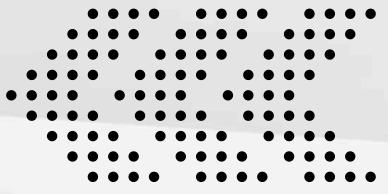


Research of Finding a Correlation Between Phone Screen Time and Previous Grade Point Semester from Computer Science and Data Science Field in BINUS University

Survey and Sampling Methods Final Project

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PROBLEM STATEMENT

The rise of digital technology, especially smartphones, has changed student behavior, with devices used for communication, entertainment, and navigation. The impact of screen time and app usage on students has become a key area of academic research.



Increasing smartphone use among university students, often spent on non-academic activities like social media and gaming.



Excessive screen time leads to distractions, poor time management, procrastination, and reduced academic motivation.



Blurred boundaries between study time and leisure result in multitasking, lowering cognitive focus and academic productivity.



This study aims to investigate the correlation between daily phone screen time and previous semester's GPS to provide evidence-based insights.



RESEARCH QUESTION

1. Is there a statistically significant correlation between the average daily phone screen time and the previous semester's Grade Point Semester (GPS) among Computer Science and Data Science students at BINUS University?
2. If such correlation exists, what is the strength of the correlation?

MAIN OBJECTIVES

- Analyze the potential correlation between phone screen time and GPS.
- Examine students' average daily screen time.
- Identify the most frequently used application types.
- Explore patterns and associations between digital habits and academic outcomes.
- Provide insights into the relationship between digital behavior and academic performance.

IMPORTANCE OF STUDY

For Computer Science and Data Science Students at BINUS University

Provides data to help students understand and improve their screen time habits to potentially boost academic performance.

For BINUS University and Its Faculties

Provides valuable data-driven insights for academic advisors, counselors, and faculty, enabling them to support students more effectively.

For the Academic and Research Community

Fills a research gap by focusing on BINUS University students, offering a basis for future comparative studies on screen time and academic performance.

SURVEY DESIGN

Self-administered online questionnaire using Google Form

SECTIONS

- Informed Consent
- Demographic Data
- Screen Time
- Academic Performance

QUESTION TYPES

- Multiple Choice
- Checkbox
- Likert Scale
- Open Ended

SURVEY DESIGN

PRE-TEST PROCESS & REVISIONS

Pilot test was conducted with a sample of 20 respondents

- Enhanced clarity & specificity
- Removing redundant question
- Improved details and guidance for participants
- enriched data collection
- General wording refinements

POPULATION & SAMPLING

SAMPLING FRAME

TARGET POPULATION:

B27 students majoring in Computer Science and Data Science at BINUS University, Kemanggisan campus, with an estimated total of 785 students.

SAMPLING FRAME:

- Computer Science: **LA01, LB01, LC01, LD01, LE01, LF01, LG01, LH01, LI01**
- Data Science: **LA09, LB09, LC09**

POPULATION & SAMPLING

SAMPLING METHOD

-  The study employed a Simple Random Sampling method within a non-probability sampling framework.
-  The purpose is to ensure that every student in the target classes had an equal chance of being selected, thereby minimizing selection bias and improving sample representativeness.

POPULATION & SAMPLING

SAMPLE CALCULATION

- ✓ The sample size calculation utilized the finite population formula with a total population of 785 Students
- ✓ Using a 95% confidence level (Z-score = 1.96), estimated proportion of 0.5 (most conservative estimate), and margin of error of 10%, the calculation yielded a required sample size of approximately 86 respondents.

POPULATION & SAMPLING

ACTUAL SAMPLE OBTAINED

A total of 86 valid responses were collected

Demographic of respondents by major:

- Computer Science: 44 respondents (51.2%)**
- Data Science: 42 respondents (48.8%)**

DATA COLLECTION

SURVEY MODE

- The survey was conducted online via Google Forms for accessibility and ease of distribution.
- Due to no official database, Simple Random Sampling was applied to Computer Science and Data Science student group lists.
- Selected students were individually messaged with survey details and a link, ensuring equal selection chance and minimizing bias.

