

THE IMPACT OF HAVING PARENTS IN TECH ON

STUDENT PERFORMANCE & HABITS

HomeWork 5 - CMSC320

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INTRODUCTION

WHAT'S THE OBJECTIVE?

This analysis dives deep into how tech-savvy parents impact their children's GPA, programming habits, study routines, and even lifestyle factors like sleep and screentime.



HOW DOES THE DATA LOOK? DATA COLUMNS

- **Tech_Parents:** “Number of parents in tech (0, 1, or 2)”
- **Prog_Age:** “Age at which the student started programming.”
- **GPA_Last & GPA_Lasttolast:** “GPA for the last two semesters.”
- **Notes:** “Note-taking method (Tablet, Paper, Computer, or None).”
- **Screentime:** “Average daily screentime in hours.”
- **Sleep:** “Hours of sleep per day.”
- **Other variables:** Group Study habits, scholarship status private school attendance.

Time	State	Major	Prog_Age	Private_School	Scholarship	Tech_Parents	Grp_Study	Notes	Creds_last	Screentime	Tiktok_Time	Sleep	GPA_Last	GPA_Lasttolast
11/5/2024 14:57:00	NJ	Computer Science	14.0	No	NaN	No parents	Sometimes	Yes, on a tablet	16	5.0	2.0	7.0	2.780	2.600
11/5/2024 14:57:33	VA	Computer Science	8.0	No	Partial	Two parents	Sometimes	Yes, on paper	17	3.5	1.0	7.0	3.900	3.700
11/5/2024 14:57:41	MD	Computer Science	14.0	No	Partial	No parents	Frequently	Yes, on paper	17	6.5	2.0	8.0	3.900	4.000
11/5/2024 14:57:50	VA	Computer Science	14.0	No	Partial	One parent	Frequently	Yes, on paper	18	6.0	2.0	8.0	4.000	4.000
11/5/2024 14:57:54	CA	Data, Government and Politics	11.0	No	Partial	Two parents	Frequently	Yes, on a computer	15	5.0	1.0	8.0	4.000	4.000

DATA CLEANING

HANDLING NULLS

These were the columns with nulls:

	0
State	1
Prog_Age	1
Screentime	3
Tiktok_Time	4
Sleep	1
GPA_Last	3
GPA_Lasttolast	3

Since, this is only 9.6% of the data, I decided to delete rows with null values for the ease of analysis.

CHANGING VALUES

There were multiple columns that were purely categorical but either represented binary categories or ranges of some sort. I changed them to numbers for the ease of analysis.

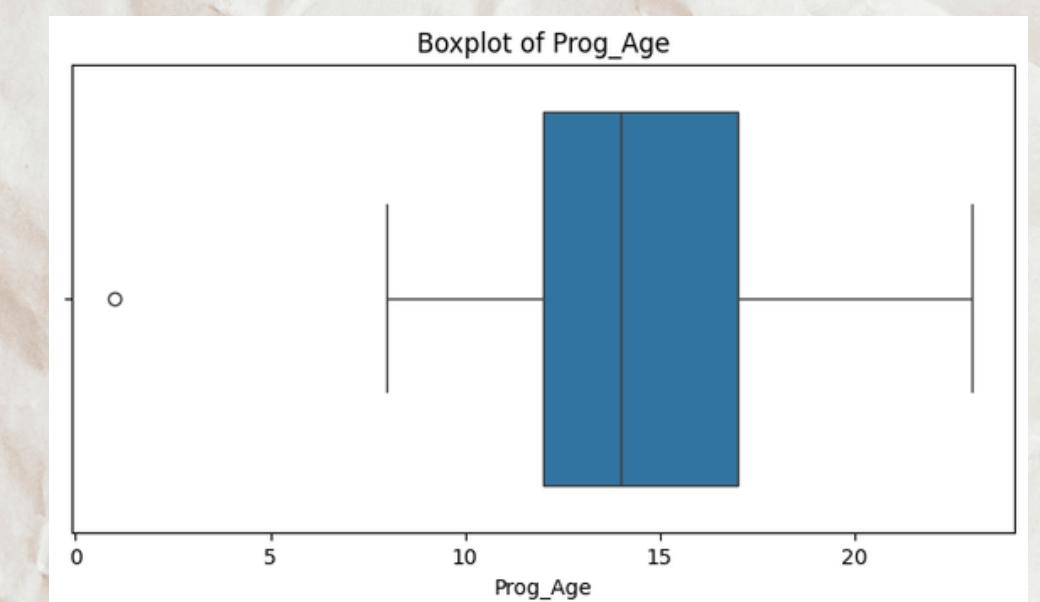
Example (Scholarship):

