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Sleep Health and Lifestyle Data Analysis

Bootcamp Data Analyst with SQL & Python using Google Platform

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Introduction

Background

Sleep is a fundamental pillar of health, yet millions worldwide **struggle with sleep disorders** that compromise their well-being and daily functioning.

This analysis examines how demographics, lifestyle choices, and physiological factors influence sleep health across three key cohorts: individuals with no sleep disorders, those with insomnia, and those with sleep apnea. By uncovering patterns and risk factors within these groups, we aim to provide **data-driven insights** that can guide more **personalized interventions**, improving sleep quality and overall health outcomes.

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Data Overview

Data Description

The dataset is sourced from **Sleep_health_and_lifestyle_dataset.csv** on Kaggle and comprises of 374 records and 13 attributes. The data covers a wide range of variables related to sleep and daily habits of each individuals.

- Person ID
- Gender
- Age
- Occupation
- Sleep Duration
- Quality of Sleep
- Physical Activity Level
- Stress Level
- BMI Category
- Blood Pressure
- Heart Rate
- Daily Steps
- Sleep Disorder

DISCLAIMER

Personal health data is sensitive and subject to privacy and security regulations.
This dataset is entirely synthetic and does not contain any real information.

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Data Overview

Data Processing

Tools and Library

Google Colab

Python Programming Language

Google Looker Studio

Pandas

Matplotlib

Seaborn

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Data Overview

Data Processing

Data Cleaning

1. **Sleep Disorder** column
   Null value imputation (fill NaN with 'None')
2. **BMI Category** column
   Improving data consistency (replace 'Normal Weight' with 'Normal')
3. **Blood Pressure** column
   Split into **Systolic** and **Diastolic** blood pressure and change the column type to numeric

Data Cleaning

Before and After

Raw Data

	Person ID	Gender	Age	Occupation	Sleep Duration	Quality of Sleep	Physical Activity Level	Stress Level	BMI Category	Blood Pressure	Heart Rate	Daily Steps	Sleep Disorder
0	1	Male	27	Software Engineer	6.1	6	42	6	Overweight	126/83	77	4200	NaN
1	2	Male	28	Doctor	6.2	6	60	8	Normal	125/80	75	10000	NaN
2	3	Male	28	Doctor	6.2	6	60	8	Normal	125/80	75	10000	NaN
3	4	Male	28	Sales Representative	5.9	4	30	8	Obese	140/90	85	3000	Sleep Apnea
4	5	Male	28	Sales Representative	5.9	4	30	8	Obese	140/90	85	3000	Sleep Apnea

Clean Data

	Person ID	Gender	Age	Occupation	Sleep Duration	Quality of Sleep	Physical Activity Level	Stress Level	BMI Category	Systole	Diastole	Heart Rate	Daily Steps	Sleep Disorder
0	1	Male	27	Software Engineer	6.1	6	42	6	Overweight	126	83	77	4200	None
1	2	Male	28	Doctor	6.2	6	60	8	Normal	125	80	75	10000	None
2	3	Male	28	Doctor	6.2	6	60	8	Normal	125	80	75	10000	None
3	4	Male	28	Sales Representative	5.9	4	30	8	Obese	140	90	85	3000	Sleep Apnea
4	5	Male	28	Sales Representative	5.9	4	30	8	Obese	140	90	85	3000	Sleep Apnea

Click below to see the codes:

Sleep Health and Lifestyle Data

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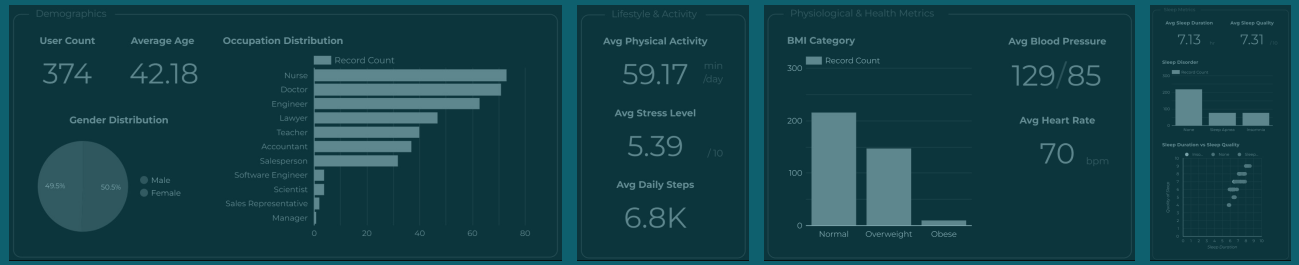
Exploratory Data Analysis