DURATION

THREE WEEKS

Tuesday, 21st May 2025 - Tuesday, 10th June 2025

DATA COLLECTION CHALLENGES

The primary challenge was participant non-response. To achieve the target sample size, a systematic follow-up strategy was implemented:

- Non-responsive students received a polite follow-up message after a few days.
- If still unresponsive after two follow-up attempts, a new student was randomly selected as a replacement from the sampling frame.

This process continued until all 86 target responses were secured, maintaining sample size and randomization integrity.

DATA ANALYSIS

-  **Missing values were converted to 0, as all survey questions were mandatory, except for the open-ended question on reasons for reducing screen time.**
-  **Null values in the open-ended question were treated as having no reason, since only respondents who reduced screen time answered it.**
-  **Typos and spelling errors in open-ended responses were manually corrected for consistency and easier analysis.**
-  **No outliers or inconsistent responses were found, so no additional cleaning was needed.**

DESCRIPTIVE STATISTICS

major

Jurusan

screentime_spend

Berapa rata-rata waktu penggunaan layar smartphone (screen time) harian kamu (dalam satuan jam)?

screentime_app

Dari total screen time smartphone kamu, jenis aplikasi apa yang paling banyak menghabiskan waktumu?

phone_distraction_freq

Seberapa sering kamu merasa terganggu oleh penggunaan smartphone untuk hal non-akademik (e.g. sosial media, game, streaming video) saat sedang belajar?

reduced_phone_use

Apakah kamu pernah secara sadar mengurangi penggunaan smartphone pada semester kemarin?

DESCRIPTIVE STATISTICS

reduction_reason

Apa alasan utama kamu mengurangi penggunaan smartphone pada semester kemarin?

GPS

Berapa range Grade Point Semester (GPS) kamu pada semester ganjil 2024/2025?

screentime_impact

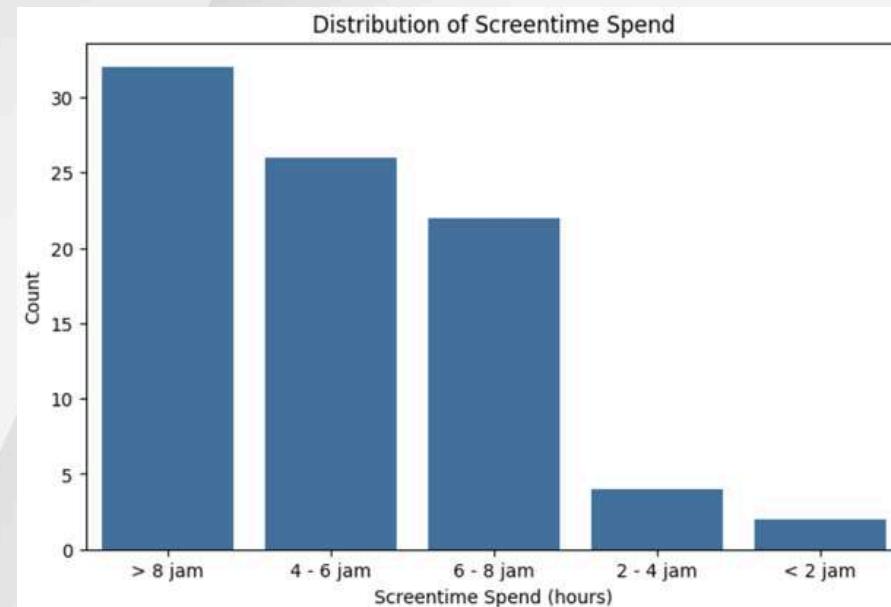
Menurut kamu, bagaimana efek dari screen time terhadap performa akademik pada semester kemarin (semester ganjil 2024/2025)?

screentime_on_learning

Bagaimana kebiasaan screen time memengaruhi performamu dalam belajar di semester ganjil 2024/2025.