- NaN -> 0
- Partial -> 1
- Full -> 2

MANAGING OUTLIERS

Distribution for every column had a very outliers but they seemed fairly believable like having Screentime \geq 12hrs.

However the only outlier which a possible misentry of data or too drastic of an outlier was Programming at the age of 2. Thus, I removed it.



VISUALIZING CLEAN DATA

	State	Major	Prog_Age	Private_School	Scholarship	Tech_Parents	Grp_Study	Notes	Creds_Last	Screentime	Tiktok_Time	Sleep	GPA_Last	GPA_LasttoLast	Double_Major
0	NJ	CS	14.0	0	0.0	0	1	Tablet	16	5.0	2.0	7.0	2.780	2.600	0
1	VA	CS	8.0	0	1.0	2	1	Paper	17	3.5	1.0	7.0	3.900	3.700	0
2	MD	CS	14.0	0	1.0	0	2	Paper	17	6.5	2.0	8.0	3.900	4.000	0
3	VA	CS	14.0	0	1.0	1	2	Paper	18	6.0	2.0	8.0	4.000	4.000	0
4	CA	D+GP	11.0	0	1.0	2	2	Computer	15	5.0	1.0	8.0	4.000	4.000	1
...
68	MD	CS	16.0	0	0.0	1	1	Paper	15	5.5	1.0	8.0	3.557	3.504	0
69	MD	CS	15.0	0	2.0	0	0	Paper	17	10.0	1.0	8.0	4.000	4.000	0
70	MD	CS	17.0	0	0.0	0	0	Paper	16	5.0	2.0	5.0	3.500	3.700	0
71	NJ	CS	15.0	0	0.0	1	2	Paper	17	9.0	3.0	6.0	3.894	3.940	0
72	TX	CS	13.0	1	1.0	0	0	No	15	4.0	1.0	8.0	3.900	3.900	0