Exploratory Dashboard

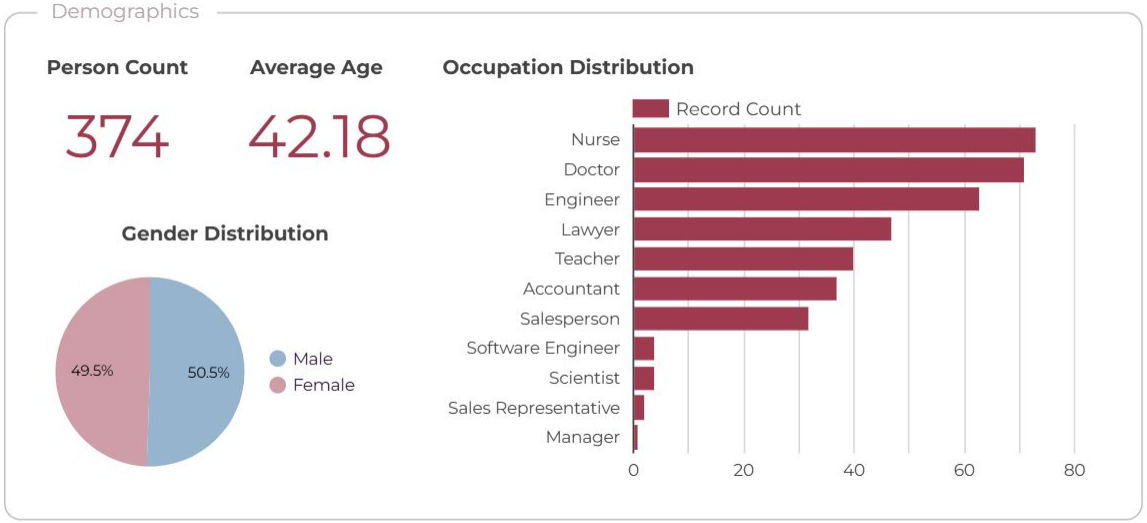
The dashboard comprises of four sections:

Demographics | Lifestyle & Activity | Physiological & Health Metrics | Sleep Metrics



Exploratory Dashboard

Demographics

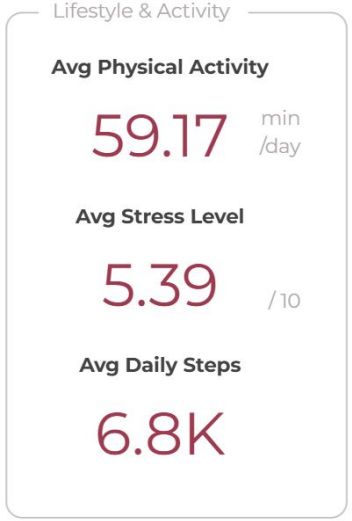


Initial Insights

- 374 individuals are documented in this data
- The average age indicates that the data focuses on a slightly **older adult population**
- Subjects have **equal** distribution of gender
- Nurse is the most frequent occupation and has a **big gap** with the least frequent occupation (imbalanced representation of professions)

Exploratory Dashboard

Lifestyle & Activity



Initial Insights

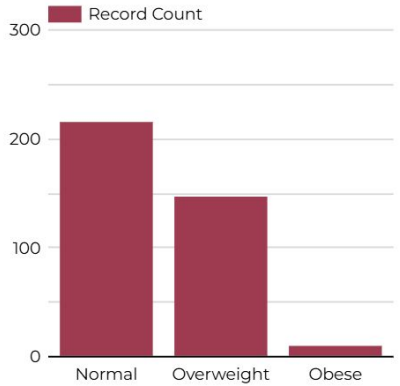
- The average physical activity level is about an hour a day, suggesting that the data represents a generally **active** adult population
- The subjective stress level averages 5.39 on a 1-10 scale, indicating a **moderate average stress perception** among participants
- The daily step count suggests that most individuals engage in a **moderate level of daily movement**