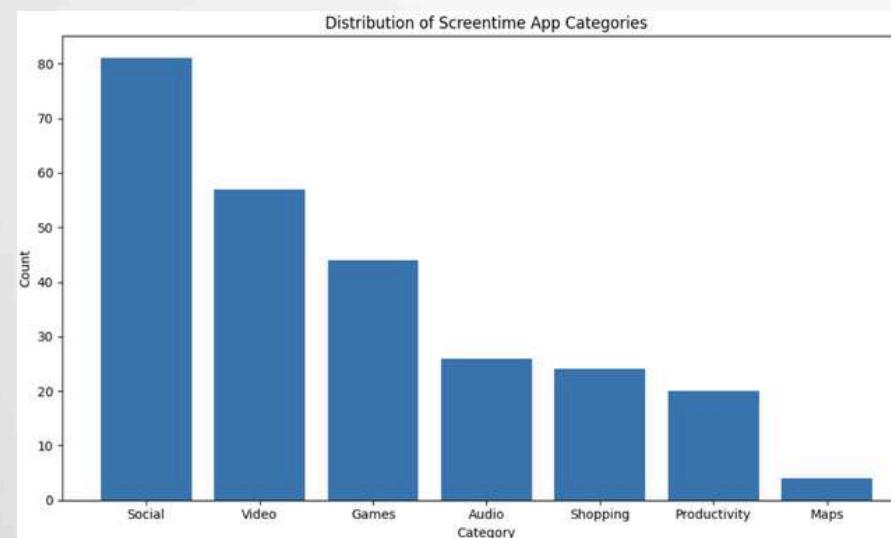
DESCRIPTIVE STATISTICS

SCREENTIME_SPEND



- The most common screen time category was over 8 hours per day.
- Fewer respondents spent 2-4 hours or less than 2 hours per day on their phones.
- Indicates that high daily screen time is common, raising concerns about excessive smartphone use among students.

SCREENTIME_APP

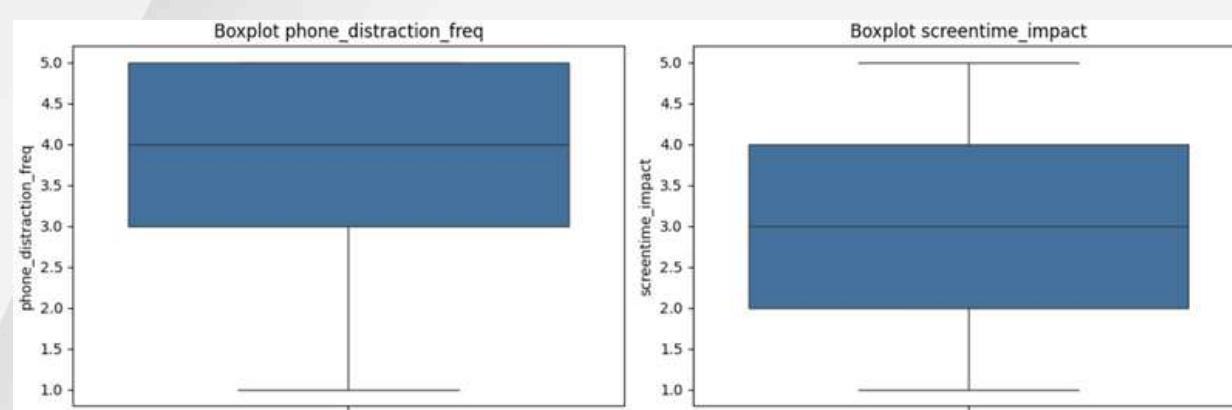


- Most respondents reported using social media, video, and gaming apps.
- Indicates that screen time is primarily spent on entertainment and social interaction, reflecting common digital habits among students.

DESCRIPTIVE STATISTICS

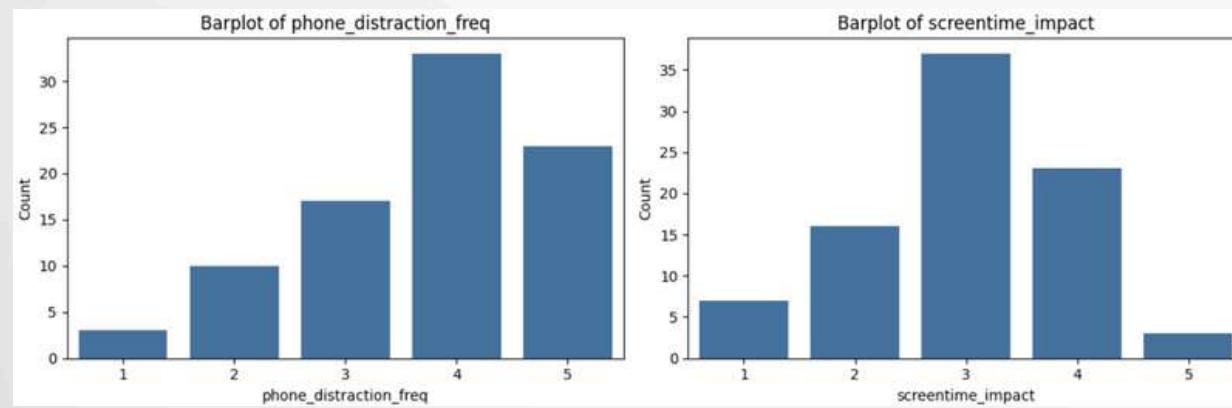
PHONE_DISTRACTION_FREQ & SCREENTIME_IMPACT