25 rows x 15 columns

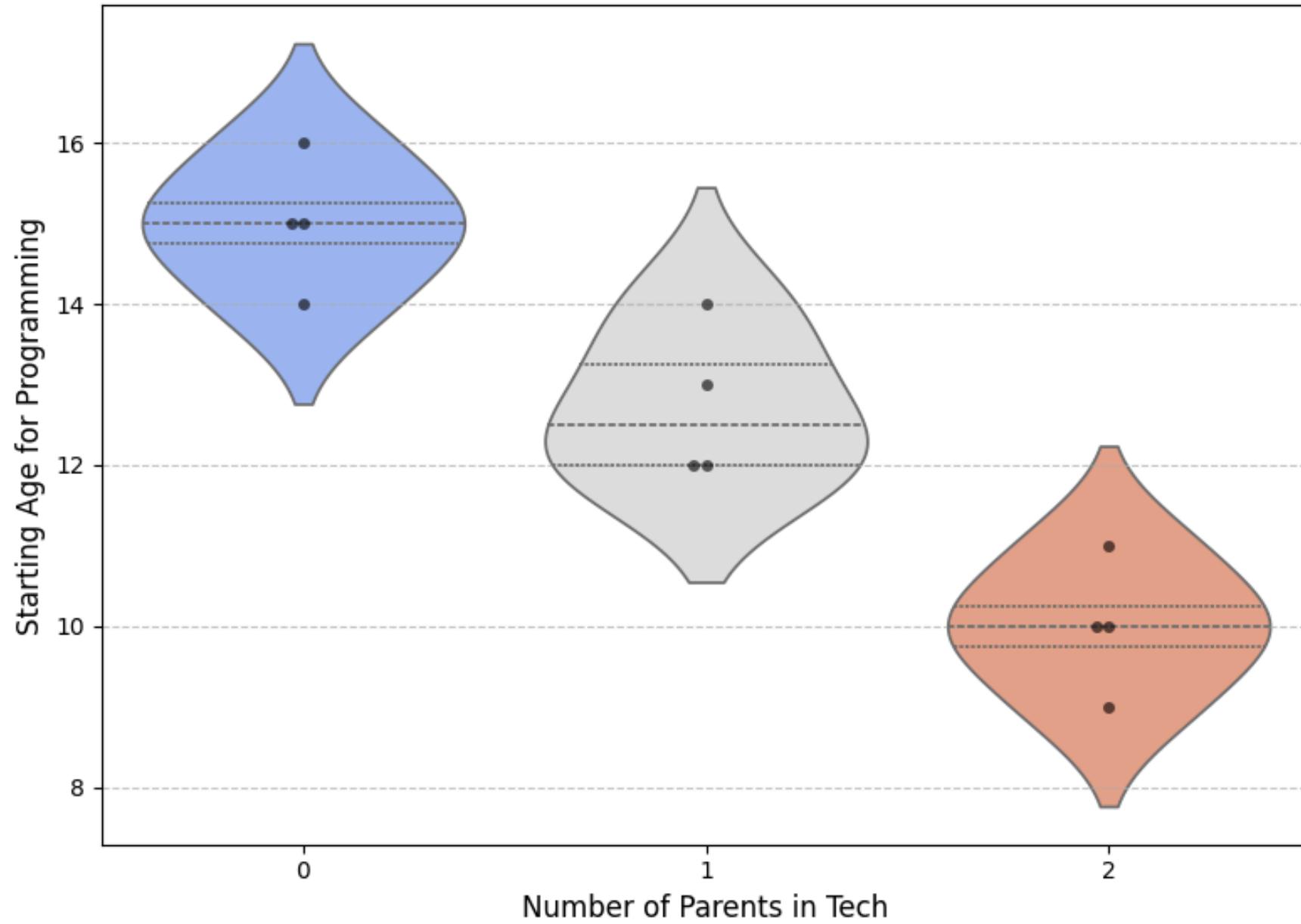
Additional Elements Added: Changed the Major Values to common abbreviations and added a column called "Double_Major" to denote if a student is double majoring.

APPROACH TO ANSWERING THE QUESTION

1. **Impact of Tech_Parents in the Starting Age of Programming (Prog_Age)**
 - o Perform Correlation
 - o ANOVA Testing
2. **Impact of Tech_Parents on GPA**
 - o Compare Correlations with GPA_Last and GPA_Lasttolast
 - o ANOVA Testing
3. **Impact of Tech_Parents on Study Habits**
 - o Explore Relation with Group Study
 - o Explore Relation with Note Taking behavior
4. **Impact of Tech_Parents on Lifestyle**
 - o Explore Relation with Sleep
 - o Explore Relation with Screen time
 - o Explore Relation with TikTok time

Note: Tech_Parents refers to the number of parents a student has in the tech field.

Starting Age for Programming by Tech Parents



ANOVA F-statistic: 5.831, P-value: 4.780e-03

Conclusion: Tech_Parents significantly impacts Prog_Age.

