

# **How Daily Habits Influence Academic Performance: Evidence from Statistical Hypothesis Testing**

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## Introduction

Academic performance has long been a central focus in educational research, with particular attention given to identifying behavioral and contextual factors that significantly influence student achievement. In recent years, interest has increasingly shifted toward examining the role of daily personal habits—such as study hours, sleep duration, and social media use—and how these behaviors correlate with academic success.

In the preliminary exploratory analysis (Assignment 1), study time emerged as the strongest predictor of exam performance, whereas demographic and lifestyle variables such as gender, diet quality, and part-time job status showed limited explanatory power. These findings justify a more targeted investigation into modifiable daily behaviors that may play a critical role in shaping student outcomes.

Existing literature supports this focus: consistent evidence links effective study routines, adequate sleep, and moderate digital media use to enhanced cognitive functioning, concentration, and academic achievement (Nonis & Hudson, 2006; Curcio et al., 2006; Shen, 2019). However, questions remain regarding the optimal thresholds at which these habits begin to make a measurable difference—particularly in diverse academic contexts.

This study therefore centers on three specific behavioral variables—study time, sleep duration, and social media usage—examined through the lens of statistical hypothesis testing. By applying clearly defined benchmarks derived from prior research, the analysis seeks to uncover whether meaningful performance differences exist across these behaviors, and how pronounced those differences may be.

Ultimately, this analysis seeks to contribute to a more grounded understanding of how modifiable daily routines interact with student performance. By identifying patterns that distinguish higher- and lower-performing students, it offers a basis for more reflective discussions on academic support, time use, and behavioral well-being within educational contexts.

## Rationale for Research Questions

The formulation of research questions in this study is grounded in both theoretical understanding and empirical findings from the initial exploratory analysis. The primary aim is to identify behavioral habits that significantly influence academic performance and can be targeted through practical interventions. Given the limited impact of demographic and lifestyle variables such as gender or employment status in the preliminary analysis, this research turns to personal habits—specifically, study time, sleep duration, and social media use—as potentially modifiable predictors of student success.

The rationale for selecting these three habits is supported by a robust body of literature. Previous studies have consistently emphasized the role of adequate study time in promoting better academic outcomes (Nonis & Hudson, 2006), highlighted the cognitive benefits of sufficient sleep (Curcio et al., 2006), and documented the negative correlation between excessive social media use and academic performance (Shen, 2019). However, much of this prior research lacks consensus on specific behavioral thresholds that clearly distinguish high-achieving from low-achieving students. This study fills that gap by operationalizing the constructs through standardized benchmarks derived from institutional and scientific sources.

To this end, three specific research questions are developed:

1. *Do high-achieving students (exam score  $\geq 80$ ) spend more time studying per day than the overall average?*

Building on the findings from the initial analysis, study time was identified as the most significant factor influencing academic performance in this dataset. This observation is consistent with educational research, which has established a strong relationship between greater study time and higher academic achievement. In addition, university grading standards commonly define a score of 80 or above as indicative of high achievement (Monash University, 2025; University of Melbourne, 2025). Accordingly, this question therefore investigates whether students within this high-achieving group spend significantly more time studying than the average student to offer insight into how study habits may distinguish top performers.

2. *Do low-achieving students (exam score  $< 60$ ) spend more time on social media per day than the overall average?*

Social media has become an essential part of students' daily routines; however, excessive use has consistently been associated with reduced academic focus and lower achievement. Studies by Jie Shen (2019) demonstrated that greater time spent on social media is negatively correlated with GPA and academic performance. To investigate this relationship more clearly, the present study defines "low-achieving" students as those with exam scores below 60—a threshold commonly used by leading universities to indicate failure or unsatisfactory academic progress. For instance, Monash University explicitly categorizes scores under 60 as failing to meet minimum academic standards (Monash University, 2025). This research question, therefore, aims to determine whether students in this category tend to spend more time on social media compared to the broader population. This line of inquiry aims to uncover whether digital habits may serve as warning signs for academic risk.

3. *Do students who sleep more than 7 hours per night achieve higher average exam scores than those who sleep 7 hours or less?*

Adequate sleep is essential for learning, memory consolidation, and overall cognitive functioning. The National Heart, Lung, and Blood Institute (2022) recommends at least 7 hours of sleep per night to maintain optimal health and cognitive efficiency. Based on this recommendation, this question examines whether students who meet or exceed this sleep benchmark outperform their peers who sleep less to highlight the possible academic value of healthy sleep patterns.