BOXPLOT



- The boxplots showed significant variation in the perceived impact of screen time, indicating that its effect isn't always significant.
- Most respondents reported frequent distractions (levels 4 or 5), with distraction levels naturally varying among individuals, which doesn't require further preprocessing.

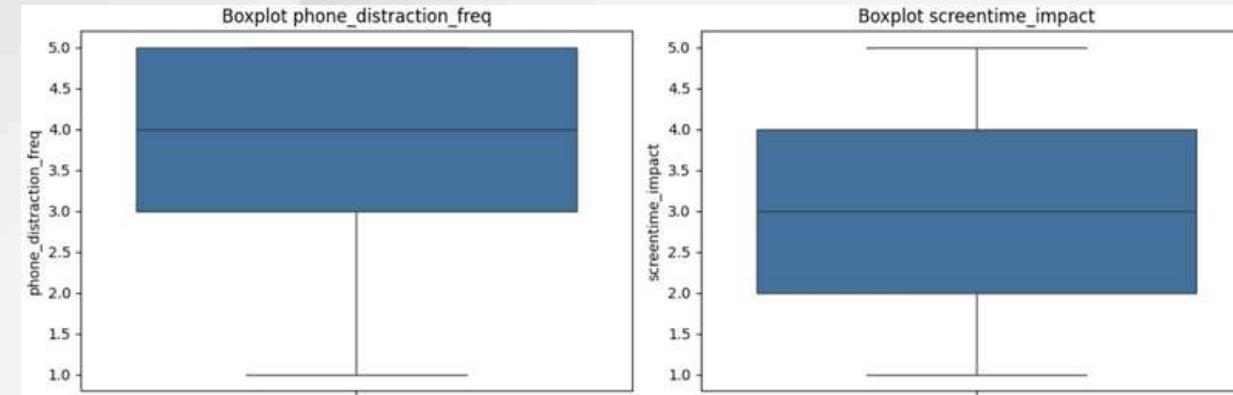
BARPLOT



- Most respondents reported high distraction levels (4 and 5) during study sessions.
- Perceptions of screen time's academic impact were generally neutral (3), with some seeing it as somewhat negative (4) or slightly positive (2).
- Few perceived an extreme impact, indicating a moderate or mixed effect on academic performance.