Tech_Parents	count	mean	std	min	25%	50%	75%	max
0	34.0	15.264706	2.863658	10.0	13.25	16.0	17.00	23.0
1	16.0	14.562500	2.874456	10.0	12.75	14.5	16.25	20.0
2	15.0	12.333333	2.439750	8.0	11.00	12.0	13.00	18.0

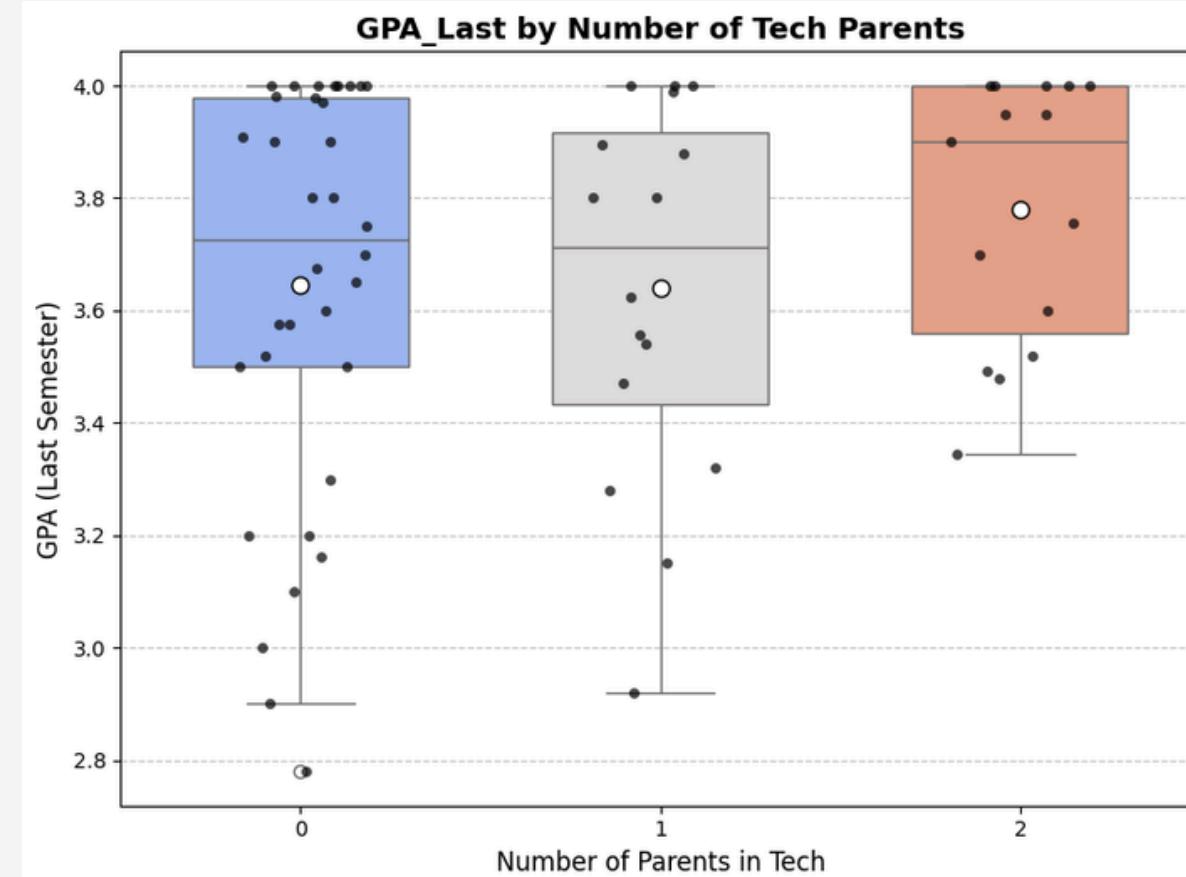
01.

