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Written Report

Seminar in Computer Science

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Research Report: The Impact of Physical Activity on Sleep and Overall Health Indicators

Research Question

How does physical activity level relate to sleep quality and overall health indicators such as BMI, blood pressure, and heart rate?

Methodology

For this study, I conducted a regression analysis using the Sleep Health and Lifestyle Dataset, a comprehensive dataset containing information on various lifestyle factors and health indicators. The dataset includes data on physical activity level, sleep quality, BMI, blood pressure, heart rate, and other relevant variables. The dataset was obtained from [Kaggle](#) and was preprocessed and analyzed using Python programming language.

Data Analysis

1. **Data Preprocessing:** Before conducting the analysis, I cleaned the dataset to ensure data quality and consistency. This involved handling missing values, removing outliers, and standardizing data formats. I also performed exploratory data analysis to gain insights into the distribution of the data and identify any patterns or trends.
2. **Feature Selection:** For the regression analysis, I selected a subset of features that were deemed relevant to the research question. These features included Physical Activity Level, Quality of Sleep, BMI Category, Blood Pressure, and Heart Rate. Other variables, such as age, gender, and lifestyle factors, were also considered in the analysis.

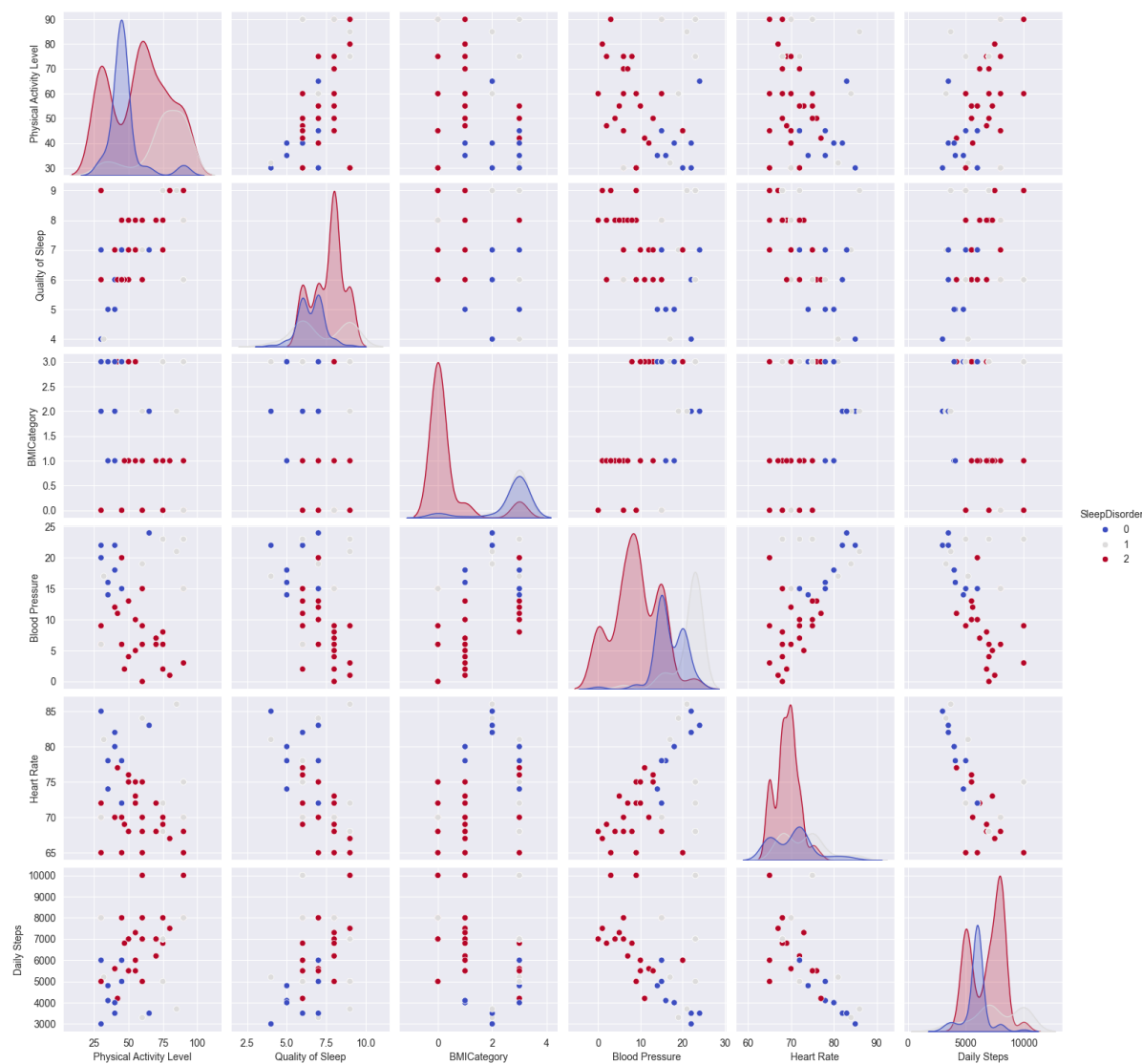
3. **Regression Analysis:** To analyze the relationship between physical activity level, sleep quality, and overall health indicators, I used multiple linear regression. This statistical method allowed me to model the relationship between the independent variable (physical activity level) and the dependent variables (sleep quality, BMI, blood pressure, and heart rate). I also explored potential confounding variables and interactions between variables to better understand the relationship.