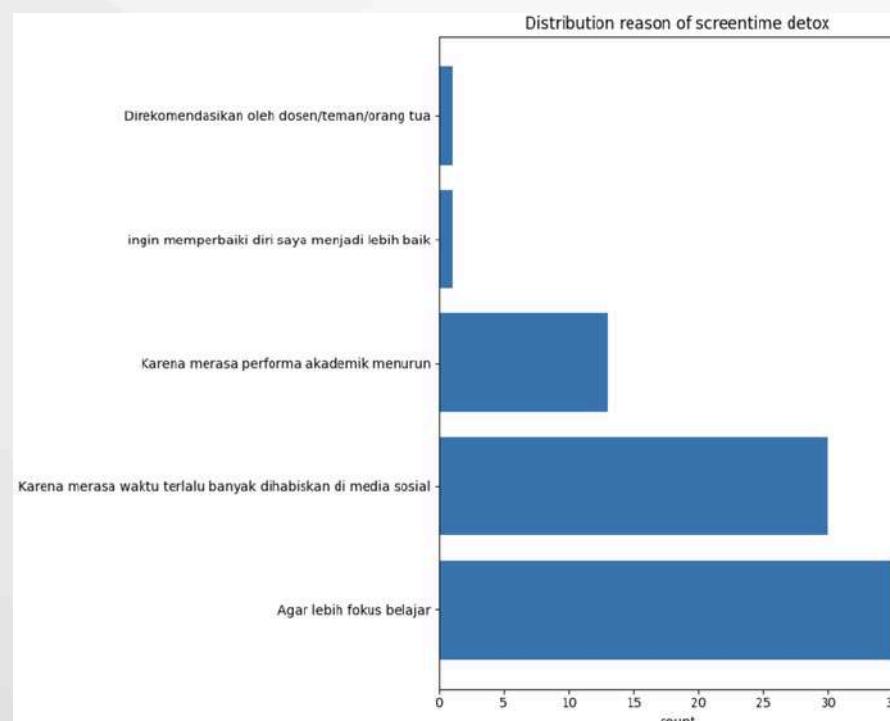
DESCRIPTIVE STATISTICS

REDUCED_PHONE_USE



- More respondents reported consciously reducing their smartphone usage ("Pernah") than those who did not ("Tidak").
- This suggests that many students are aware of their smartphone habits and have made efforts to limit usage, though many have not attempted to reduce screen time.