## Hypothesis Testing and Findings

### **Question 1:**

*Do high-achieving students (exam score  $\geq 80$ ) spend more time studying per day than the overall average?*

### **Test Choice**

A one-sided one-sample t-test was selected to compare the mean daily study hours of high-achieving students (exam score  $\geq 80$ ) to the overall student average. This statistical test was appropriate because the research question specifies a directional hypothesis—that is, it seeks to determine whether high-achieving students study more than the average, not merely whether they study a different amount. To reflect this, the alternative hypothesis was set as "greater than."

Since the objective was to evaluate whether the mean of a single sample (high-achieving students) exceeds a known population mean, the one-sample t-test was an appropriate choice. Unlike two-sample tests, this approach is specifically designed for comparing one group's mean to a reference value. As such, it allowed for an effective assessment of whether high-achieving students dedicate significantly more time to studying than the general student population.

### **Explanation of the hypothesis testing**

The null hypothesis  $H_0$  stated that the mean daily study hours of high-achieving students is less than or equal to the overall mean. The alternative hypothesis  $H_1$  posited that high-achieving students spend more time studying per day than the average student.

Specifically:

- **Null Hypothesis ( $H_0$ ):**  
High-achieving students spend less than or equal to the average study hours per day compared to all students.

$$H_0 : \mu_{\text{high-achieving}} \leq \mu_{\text{overall}}$$

- **Alternative Hypothesis ( $H_1$ ):**  
High-achieving students spend more study hours per day than the overall average.

$$H_1 : \mu_{\text{high-achieving}} > \mu_{\text{overall}}$$

The following are the steps for performing a hypothesis test:

#### *Step 1 – State the Hypotheses*

- $H_0: \mu_{\text{high}} \leq \mu_{\text{overall}}$
- $H_1: \mu_{\text{high}} > \mu_{\text{overall}}$

Result: We have a one-sided (“greater”) hypothesis comparing one group mean to the population mean.

#### *Step 2 – Set Significance Level*

- $\alpha = 0.05$

Result: 5% risk of Type I error is established.

### *Step 3 – Select the Test*

- One-sample, one-sided t-test (alternative = “greater”)

Result: Appropriate for comparing a single sample mean against the known overall mean.

### *Step 4 – Compute Test Statistic*

- Sample mean (high-achievers)  $\bar{x} = 5.03$  hrs/day
- Population mean  $\mu = 3.55$  hrs/day
- $t = 23.40$  ( $df = n_{\text{high}} - 1$ )
- $p\text{-value} = 8.97 \times 10^{-68}$

Result: Very large  $t$  and extremely small  $p$ -value indicate strong evidence against  $H_0$ .

### *Step 5 – Decision & Conclusion*

Since  $p < 0.05$ , reject  $H_0$ .

Conclusion: High-achieving students study significantly more per day than the overall average.

### ***Test Results***

Name	Type	Value
t_test1	list [10] (S3: htest)	List of length 10
• statistic	double [1]	23.39848
• parameter	double [1]	276
p.value	double [1]	8.966485e-68
conf.int	double [2]	4.93 Inf
• estimate	double [1]	5.031769
• null.value	double [1]	3.5501
stderr	double [1]	0.06332331
alternative	character [1]	'greater'
method	character [1]	'One Sample t-test'
data.name	character [1]	'high_achievers\$study_hours_per_day'

**Table 1. One-Sample t-Test: High-Achieving Students' Average Daily Study Hours vs. Overall Mean**

### ***Interpretation***

The results from the one-sample t-test provide clear evidence that high-achieving students (exam scores  $\geq 80$ ) dedicate significantly more time to studying each day compared to the average student. Specifically, high-achievers studied an average of 5.03 hours per day, while the overall student average was 3.55 hours per day.

The test statistic of 23.40 and an extremely small p-value ( $8.97 \times 10^{-68}$ ) confirm that this difference is statistically significant at any conventional significance level.

Therefore, we can confidently reject the null hypothesis and conclude that high-achieving students do spend more time studying. This result underscores the strong link between consistent study habits and academic success, suggesting that encouraging students to increase their daily study hours could be an effective strategy for improving performance.

### ***Conclusion***

The analysis confirms that high-achieving students devote significantly more time to studying each day than the average student, with an average of 5.03 hours compared to 3.55 hours. This statistically significant difference underscores a strong association between sustained study effort and academic performance. Rather than pointing solely to innate ability, the findings suggest that consistent, self-directed learning behaviors may play a key role in shaping outcomes.