Exploratory Dashboard

Physiological & Health Metrics

Physiological & Health Metrics

BMI Category



Avg Blood Pressure

129/85

Avg Heart Rate

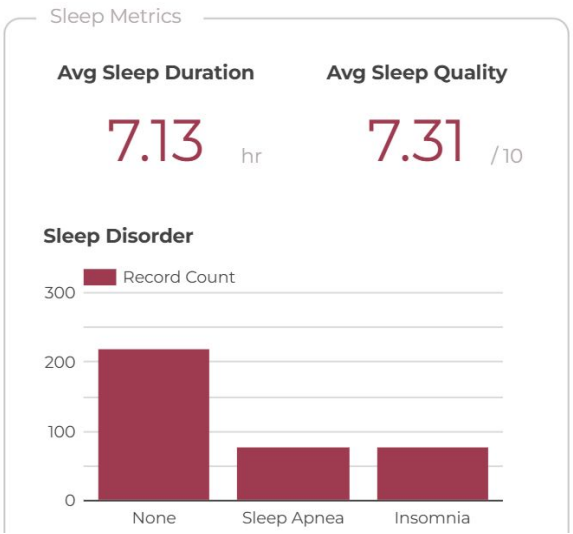
70 bpm

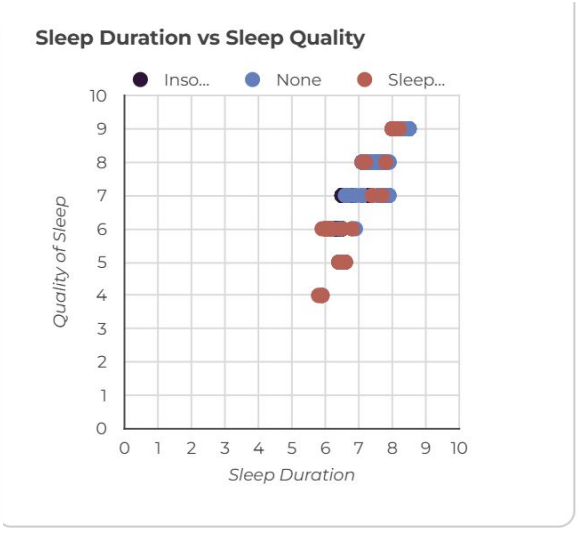
Initial Insights

- The majority of participants fall into the normal BMI category, indicating a relatively **healthy BMI** distribution
- The blood pressure average reflects a population predominantly in the **prehypertensive to mildly hypertensive** range (a normal blood pressure is less than 120/80 mmHg)
- The dataset's average resting heart rate suggests a generally **healthy cardiovascular profile** among participants (a normal resting heart rate for adults is between 60 and 100 bpm)

Exploratory Dashboard

Sleep Metrics





Sleep apnea is a sleep disorder that causes breathing to repeatedly stop and start during sleep, resulting in disrupted sleep patterns and potential health risks.

Insomnia a sleep disorder that makes it hard to fall asleep, stay asleep, or get enough quality sleep, leading to inadequate or poor-quality sleep.

Initial Insights

- The average sleep duration indicates that most participants **approach the recommended sleep duration**
- The subjective sleep quality averages 6.31 on a 1-10 scale, indicating that most individuals perceive their sleep as **fair to good**
- There is a relatively **balanced distribution** between disordered and non-disordered sleepers

Exploratory Data Analysis

Correlation Analysis

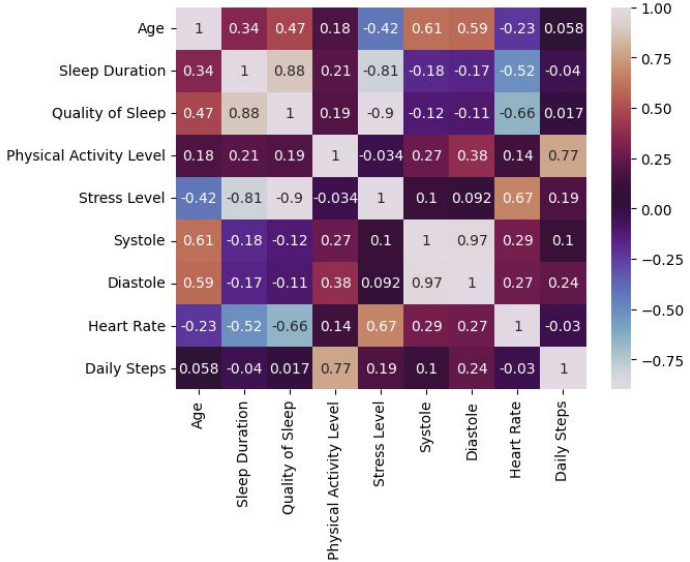
Pearson Correlation is performed to measure the similarity or correlation between two data objects by comparing their attributes and calculating a score ranging from -1 to +1. We will focus on **very strong** and **strong** correlations.

0.80 – 1.00	**Very strong**
0.60 – 0.79	**Strong**
0.40 – 0.59	Moderate
0.20 – 0.39	Weak
0.00 – 0.19	Very weak

Positive correlation occurs when two variables move in the same direction, while negative correlation occurs when two variables move in opposite directions.