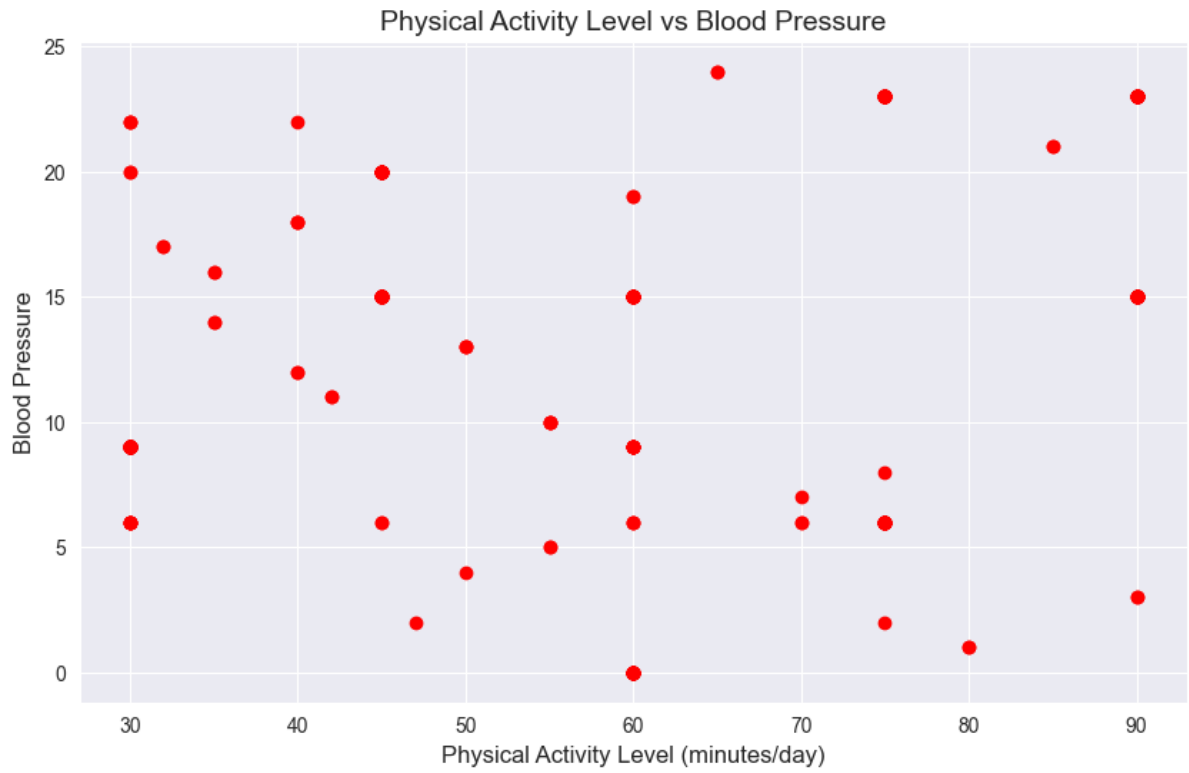
Findings

The analysis revealed several key findings regarding the relationship between physical activity, sleep quality, and overall health indicators:

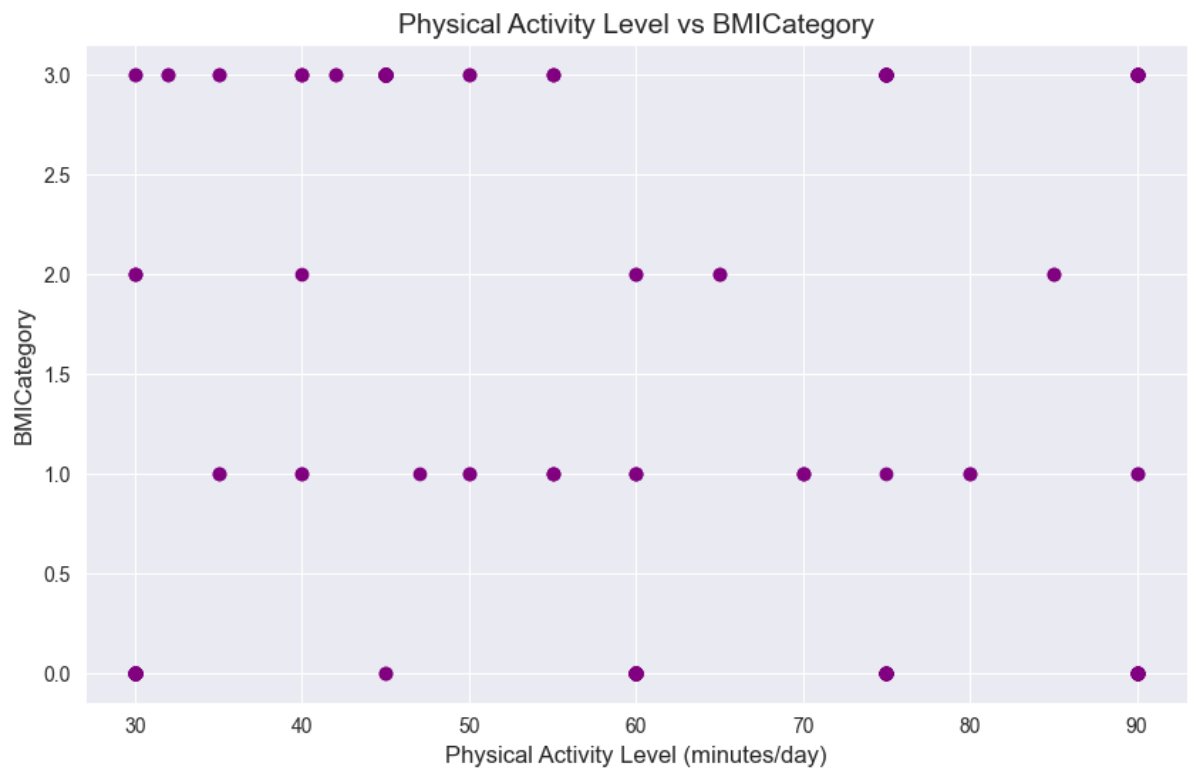
- **Positive Association with Sleep Quality:** Higher physical activity levels were positively associated with better sleep quality. Individuals who engaged in regular physical activity reported higher quality sleep compared to those with lower activity levels.
- **Impact on BMI:** Higher physical activity levels were associated with lower BMI. This suggests that physical activity plays a role in weight management and can contribute to overall health.
- **Effect on Blood Pressure and Heart Rate:** Physical activity was also linked to better blood pressure and lower heart rate. Individuals who were more physically active tended to have healthier cardiovascular profiles compared to those with lower activity levels.
- **Negative Effects of Sedentary Behavior:** Sedentary behavior and insufficient physical activity were associated with poorer sleep quality and overall health outcomes. This highlights the importance of reducing sedentary time and promoting physical activity for better health.

