G. A., Salem, M. A., & Alharbi, A. A. (2023). The effect of physical activity on sleep quality and sleep disorder: A systematic review. Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC10503965/>

Campbell, M. (n.d.). Study finds that experiences of daily stress decrease as people age: Penn State University. Retrieved from <https://www.psu.edu/news/health-and-human-development/story/study-finds-experiences-daily-stress-decrease-people-age>

Chin, D. L., Nam, S., & Lee, S.-J. (2016). Occupational factors associated with obesity and leisure-time physical activity among nurses: A Cross Sectional Study. Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC4871118/>

How to fix the health issues associated with the engineering lifestyle. (2020). Retrieved from <https://www.ltvco.com/engineering/health-implications-engineer-lifestyle/#poor-food-decisions>

The impact of stress on older adults and tips for managing it. (2024). Retrieved from <https://www.hebrewseniorlife.org/blog/impact-stress-older-adults-and-tips-managing-it>

Sleep apnea. (2023). Retrieved from <https://www.mayoclinic.org/diseases-conditions/sleep-apnea/symptoms-causes/syc-20377631#:~:text=The%20repeated%20awakenings%20associated%20with,TV%20or%20even%20when%20driving.>

Sleep health. (n.d.). Retrieved from <https://www.nhlbi.nih.gov/health-topics/education-and-awareness/sleep-health>



Thanks!

Do you have any questions?