Correlation Analysis

Pearson Correlation Analysis for Numeric Columns

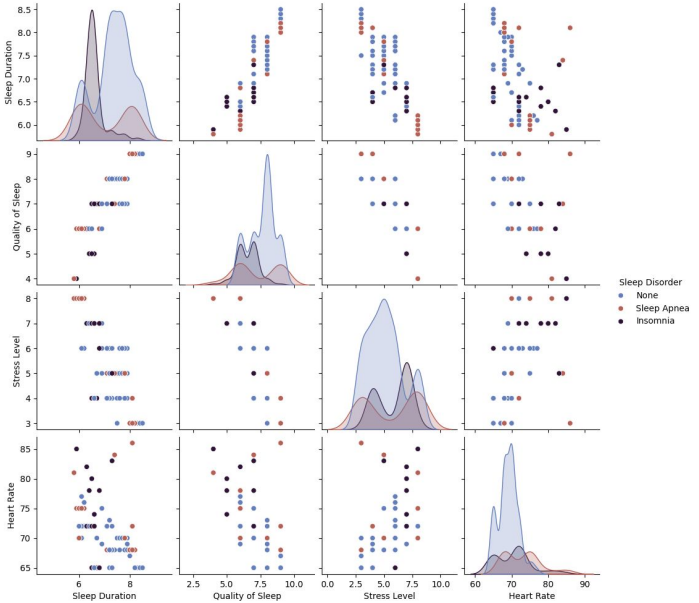


Initial Insights

- Very strong positive correlation between sleep duration and quality reinforces the **importance of sufficient rest** for subjective sleep satisfaction
- Very strong negative correlation between stress and sleep emphasizes the **detrimental effect of stress** on sleep health
- Strong positive correlation between heart rate and stress reflects physiological responses to stress
- Strong negative correlation between heart rate and sleep quality indicates the **role of autonomic nervous system activity in sleep regulation**
- Strong positive correlation between age and blood pressure aligns with known age-related cardiovascular risks

Correlation Analysis

Pairplot Variables with Strong Correlations



Initial Insights

- **Insomnia** is strongly linked to shorter sleep duration, poorer sleep quality, and **higher stress levels**.
- **Sleep apnea** is associated with slightly reduced sleep duration, lower sleep quality, and **elevated heart rates**.
- Those without sleep disorders generally experience better sleep quality, longer sleep durations, and lower stress and heart rates.

Findings

Data analysis was centered around the influence of demographics, lifestyle, and physiological factors on sleep health

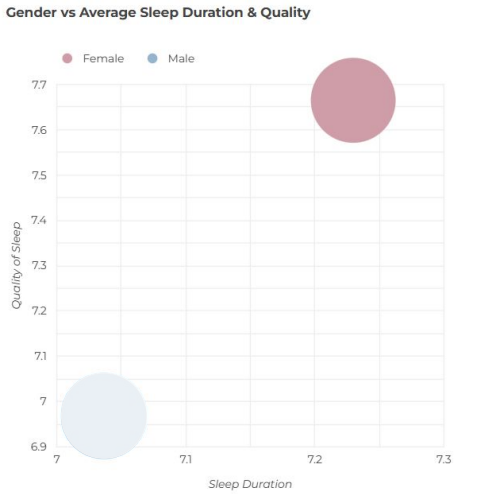
1. **Demographics & Sleep Health**
   The influence of demographic factors on sleep quality, the prevalence of sleep disorders, and the population groups at higher risk

2. **Lifestyle, Activity & Sleep Patterns**
   How daily habits impact sleep duration and quality across different sleep disorder cohorts

3. **Physiological & Health Metrics in Sleep Disorders**
   The relationship of key health indicators with sleep disturbances and the severity of conditions

Demographics & Sleep Health — Finding #1

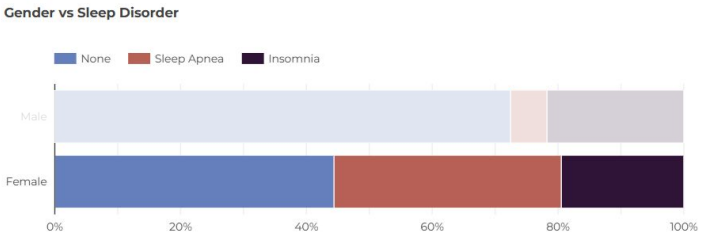
Females have a higher prevalence of sleep disorders



	Gender	Sleep Duration	Quality of Sleep
1.	Female	7.23	7.66
2.	Male	7.04	6.97

1 - 2 / 2

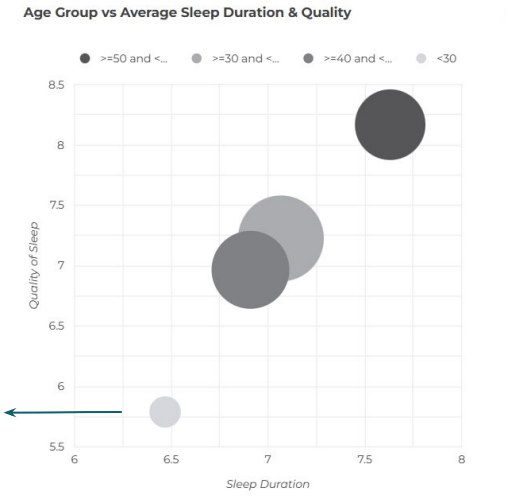
In average, **female** has a slightly longer sleep duration and higher sleep quality than male. While males experience more insomnia, females are **more at-risk** in developing sleep apnea.