IMPACT ON PROG AGE

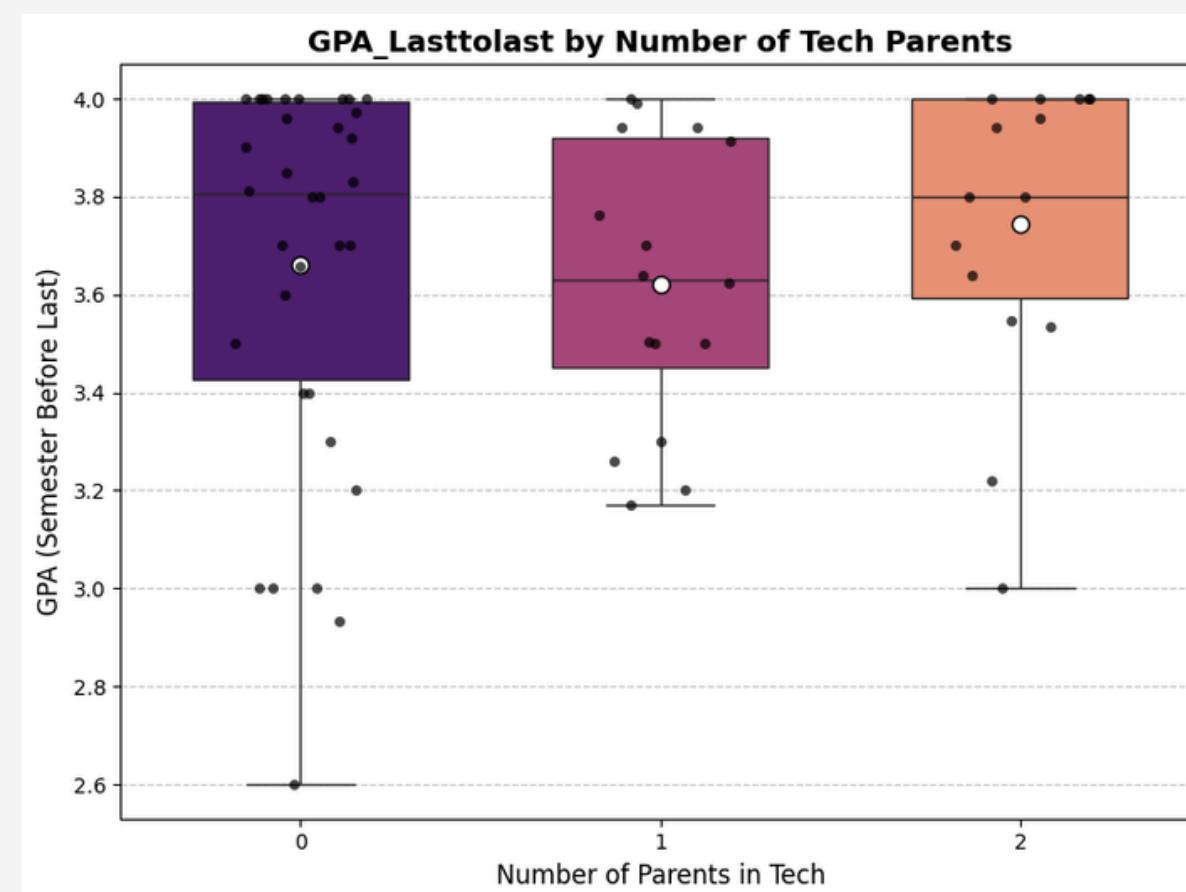
The number of tech-savvy parents has a statistically significant and meaningful impact on the age at which students begin programming. Students with more tech-savvy parents consistently start programming earlier, as confirmed by both ANOVA and correlation analysis. This trend underscores the importance of early exposure to technology in shaping programming skills and suggests a need for broader educational interventions to level the playing field for all students.

IMPACT ON GPA

The analysis reveals no statistically significant impact of having tech-savvy parents on GPA. While students with two tech-savvy parents show slightly higher GPA medians, the overlaps across groups and weak correlations indicate minimal direct influence. Academic performance appears to be shaped more by individual habits and external factors than parental tech background. This suggests that a tech-oriented household might not guarantee higher grades, highlighting the need to investigate other potential contributors to student success.