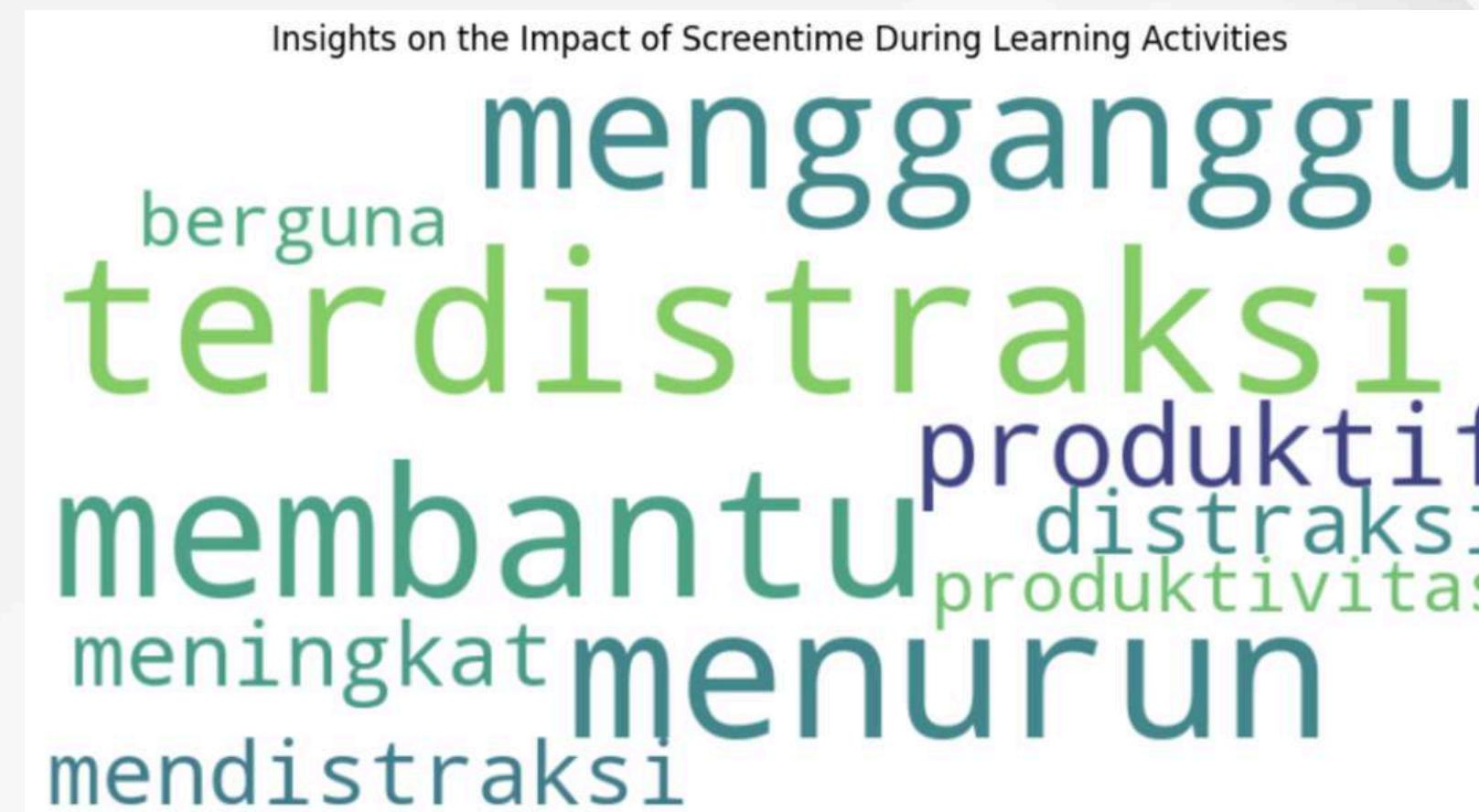
REASON OF SCREENTIME DETOX



- The most common reason for reducing screen time was the desire to focus on studying, reflecting the academic responsibilities of university students.
- Many students reported feeling distracted by their smartphones while studying, which motivated them to reduce usage to improve concentration and productivity.

DESCRIPTIVE STATISTICS

INSIGHTS ON IMPACT ON SCREENTIME DURING LEARNING ACTIVITIES



- The top 10 most frequent words reveal mixed perceptions of screentime during learning.
- Negative terms (i.e terdistraksi, mengganggu) suggest that many students feel distracted and have reduced focus. However, positive words (i.e membantu, produktif) suggest that others find screen time helpful for learning.
- This contrast highlights that the impact of screen time depends on individual habits and usage.

INFERRENTIAL ANALYSIS

CROSS TABULATION

app_list	Audio	Games	Maps	Productivity	Shopping	Social	Video
GPS							
2.00 - 2.99	3	3	0	2	1	4	2
3.00 - 3.49	10	17	3	3	8	27	16
3.5 - 3.89	10	19	0	11	11	36	27
< 2.00	1	0	1	0	1	0	0
> 3.90	2	5	0	4	3	14	12

- Social media and video apps are popular across all GPA levels, especially among mid to high-achieving students.
- Productivity app use is more common in higher GPA groups, suggesting more balanced digital habits.
- Games are popular in mid-range GPAs, they're also seen in top performers.
- Low GPA students use fewer apps overall but still engage with social and video content.
- Higher-GPA students blend entertainment with purposeful app usage.

INFERENTIAL ANALYSIS

CROSS TABULATION

phone_distraction_freq	1	2	3	4	5
GPS					
2.00 - 2.99	0	0	2	2	1
3.00 - 3.49	0	4	4	11	9
3.5 - 3.89	2	5	7	16	8
< 2.00	1	0	0	0	0
> 3.90	0	1	4	4	5

- Moderate to high phone distraction (levels 3-5) is prevalent across all GPA groups, including top academic performers.
- Mid (3.00-3.49) and high GPA students (3.5-3.89) report the most frequent distraction, particularly at level 4. This indicates that frequent phone distraction is common regardless of GPA and does not directly equate to poor academic performance.