Demographics & Sleep Health — Finding #2

Sleep disorders in older adults are more prevalent

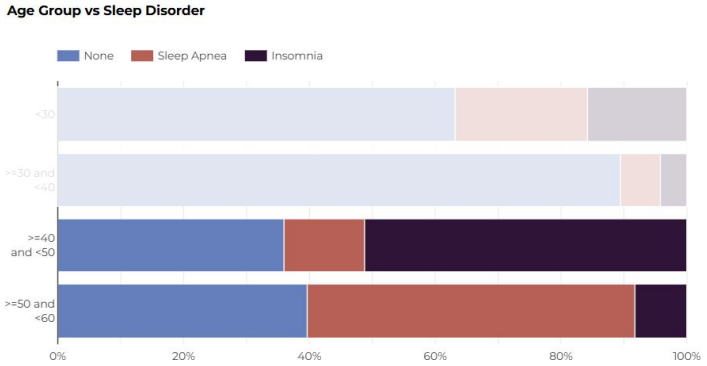
Although underrepresented, younger individuals are shown to have the poorest sleep quality and shortest sleep duration.



	Age Group	Sleep Duration	Quality of Sleep
1.	>=50 and <60	7.63	8.17
2.	>=30 and <40	7.07	7.23
3.	>=40 and <50	6.91	6.97
4.	<30	6.47	5.79

1 - 4 / 4

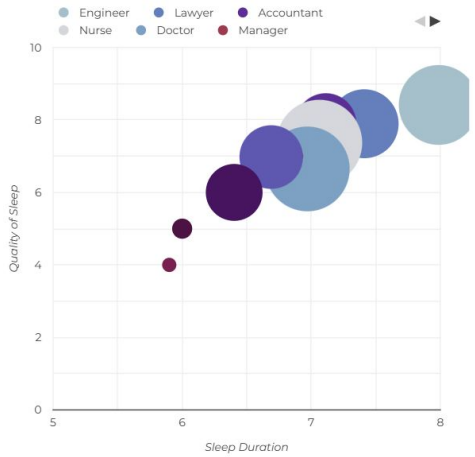
While age only correlates moderately with sleep duration and quality, **the prevalence of sleep disorders increases with age**. Insomnia is most prevalent in the 40-50 age group, whereas sleep apnea is most prevalent in 50–60 age group.



Demographics & Sleep Health — Finding #3

Work may impact both quantity and quality of sleep

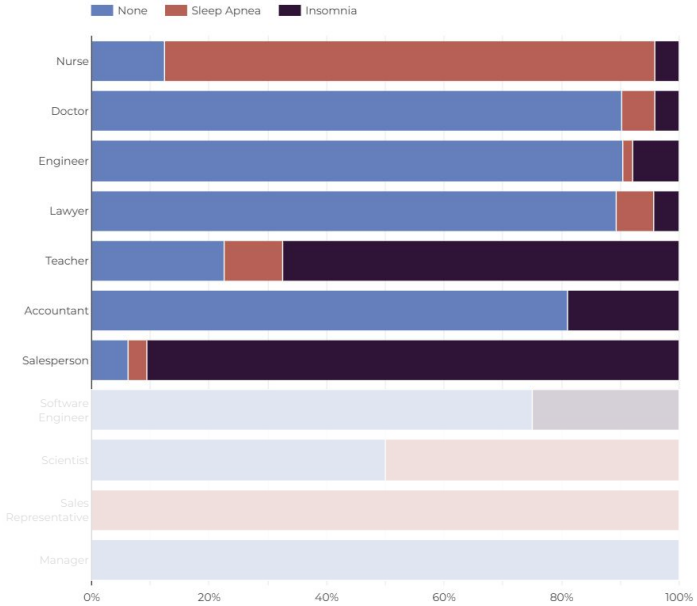
Occupation vs Average Sleep Duration & Quality



	Occupation	Sleep Duration	Quality of Sleep
1.	Engineer	7.99	8.41
2.	Lawyer	7.41	7.89
3.	Accountant	7.11	7.89
4.	Nurse	7.06	7.37

1 - 11 / 11

Occupation vs Sleep Disorder



The representation of the professions is not balanced, so we will compare only those in the Top 7 which have more than 30 record count.

Engineers report the highest sleep quality. Nurses, Teachers, and Salespersons show significantly high instances of sleep disorders. Sleep apnea is more common among **physically demanding and high-stress jobs**, whereas insomnia is more prevalent among teachers and office-based jobs.