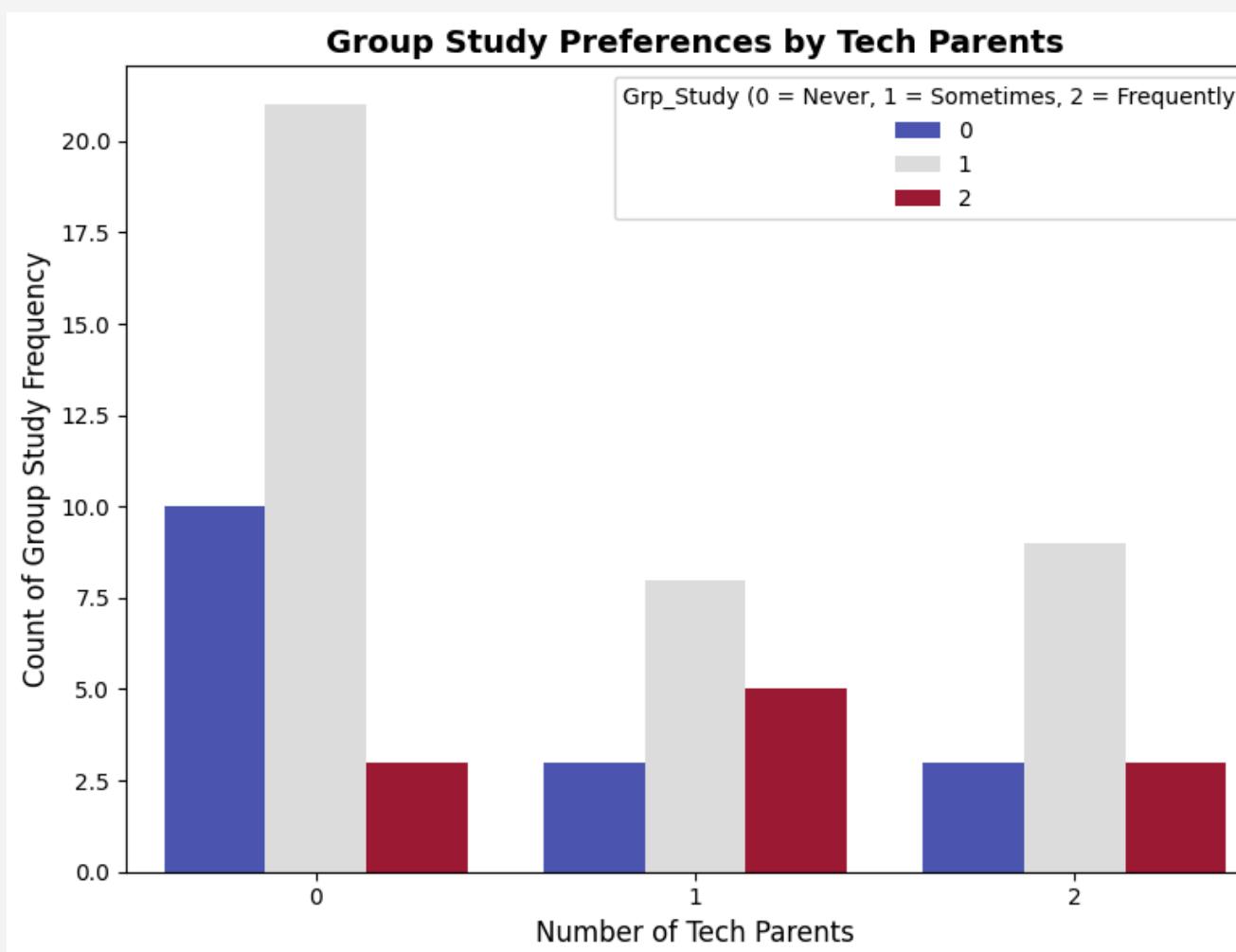