Visualizations

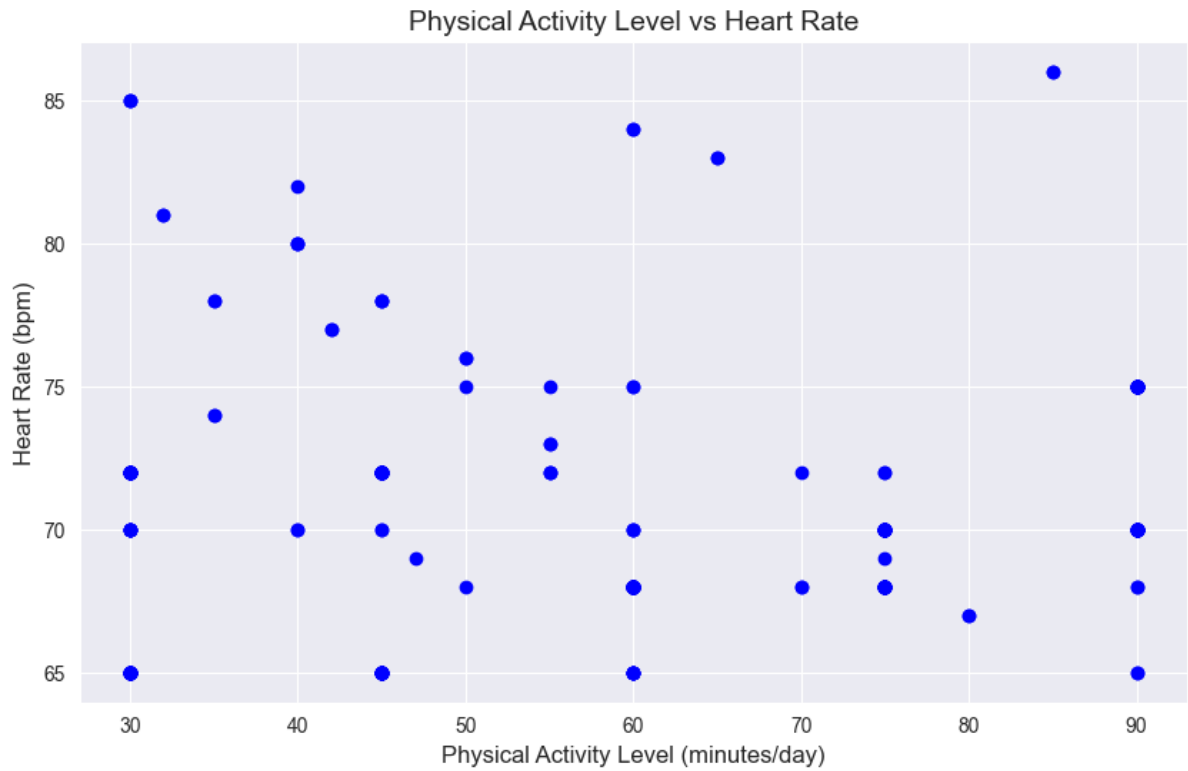




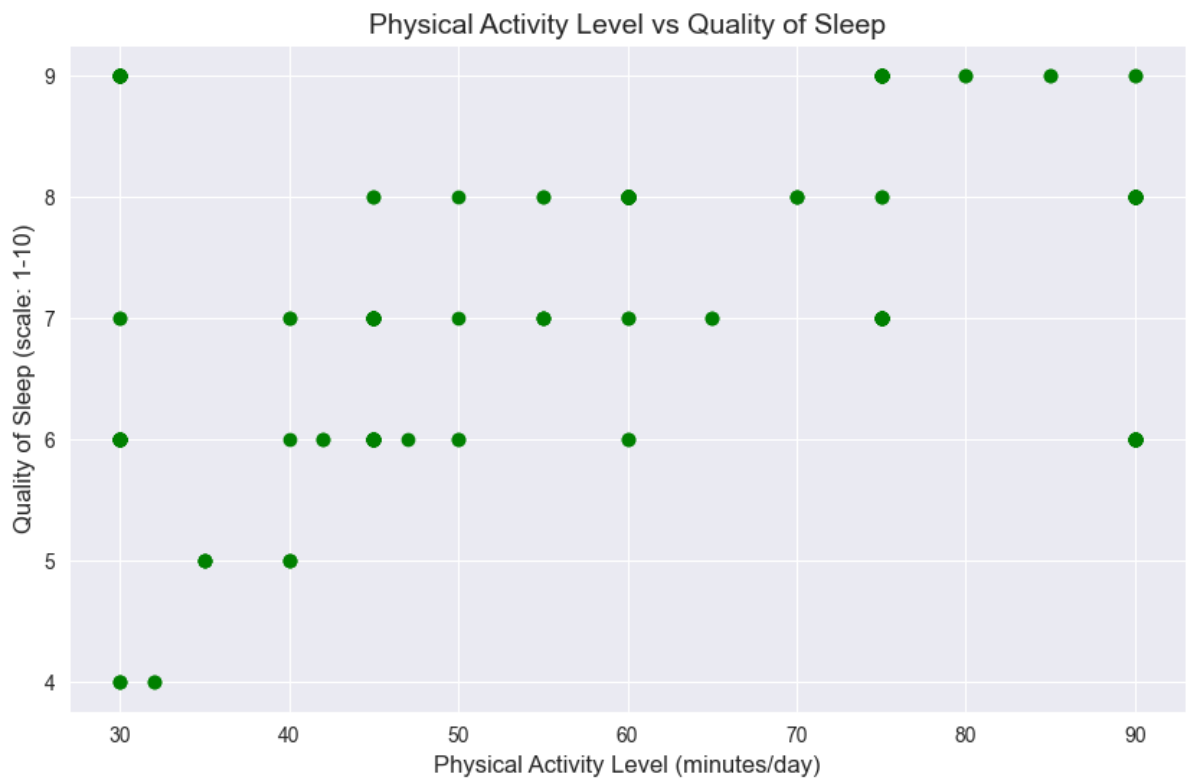
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