Lifestyle, Activity & Sleep Patterns — Finding #1

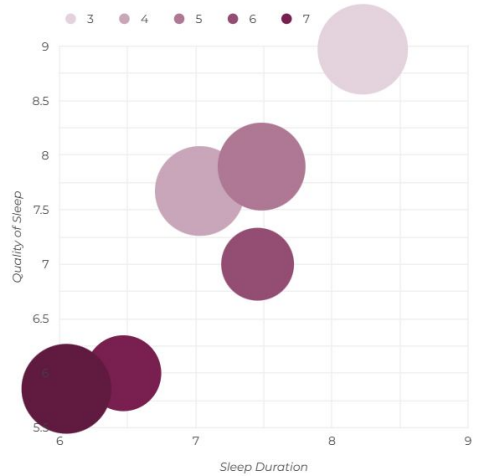
Stress exposure disrupts sleep

Average Stress Level in Different Sleep Disorders

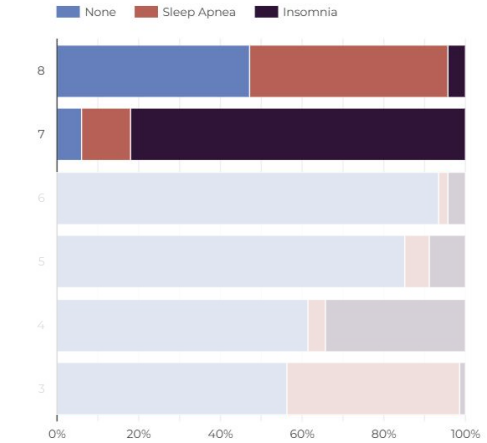
	Sleep Disorder	Stress Level
1.	Insomnia	5.87
2.	Sleep Apnea	5.67
3.	None	5.11

1 - 3 / 3

Stress Level vs Average Sleep Duration & Quality



Stress Level vs Sleep Disorder



Individuals with insomnia have the highest average stress level which consequently impacts sleep duration and quality in a detrimental manner. **Sleep disorders also have a higher prevalence in those with higher stress levels**. This explains why certain age groups and occupations experience poorer sleep quality.

Lifestyle, Activity & Sleep Patterns — Finding #2

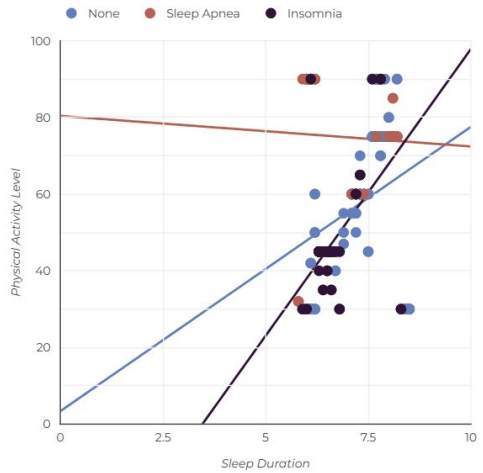
Sleep apnea decreases exercise tolerance

Average Activity Levels in Different Sleep Disorders

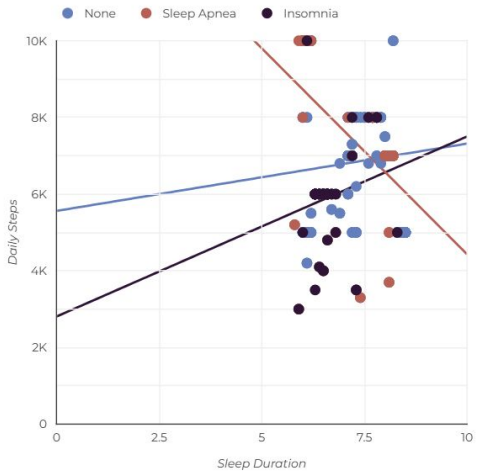
	Sleep Disorder	Physical Activity Level	Daily Steps
1.	Sleep Apnea	74.79	7,619.23
2.	None	57.95	6,852.97
3.	Insomnia	46.82	5,901.3

1 - 3 / 3

Physical Activity Level vs Sleep Duration on Different Cohorts



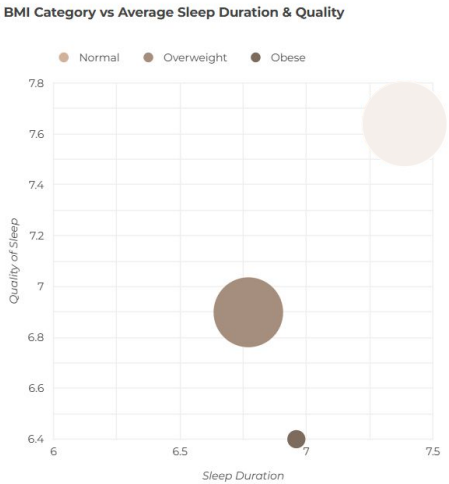
Daily Steps vs Sleep Duration on Different Cohorts