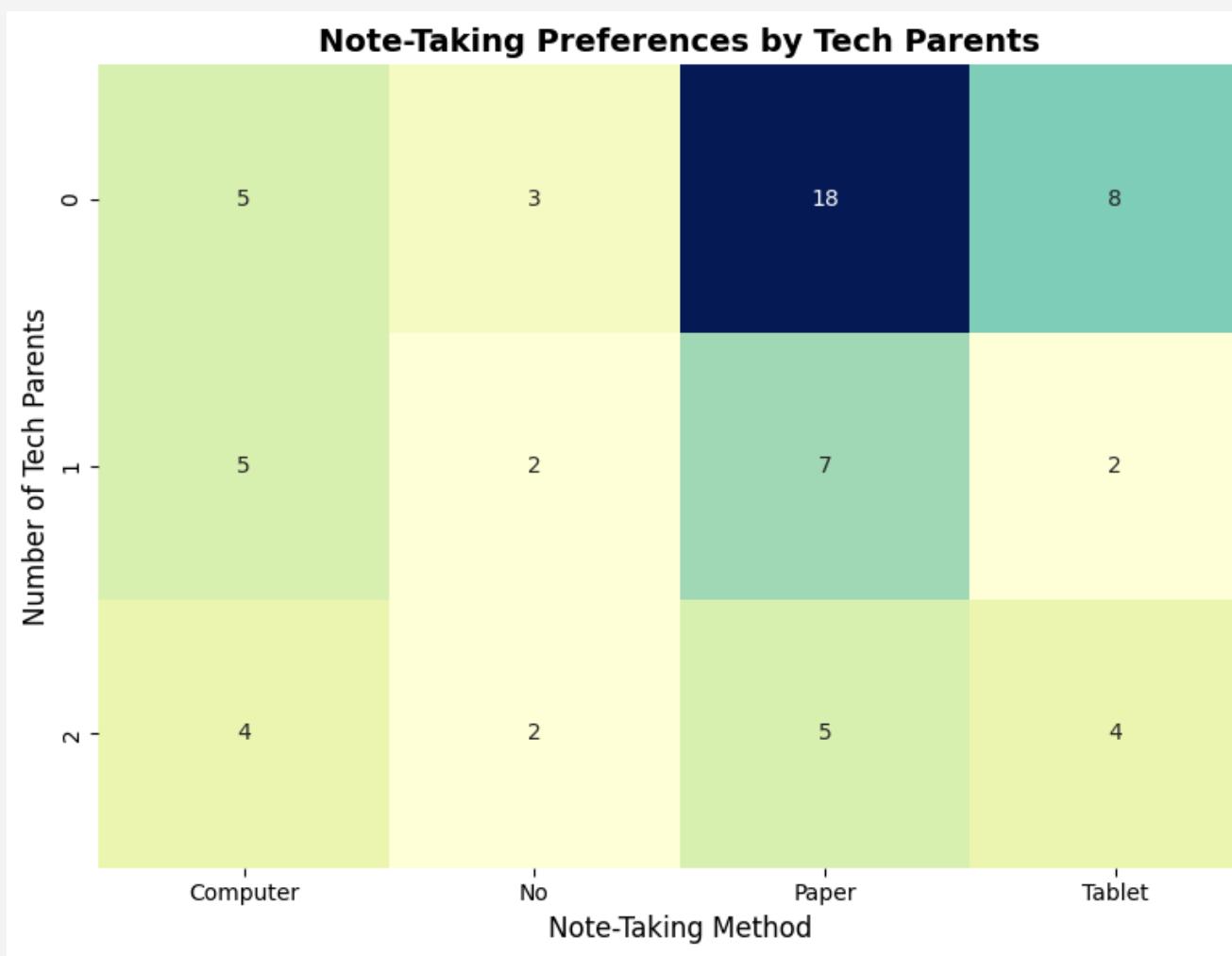