### ***Key Insights***

While the analysis clearly shows that high-achieving students study significantly more than their peers, this observation raises broader questions about what drives such behavior. Is greater study time itself the cause of academic success, or might it reflect deeper factors—such as intrinsic motivation, effective time management, or access to supportive learning environments?

It is also worth considering whether encouraging all students to simply "study more" addresses the core of academic disparities. For some, limited study time may stem not from lack of effort, but from competing responsibilities, mental fatigue, or ineffective learning strategies. In this light, the relationship between study time and performance may be shaped as much by external context and internal mindset as by raw time allocation.

These insights point to the possibility that study time, while a strong behavioral marker of academic success, may operate within a larger ecosystem of habits, supports, and self-regulatory capacities. Further exploration might help illuminate what distinguishes students who sustain disciplined study routines from those who struggle to do so—and how academic environments can better support that balance in varied and equitable ways.

***Question 2:*** *Do low-achieving students (exam score <60) spend more time on social media per day than the overall average?*

### ***Test Choice***

A one-sided one-sample t-test was selected because the research question predicts a directional effect: specifically, that low-achieving students spend more time on social media per day than the overall student average. This test compares the mean social media usage of the low-achieving group (exam score <60) to the overall student mean.

The one-sample t-test is appropriate because the analysis involves comparing the mean of a single group to a known reference value, rather than comparing two independent groups. The use of a one-sided alternative ("greater") increases the statistical power to detect whether low-achieving students use social media significantly more than the general student population.

### ***Explanation of the hypothesis testing***

This research question examines whether low-achieving students (exam score <60) spend more time on social media per day than the overall student average.

- **Type of test:** One-sample t-test (comparing the mean social media hours of low-achieving students to the overall mean)
- **Null Hypothesis ( $H_0$ ):**  
Low-achieving students spend less than or equal to the average social media hours per day compared to all students.

$$H_0 : \mu_{\text{low-achieving}} \leq \mu_{\text{overall}}$$

- **Alternative Hypothesis ( $H_1$ ):**  
Low-achieving students spend more social media hours per day than the overall average.

$$H_1 : \mu_{\text{low-achieving}} > \mu_{\text{overall}}$$

The following are the steps for performing a hypothesis test:

*Step 1 – State the Hypotheses*

- $H_0: \mu_{\text{low}} \leq \mu_{\text{overall}}$
- $H_1: \mu_{\text{low}} > \mu_{\text{overall}}$

Result: Directional hypothesis for increased social-media time.

*Step 2 – Set Significance Level*

- $\alpha = 0.05$

Result: Standard 5% threshold.

*Step 3 – Select the Test*

- One-sample, one-sided t-test (alternative = “greater”)

Result: Suitable to test if low-achievers exceed the population mean.

*Step 4 – Compute Test Statistic*

- $\bar{x}_{\text{low}} = 2.74$  hrs/day
- $\mu = 2.51$  hrs/day
- $t = 3.36$
- p-value = 0.00044

Result: t and p-value show a statistically significant difference.

*Step 5 – Decision & Conclusion*

$p < 0.05 \rightarrow$  reject  $H_0$ .



Conclusion: Low-achieving students spend more time on social media than average.

## Test Results

Name	Type	Value
t_test2	list [10] (S3: htest)	List of length 10
statistic	double [1]	3.364341
parameter	double [1]	279
p.value	double [1]	0.0004373974
conf.int	double [2]	2.63 Inf
estimate	double [1]	2.744286
null.value	double [1]	2.5055
stderr	double [1]	0.07097547
alternative	character [1]	'greater'
method	character [1]	'One Sample t-test'
data.name	character [1]	'low_achievers\$social_media_hours'

**Table 2. One-Sample t-Test: Low-Achieving Students' Average Daily Social Media Use vs. Overall Mean**

### Interpretation

The results from the one-sample t-test reveal that low-achieving students (those with exam scores <60) spend significantly more time on social media each day compared to the overall student average. Specifically, the mean daily social media usage for low-achievers was 2.74 hours, while the overall student average was 2.51 hours. The test statistic of 3.36 and a very small p-value (0.00044) indicate that this difference is statistically significant at the 0.05 level. Therefore, we can confidently reject the null hypothesis and conclude that low-achieving students do spend more time on social media per day than the general student population.

### Conclusion

Overall, the findings confirm that low-achieving students tend to spend more time on social media than their peers, with an average of 2.74 hours per day compared to 2.51 hours for the overall student population. This supports the established link between excessive social media use and poorer academic outcomes.