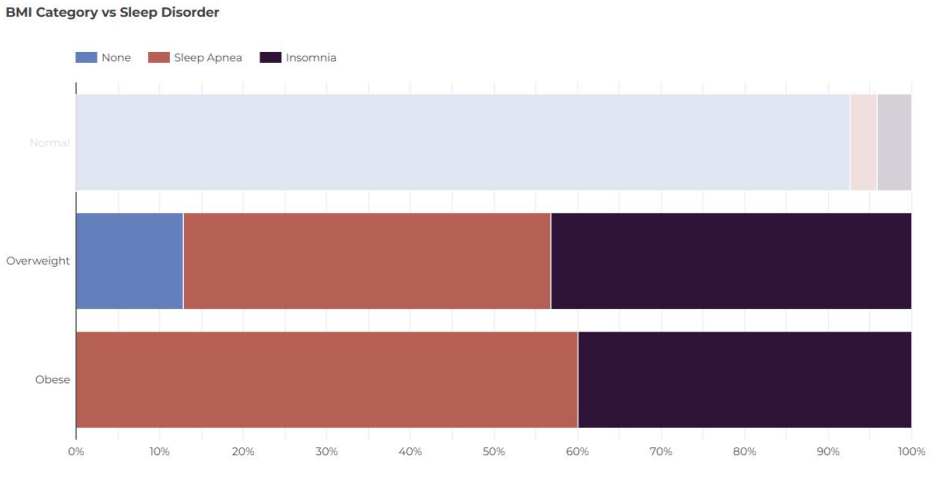


While physical activity and daily steps have generally weak correlations with sleep, regular exercise can help healthy adults sleep better. Through further inspections, we can see that **individuals with sleep apnea** are noticeably the only one having a negative correlation — they **exhibit the highest activity level, but experience suboptimal sleep quality**.

Physiological & Health Metrics in Sleep Disorders — Finding #1

Higher BMI links to poorer and more severe sleep conditions





Despite being underrepresented, individuals with obesity are shown to have the poorest sleep quality and are more likely to suffer from sleep disorders (note: there are no obese individuals with no sleep disorder included in the dataset). Compared to those with with a normal BMI, both obese and overweight individuals have **lower sleep quality**, **shorter sleep duration**, and a **higher risk of developing sleep disorders**. Obese and overweight individuals also tend to have higher cardiovascular health metrics.

Physiological & Health Metrics in Sleep Disorders — Finding #2

Sleep disorders further increase cardiovascular risk

People with sleep apnea and insomnia have **higher heart rates and blood pressure** compared to those without sleep disorders.

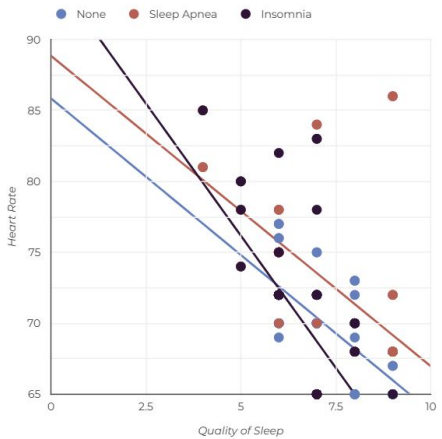
Average Cardiovascular Health Metrics in Different Sleep Disorders

	Sleep Disorder	Heart Rate	Systole	Diastole
1.	Sleep Apnea	73.09	137.77	92.72
2.	Insomnia	70.47	132.04	86.86
3.	None	69.02	124.05	81

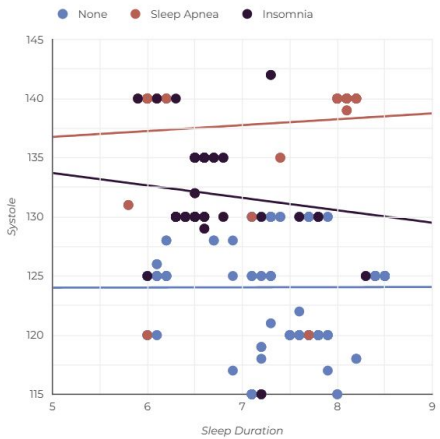
1 - 3 / 3

There is a negative correlation between sleep quality and heart rate in all subjects. Blood pressure has a very weak correlation with sleep in general and does not seem to affect sleep duration in healthy individuals. However, between those with sleep apnea and those with insomnia, contrasting correlations exist.

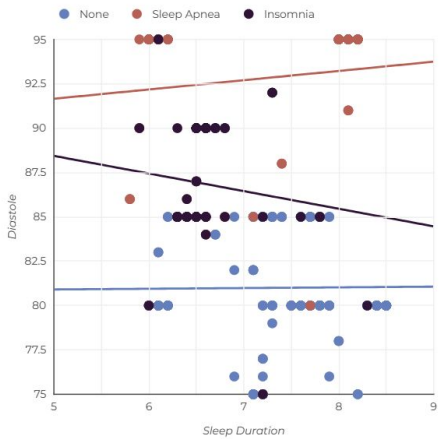
Heart Rate vs Sleep Quality on Different Cohorts



Systolic Blood Pressure vs Sleep Duration on Different Cohorts



Diastolic Blood Pressure vs Sleep Duration on Different Cohorts



Findings

Summary

- Females have a higher prevalence of sleep disorders
- Sleep disorders in older adults are more prevalent
- Work may impact both quantity and quality of sleep
- Stress exposure disrupts sleep
- Sleep apnea decreases exercise tolerance
- Higher BMI links to poorer and more severe sleep conditions
- Sleep disorders further increase cardiovascular risk

