The Analysis of Lifestyle Factors and Student Academic Performance

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Introduction

While academic success is often linked to intelligence and effort, growing evidence suggests that lifestyle habits and environmental conditions also significantly impact student performance.

Research Question:
Do lifestyle and environmental factors significantly influence student exam scores?

Why It Matters:
Understanding how non-academic factors affect achievement can help educators, parents, and policymakers create supportive environments and targeted interventions to boost student outcomes.

Hypothesis

Main Hypotheses:
- Null (H_0): No significant effect of lifestyle and environmental factors on student exam scores.
- Alternative (H_1): At least one lifestyle and environmental factor affects students' exam scores and performance.

Sub Hypothesis include:
- Extracurricular Activities
- Peer Influence
- Family Income
- Distance from home
- Internet Access

Methodology

- **Data Source:**
  - Kaggle dataset ("Student Performance Factors").
  - Sample: 6,607 student records.
- **Variables Analyzed:**
  - Numerical: Hours studied, attendance, sleep, tutoring sessions.
  - Categorical: Gender, school type, parental involvement, motivation
- **Statistical Approach:**
  - Descriptive Statistics: Mean exam scores by optimal factors met.
  - Hypothesis Testing:
    - T-tests (e.g., hours studied, internet access).
    - ANOVA (e.g., motivation levels).
   - Welch's t-tests for post-hoc comparisons
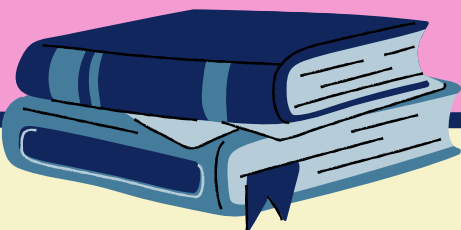
Conclusion

- 15 out of 19 lifestyle and environmental variables significantly impact academic outcomes, leading to the **rejection of the null hypothesis.**
- Key factors proven to have a **significant impact** on exam scores are : Attendance, Hours studied, previous scores, tutoring sessions, parental involvement, sleep quality, teacher quality, peer influence, distance from home, parental education level, family income, motivation level, access to resources, learning disabilities , extracurricular activities and internet access.
- Factors proven to have **no significant impact** on exam scores are: Sleep, gender, physical activity and school type.
- **Positive** correlation between the number of optimal factors met and exam scores.
- **Implications:**
  - For Educators: Prioritize attendance, study habits, and equitable resource distribution.
  - For Families: Foster motivation, engage in extracurriculars, and leverage parental involvement.

Analysis

- Computed the number of optimal factors each student met.
- Examined correlation between the count of optimal factors and exam scores.
- Conducted hypothesis tests (t-tests, ANOVA) on individual factors to identify significant differences in exam scores across groups.
- Visualized data with box plots and scatter plots to illustrate relationships.
  This boxplot visualizes the relationship between the number of optimal academic and lifestyle factors met by students and their exam scores.
  As the number of optimal factors increases, there is a clear upward trend in average exam performance. Students who met more factors tend to achieve higher scores, indicating a positive cumulative effect of supportive habits and environments on academic success.

Exam Score by Number of Optimal Factors Met
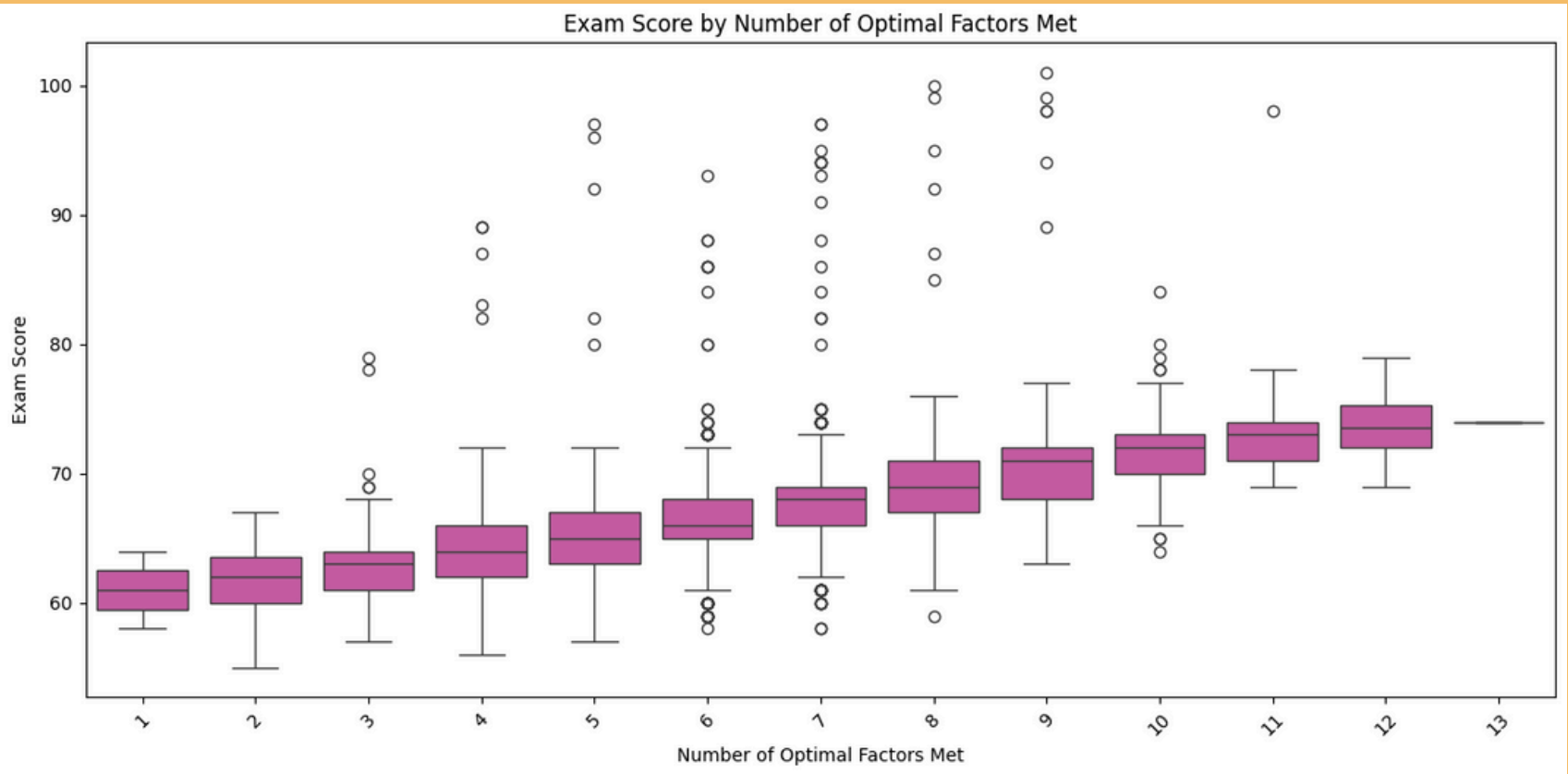
A clear positive trend: the more significant factors students meet, the higher their exam scores tend to be.

Exam scores remain relatively stable regardless of how many non-significant conditions students meet, showing little to no impact on performance.

Relationship Between Optimal Factors Met and Exam Score

Exam Score vs Non-Effect Optimal Conditions Met

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