However, the difference—approximately 0.23 hours (about 14 minutes) per day—is relatively modest. This suggests that while increased social media use is a risk factor for lower academic achievement, its impact, as observed in this study, is present but not dominant.

### Key Insights

The data reveals that low-achieving students spend slightly more time on social media than the overall student population—2.74 hours versus 2.51 hours per day. Although this difference is statistically significant, its modest size invites further scrutiny. A 14-minute increase may not, on its own, meaningfully alter academic outcomes, prompting reflection on whether time spent is the most informative measure of social media's impact.

While the association between higher social media use and lower academic performance is observable, it remains uncertain whether social media is a direct contributor to underperformance, or whether it reflects broader behavioral patterns—such as procrastination, disengagement, or elevated stress. The nature and purpose of use may also matter: passive scrolling may affect focus differently than purposeful, collaborative engagement.

The context in which students turn to social media further complicates interpretation. For some, it may serve as a coping mechanism or momentary distraction; for others, it may offer emotional support or academic resources.

Without insight into intention or content, drawing firm conclusions from usage duration alone risks oversimplification.

Ultimately, the findings suggest a nuanced relationship between digital behavior and academic outcomes—one that may depend less on the quantity of usage than on the underlying motivations and circumstances surrounding it. Exploring these dimensions more closely could lead to a fuller understanding of when and how digital habits become academically consequential.

**Question 3:** *Do students who sleep more than 7 hours per night achieve higher average exam scores than those who sleep 7 hours or less?*

### ***Test Choice***

A one-sided two-sample t-test was selected because the research question compares the mean exam scores of two independent groups—students who sleep more than 7 hours per night and those who sleep 7 hours or less. The two-sample t-test is appropriate here as it allows for a direct comparison between these two distinct groups.

Furthermore, a one-sided (one-tailed) test was chosen because the hypothesis specifically predicts a directional effect: that students with longer sleep duration achieve higher average exam scores, rather than simply any difference. By using the "greater" alternative, the analysis is focused on detecting whether sufficient sleep is associated with improved academic performance, thereby increasing the statistical power to identify an effect in the hypothesized direction.

### ***Explanation of the hypothesis testing***

#### **Null Hypothesis ( $H_0$ )**

Students who sleep more than 7 hours per night have exam scores less than or equal to those who sleep 7 hours or less.

$$H_0 : \mu_{>7 \text{ hours}} \leq \mu_{\leq 7 \text{ hours}}$$

#### **Alternative Hypothesis ( $H_1$ )**

Students who sleep more than 7 hours per night have higher exam scores than those who sleep 7 hours or less.

$$H_1 : \mu_{>7 \text{ hours}} > \mu_{\leq 7 \text{ hours}}$$

The following are the steps for performing a hypothesis test:

#### ***Step 1 – State the Hypotheses***

- $H_0: \mu_{\text{sleep}>7} \leq \mu_{\text{sleep}\leq 7}$
- $H_1: \mu_{\text{sleep}>7} > \mu_{\text{sleep}\leq 7}$

Result: One-sided hypothesis comparing two independent group means.

#### ***Step 2 – Set Significance Level***

- $\alpha = 0.05$

Result: 5% significance threshold.

### *Step 3 – Select the Test*

- Two-sample, one-sided t-test (alternative = “greater”)

Result: Correct for comparing two independent samples.

### *Step 4 – Compute Test Statistic*

- $\bar{x}_{\text{sleep} > 7} = 72.1$
- $\bar{x}_{\text{sleep} \leq 7} = 68.5$
- $t = 3.16$
- p-value = 0.00083

Result: Statistically significant difference favoring longer sleepers.

### *Step 5 – Decision & Conclusion*

- $p < 0.05 \rightarrow$  reject  $H_0$ .

Conclusion: Students sleeping >7 hours score significantly higher on exams.

### ***Test Results***

Name	Type	Value
t_test3	list [10] (S3: htest)	List of length 10
statistic	double [1]	3.158354
parameter	double [1]	593.8714
p.value	double [1]	0.0008335943
conf.int	double [2]	1.74 Inf
estimate	double [2]	72.1 68.5
null.value	double [1]	0
stderr	double [1]	1.154587
alternative	character [1]	'greater'
method	character [1]	'Welch Two Sample t-test'
data.name	character [1]	'sleep_more and sleep_less_equal'

**Table 3. Two-Sample t-Test: Average Exam Scores by Sleep Duration (>7 Hours vs. ≤7 Hours)**

### ***Interpretation***

The results from the one-sided two-sample t-test indicate that students who sleep more than 7 hours per night achieve significantly higher average exam scores compared to those who sleep 7 hours or less. Specifically, the average exam score for students with more than 7 hours of sleep was 72.1, while the average for those with 7 hours or less was 68.5. The test statistic of 3.16 and a p-value of 0.00083 demonstrate that this difference is statistically significant at the 0.05 level. Therefore, the null hypothesis can be confidently rejected, supporting the conclusion that sufficient sleep is associated with improved academic performance.