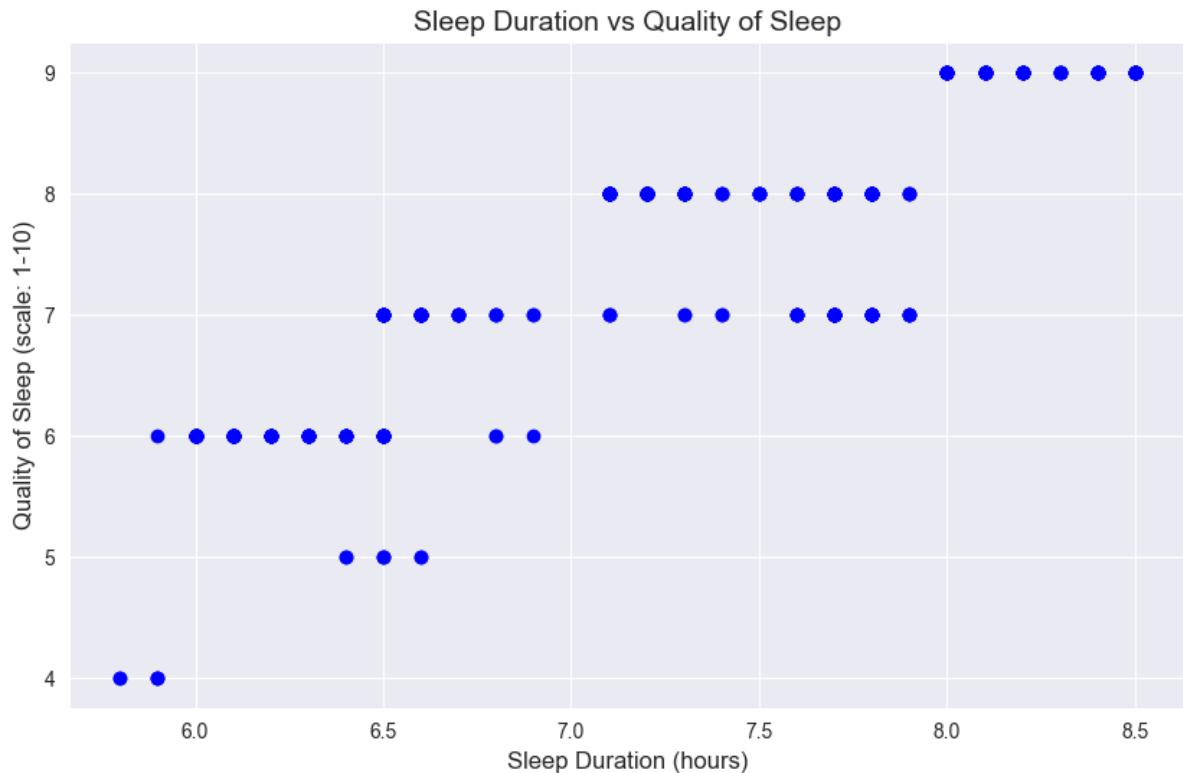
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Implications