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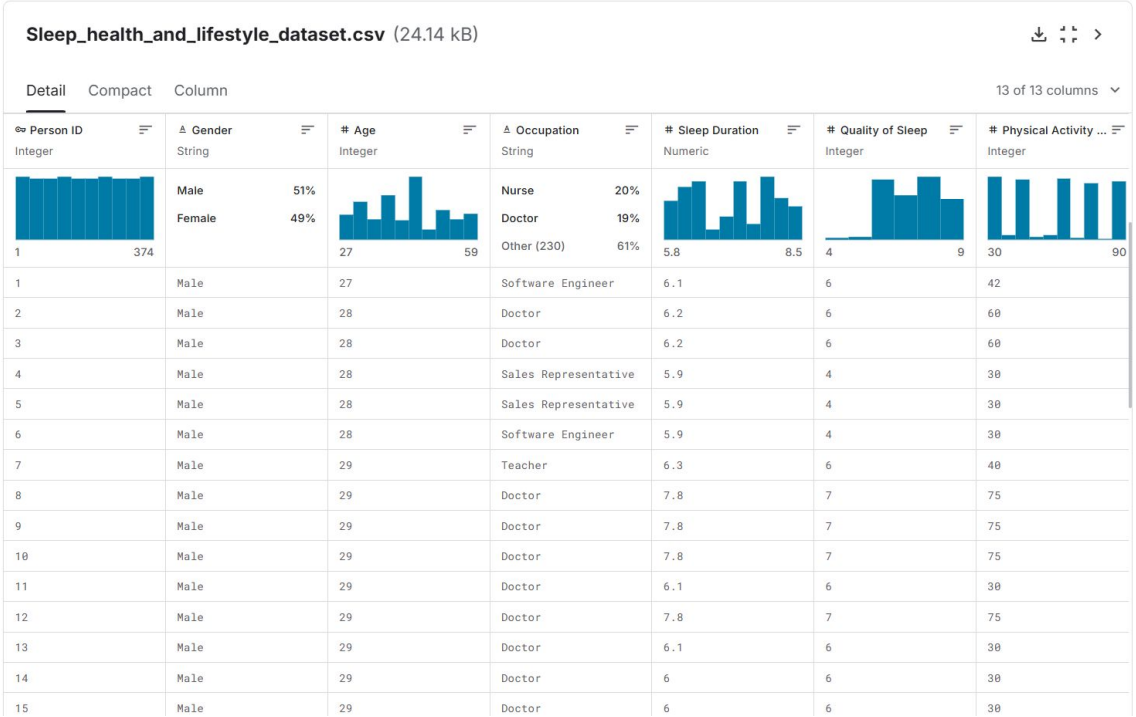
Recommendations

- Maintain a healthy body mass index (BMI) through a **balanced diet**
- Engage in regular physical activity and **prioritize movement** throughout the day
- Create a **relaxing bedtime routine** to lower stress and enhance sleep quality
- Incorporate **stress-management techniques** to lower heart rate and improve sleep
- **Track sleep patterns and lifestyle habits** using apps or wearables to identify areas for improvement
- **Monitor heart rate and blood pressure** regularly, especially for individuals with sleep apnea or insomnia
- Maintain sleep hygiene and **address potential medication side effects** impacting sleep in older adults



Sleep_health_and_lifestyle_dataset.csv (24.14 kB)

Detail | Compact | Column — 13 of 13 columns

Person ID Integer	Gender String	Age Integer	Occupation String	Sleep Duration Numeric	Quality of Sleep Integer	Physical Activity ... Integer
1 – 374	Male 51% Female 49%	27 – 59	Nurse 20% Doctor 19% Other (230) 61%	5.8 – 8.5	4 – 9	30 – 90
1	Male	27	Software Engineer	6.1	6	42
2	Male	28	Doctor	6.2	6	60
3	Male	28	Doctor	6.2	6	60
4	Male	28	Sales Representative	5.9	4	30
5	Male	28	Sales Representative	5.9	4	30
6	Male	28	Software Engineer	5.9	4	30
7	Male	29	Teacher	6.3	6	40
8	Male	29	Doctor	7.8	7	75
9	Male	29	Doctor	7.8	7	75
10	Male	29	Doctor	7.8	7	75
11	Male	29	Doctor	6.1	6	30
12	Male	29	Doctor	7.8	7	75
13	Male	29	Doctor	6.1	6	30
14	Male	29	Doctor	6	6	30
15	Male	29	Doctor	6	6	30

Data Explorer

Version 2 (24.14 kB)

Sleep_health_and_lifestyle_dataset.csv

Summary

1 file

13 columns

Appendix 1. Sleep Health and Lifestyle Dataset Preview

Click below to access the dashboard:

Sleep Health and Lifestyle Dashboard

Appendix 2. Exploratory Dashboard Preview

Thank You
for Your Attention

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SERTIFIKAT
KELULUSAN

Menyatakan bahwa:

Syifa Rahmadiani Ayunindra

Telah berhasil menyelesaikan
Bootcamp Data Analyst with SQL & Python in Google Platform Batch 15

#DQLABBDASPGPB15TMDCCL

Yovita Surianto
DQLab Manager

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