These findings reinforce existing research on the importance of adequate sleep for learning and cognitive functioning. Encouraging students to prioritize healthy sleep habits may be an effective strategy for boosting academic outcomes and supporting overall well-being.

### ***Conclusion***

The analysis reveals that students who sleep more than seven hours per night attain higher average exam scores (72.1) compared to those who sleep seven hours or less (68.5), with the difference being statistically significant. This finding points to a meaningful association between sleep duration and academic performance, reinforcing the role of rest in supporting cognitive functioning and learning.

### ***Key Insight***

The analysis indicates that students who sleep more than seven hours per night tend to achieve higher exam scores than those who sleep less, with the difference reaching statistical significance. This pattern aligns with existing scientific literature linking adequate sleep to improved concentration, memory consolidation, and cognitive functioning, suggesting that sleep duration may play a meaningful role in academic performance.

At the same time, the nature of this relationship remains open to interpretation. It is uncertain whether longer sleep directly enhances academic outcomes, or whether it reflects broader lifestyle or psychological factors—such as emotional stability, lower stress, or more structured routines. In this light, sleep may function as both a contributor to and a consequence of academic success.

Moreover, the variation in students' sleep habits invites further questions. Is reduced sleep among lower-performing students the result of deliberate academic sacrifice—such as staying up late to study—or does it indicate deeper issues such as anxiety, time mismanagement, or lack of external support? If students are sleeping less in an effort to perform better, it raises the possibility that such trade-offs may not be as effective as intended.

Ultimately, while the data reveals a consistent association between sufficient sleep and stronger academic results, the mechanisms behind this relationship remain complex. Understanding when, why, and for whom sleep becomes a critical factor may require further exploration of students' lived experiences, motivations, and learning environments.

## Summary

This study investigated how three specific daily habits—study time, sleep duration, and social media usage—relate to academic performance among university students. By applying hypothesis testing to categorized performance groups, the analysis uncovered distinct behavioral patterns that offer insight into how students' everyday routines may influence their learning outcomes.

The first key finding confirms that high-achieving students (exam scores  $\geq 80$ ) devote significantly more hours to studying than the average student. This supports existing educational research, which emphasizes consistent and focused study time as a core contributor to academic success. It also reinforces the view that academic excellence may stem not from innate ability alone, but from deliberate and sustained effort.

In contrast, the second finding shows that students with lower academic performance (exam scores  $< 60$ ) tend to spend more time on social media than their peers. Although the difference in time is statistically significant, its relatively small magnitude suggests that social media alone is unlikely to be a decisive factor. Instead, heavier social media use may reflect broader patterns—such as procrastination, reduced motivation, or poor time management—that can contribute to academic difficulties.

The third finding highlights the role of sleep, revealing that students who sleep more than seven hours per night perform better on average than those who sleep less. This aligns with established research on cognitive functioning and supports the idea that adequate rest is an often-overlooked but measurable component of student well-being and academic achievement.

Taken together, these results point toward a broader insight: academic performance appears to be shaped not only by intellectual capacity but by a constellation of behavioral choices and lifestyle patterns. Among the three habits examined, study discipline and sleep duration showed more substantial associations with academic outcomes, while social media use—though relevant—may operate more subtly or indirectly.

At the same time, these findings open space for further reflection. It remains unclear whether these habits directly influence academic success, or whether they serve as indicators of deeper psychological, motivational, or environmental factors. For example, students who study longer or sleep more may be benefitting from better self-regulation, time management, or emotional stability—factors that this study does not explicitly measure.

In particular, the nuanced role of social media use suggests that behavior should not be interpreted in isolation. Its impact may depend on purpose, content, and context—whether students are using it for passive entertainment, active learning, or social support.

To better understand the dynamics between behavior and academic outcomes, future research might explore how these daily habits interact with students' intentions, stress levels, or learning environments. Looking beyond the quantity of time spent toward the quality and purpose of each habit could yield more meaningful insights into the student experience.

Ultimately, academic performance may be less about following a specific behavioral formula and more about navigating a complex interplay of personal habits, psychological traits, and contextual pressures—an understanding that continues to evolve with further inquiry.

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