- **Promoting Physical Activity:** Healthcare professionals, educators, and policymakers can use this information to develop targeted interventions promoting physical activity. Encouraging individuals to engage in regular physical activity can improve sleep quality and overall health outcomes, potentially reducing the burden of sleep disorders and associated health conditions.
- **Health Education:** Educating individuals about the importance of physical activity in maintaining good sleep hygiene and overall health can empower them to make informed lifestyle choices. This can lead to long-term benefits in terms of improved sleep quality and reduced risk of chronic diseases.
- **Policy Development:** Policymakers can use these findings to inform policy decisions related to public health initiatives. By promoting physical activity and creating supportive environments for healthy behaviors, policymakers can contribute to improving population health and reducing healthcare costs.
- **Research Focus:** The findings highlight the need for continued research into the relationship between physical activity, sedentary behavior, and sleep quality. Future studies should explore additional variables and potential moderating factors.

to better understand the complex interplay between lifestyle factors and sleep outcomes.

Limitations

- **Data Constraints:** The dataset used may not capture all relevant factors influencing sleep quality. There may be other variables, such as genetic factors or environmental influences, not included in the analysis.
- **Generalizability:** The findings of this study may not be generalizable to all populations. The study sample may not be representative of the broader population, limiting the generalizability of the results.
- **Causality:** The cross-sectional nature of the data limits our ability to establish causal relationships between physical activity, sleep quality, and overall health outcomes. Longitudinal studies are needed to better understand the long-term effects of physical activity on sleep and health.

Recommendations

- **Longitudinal Studies:** Conduct longitudinal studies to explore the causal relationship between physical activity, sedentary behavior, and sleep quality. Long-term studies can provide valuable insights into the effects of physical activity on sleep and overall health outcomes.
- **Intervention Studies:** Implement intervention studies to evaluate the effectiveness of lifestyle interventions in promoting physical activity and improving sleep quality. These studies can help identify the most effective strategies for improving sleep outcomes through physical activity.
- **Public Health Campaigns:** Develop public health campaigns aimed at promoting physical activity and raising awareness about the importance of sleep hygiene. These campaigns can target specific populations and provide actionable recommendations for improving sleep quality.
- **Policy Changes:** Advocate for policy changes that promote physical activity and create supportive environments for healthy behaviors. This can include initiatives to increase access to safe and affordable physical activity opportunities for all individuals.

Citations

- [Physical activity across life stages and sleep quality in adulthood](#)
- [The Effect of Physical Activity on Sleep Quality and Sleep Disorders](#)
- [Objective Indicators of Physical Activity and Sedentary Time and Associations with Subjective Well-Being in Adults Aged 70 and Over](#)

Conclusion

In conclusion, physical activity plays a crucial role in promoting healthy sleep patterns and overall health outcomes. By prioritizing physical activity and implementing comprehensive lifestyle interventions, individuals can optimize their sleep quality, reduce the risk of sleep disorders, and improve their overall well-being. These findings highlight the importance of lifestyle interventions in promoting healthy sleep and underscore the need for continued research and collaboration to address sleep issues and enhance public health initiatives.