INFERENTIAL ANALYSIS

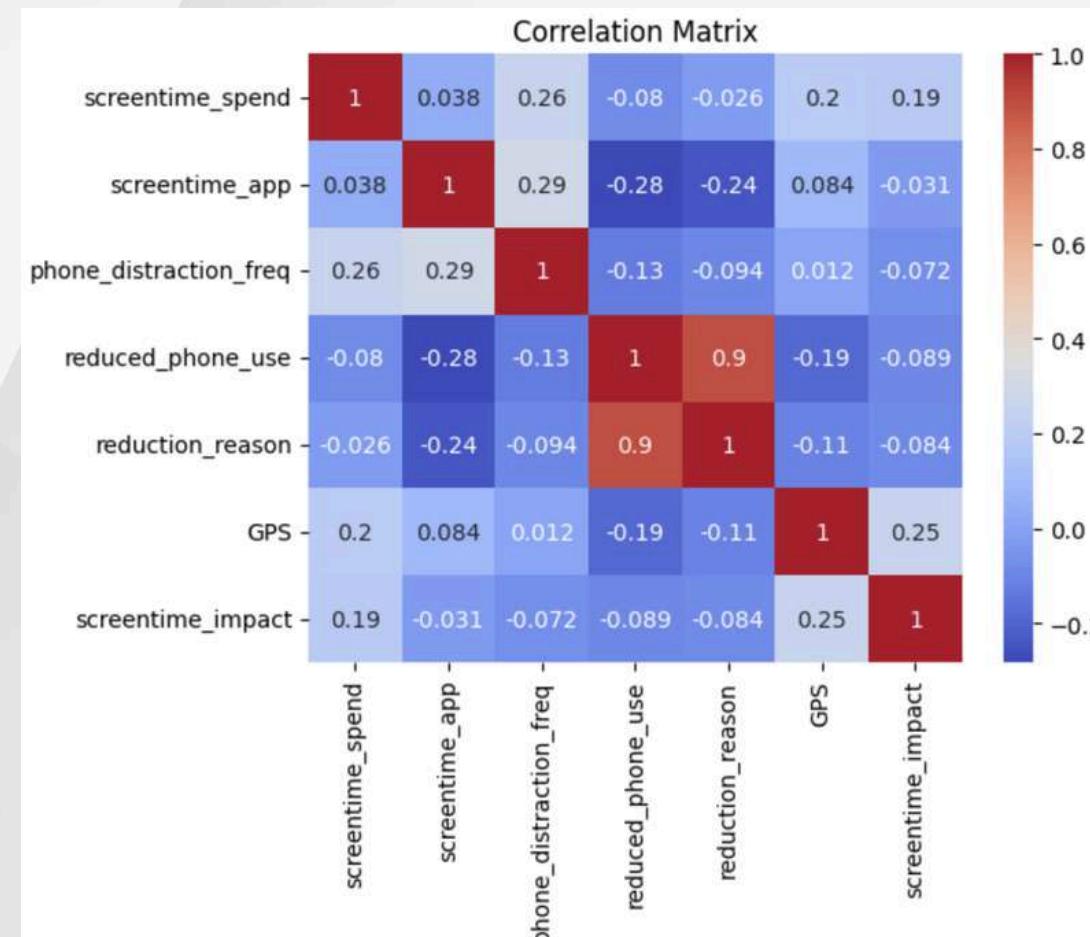
CROSS TABULATION

screentime_impact	1	2	3	4	5
GPS					
2.00 - 2.99	1	3	1	0	0
3.00 - 3.49	4	4	13	7	0
3.5 - 3.89	1	6	17	12	2
< 2.00	0	1	0	0	0
> 3.90	1	2	6	4	1

- Most students, particularly those with GPAs between 3.00 and 3.89, perceive a moderate impact of screen time on their academic performance (level 3).
- High GPA students (>3.90) also report some impact (levels 3-5).
- Lower GPA students (<3.00) largely report a low impact (levels 1-2).
- The data suggests that screen time is generally perceived as having a moderate effect, irrespective of GPA.

INFERRENTIAL ANALYSIS

CORRELATION TEST



- Mostly weak or very weak correlations between variables, indicating no strong linear relationships. The only strong correlation was between reduced_phone_use and reduction_reason, which is expected.
- Weak positive correlations were observed between:
 - GPS and screentime_impact ($p \approx 0.25$): suggesting a slight link between perceived screen time impact and GPS ranges.
 - screentime_spend and phone_distraction_freq ($p \approx 0.26$): indicating a mild association between higher screen time and more distraction.
- No single factor strongly predicts academic performance (GPS) or screen time impact in this dataset, beyond logically dependent variables.

RELIABILITY AND QUALITY CHECK

The survey achieved a **100%** response rate, with all 86 targeted individuals participating.

CRONBACH'S ALPHA

Using **Cronbach's Alpha**, an internal consistency check, for the variables screentime_spend, phone_distraction_freq, and screentime_impact yielded a value of **0.238**, indicating very low internal consistency. This low value is expected and reasonable because these variables measure distinct aspects of smartphone use (total usage, frequency of distraction, and perceived impact on academics) and are not intended to represent a single construct. **Therefore, this low Cronbach's Alpha does not undermine the validity of the data.**

KAIser-MEYER-OLKIN (KMO) TEST AND BARTLETT'S TEST OF SPHERICITY

```
KMO Score: 0.434
Bartlett's Test p-value: 0.03889

Eigenvalues:
Factor 1: 1.25
Factor 2: 1.08
Factor 3: 0.67

Factor Loadings:
      Question   Distraction Level   Usage Behavior
screentime_impact           -0.005787    0.494589
phone_distraction_freq        0.556259   -0.203433
screentime_spend             0.544455    0.266115
```

A factor analysis was conducted to assess construct validity, yielding a **Kaiser-Meyer-Olkin (KMO)** score of **0.434**. This low score suggests the dataset may not be ideal for factor analysis. However, **Bartlett's Test of Sphericity** had a p-value of **0.03889**, confirming the variables are **sufficiently correlated for analysis**.

Two factors were extracted: Factor 1, "Distraction Level" (loaded by phone_distraction_freq and screentime_spend), and Factor 2, "Usage Behavior" (loaded by screentime_impact). Some overlap was noted as screentime_spend loaded on both. Overall, the weak KMO score and limited items suggest weak construct validity, so interpretations of the factor structure should be made with caution.

KEY FINDINGS & DISCUSSIONS

No Strong Correlation Found

No strong correlation between phone screen time and GPS was found, with weak correlations observed, suggesting that screen time alone does not significantly impact academic outcomes (Jiawei H. et al, 2012).

High Screen Time is Common

Most students spend over 8 hours daily on smartphones, regardless of GPA, indicating that high screen time is a common behavior among students in technology-related fields., supporting Sapci et al. (2021), who noted that digital technology significantly transforms student behavior.

KEY FINDINGS & DISCUSSIONS

Frequently Distracted Does Not Mean Low Academic Performance

High levels of smartphone distraction (levels 4 to 5) were reported across all GPA ranges, including high-GPA students (GPA >3.90), suggesting that smartphone distractions do not directly lower academic performance, and managing distractions may be more important than limiting screen time. It highlights the need for students to focus on managing their distractions rather than solely restricting phone use.

The Balance of Application Usage May More Relevant

Higher GPA students use a mix of entertainment and productivity apps, while lower GPA students primarily use entertainment apps. This suggests that the type of apps, rather than screen time duration, has a stronger impact on academic performance. High-GPA students likely balance entertainment with academic tools, highlighting the importance of app prioritization over limiting screen time.

KEY FINDINGS & DISCUSSIONS

Perception of Screen Time Does Not Reflect Actual Performance

Most of the students perceive screen time as having a moderate impact (level 3) on their academic performance. Interestingly, lower GPA students reported perceiving less impact from screen time than higher GPA students. This result suggests a potential disconnect between perceived and actual impact so we encourage students to develop more accurate self-awareness about their technology use patterns.

CONCLUSION & RECOMMENDATION

Main Takeaway

This project concludes that no strong correlation exists between daily smartphone screen time and academic performance (GPS) among BINUS University's Computer Science and Data Science students.

Key findings indicate:

- High screen time and frequent distractions are common, but these do not directly or significantly impact academic achievement.
- The type of apps used (e.g., productivity vs. entertainment) and distraction management strategies appear to be more influential factors.
- The focus should shift from merely reducing screen time to fostering more intentional and balanced digital habits.

CONCLUSION & RECOMMENDATION

Areas for Improvement

The project could be enhanced by refining the sampling process for better representation across majors and extending the data collection period for more robust responses. Incorporating objective behavioral data (e.g., app usage logs) would improve the accuracy of self-reported screen time. Furthermore, designing the questionnaire to minimize interpretation bias and including more diverse variables like mental health, motivation, or time management would offer a more holistic perspective.

CONCLUSION & RECOMMENDATION



Limitations of the Study

- **Self-reported data** introduces recall and social desirability biases, potentially affecting accuracy.
- The **cross-sectional design** prevents inferring causality.
- The **sample may not fully represent** the broader student population despite meeting size requirements.
- **Categorical variables** limit analytical precision and deeper statistical modeling.

CONCLUSION & RECOMMENDATION



Limitations of the Study

- **Regression Models:** Applying regression models to identify interaction effects between multiple factors (e.g., app category usage, distraction levels, and GPA).
- **Cluster Analysis:** Utilizing cluster analysis to uncover distinct behavioral profiles among students with similar screen time patterns and academic outcomes.
- **Longitudinal Study:** Conducting a longitudinal study to assess changes over time, which would help in revealing potential causal relationships rather than solely relying on correlation-based insights.