ANOVA Results for GPA_Last: F-statistic = 0.961, P-value = 3.881e-01
 ANOVA Results for GPA_Lasttolast: F-statistic = 0.486, P-value = 6.176e-01
 Pearson Correlation for GPA_Last: r = 0.146, P-value = 2.443e-01
 Pearson Correlation for GPA_Lasttolast: r = 0.076, P-value = 5.457e-01



03.

IMPACT ON STUDY HABITS



The presence of tech-savvy parents does not significantly influence students' group study habits or note-taking methods. Regardless of parental tech background, most students prefer studying "Sometimes" (1). We also notice a higher inclination for traditional note-taking methods (paper) among students with no tech parents.

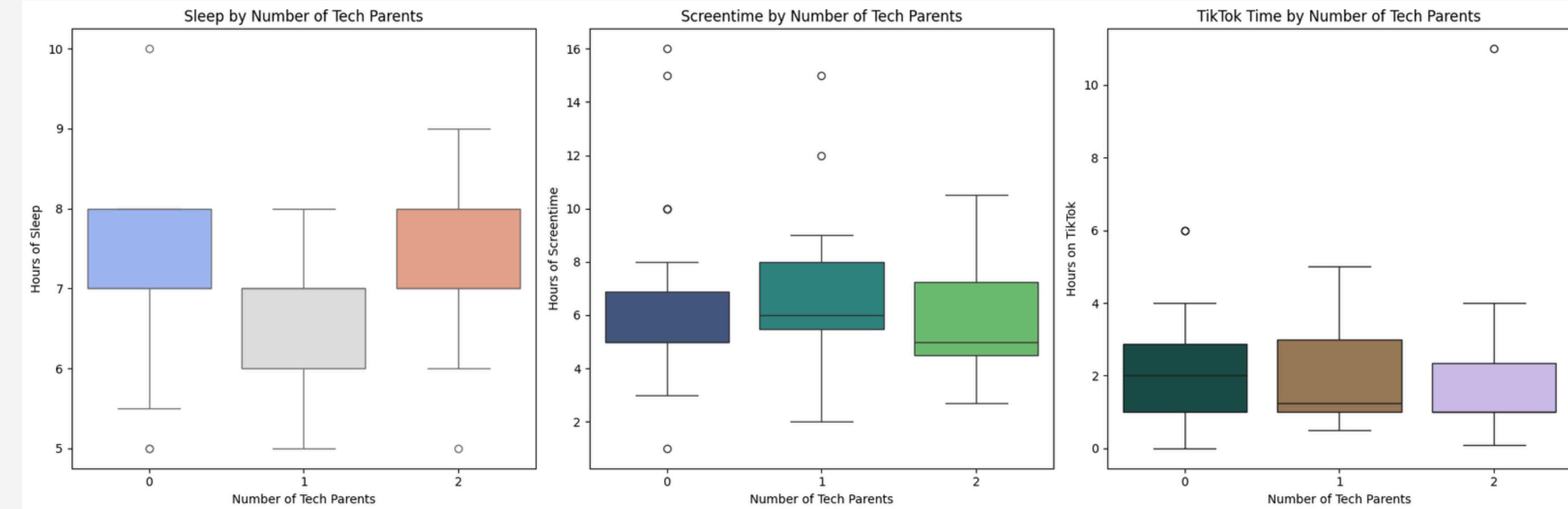
ANOVA P-VALUES

GRP_Study	Notes
0.2100	0.5584

IMPACT ON LIFESTYLE

Sleep habits are independent of the number of tech parents. Students' sleep schedules appear to be influenced more by personal routines, academic workload, or other external factors rather than parental influence.

The amount of screentime students engage in is not influenced by their parents' tech-related occupations. Factors like personal habits, academic usage, and entertainment preferences likely play a larger role.



Time spent on TikTok or similar social media platforms is not related to having tech-savvy parents. This behavior likely stems from individual choices and social influences rather than parental background.

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ANOVA Results for Sleep: F-statistic = 1.104, P-value = 3.378e-01
Correlation for Sleep: r = -0.019, P-value = 8.782e-01
ANOVA Results for Screentime: F-statistic = 0.701, P-value = 5.001e-01
Correlation for Screentime: r = -0.020, P-value = 8.736e-01
ANOVA Results for TikTok Time: F-statistic = 0.007, P-value = 9.932e-01
Correlation for TikTok Time: r = 0.015, P-value = 9.068e-01
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FINAL TAKEAWAYS

01.

PROGRAMMING AGE

Suggests that parental involvement in technology fosters early exposure to coding. Highlights the need for inclusive educational programs to provide equal opportunities for students from non-tech households.

02.

GPA

While students with two tech-savvy parents showed slightly higher GPA medians, overlapping distributions and weak correlations indicate minimal direct influence.

03.

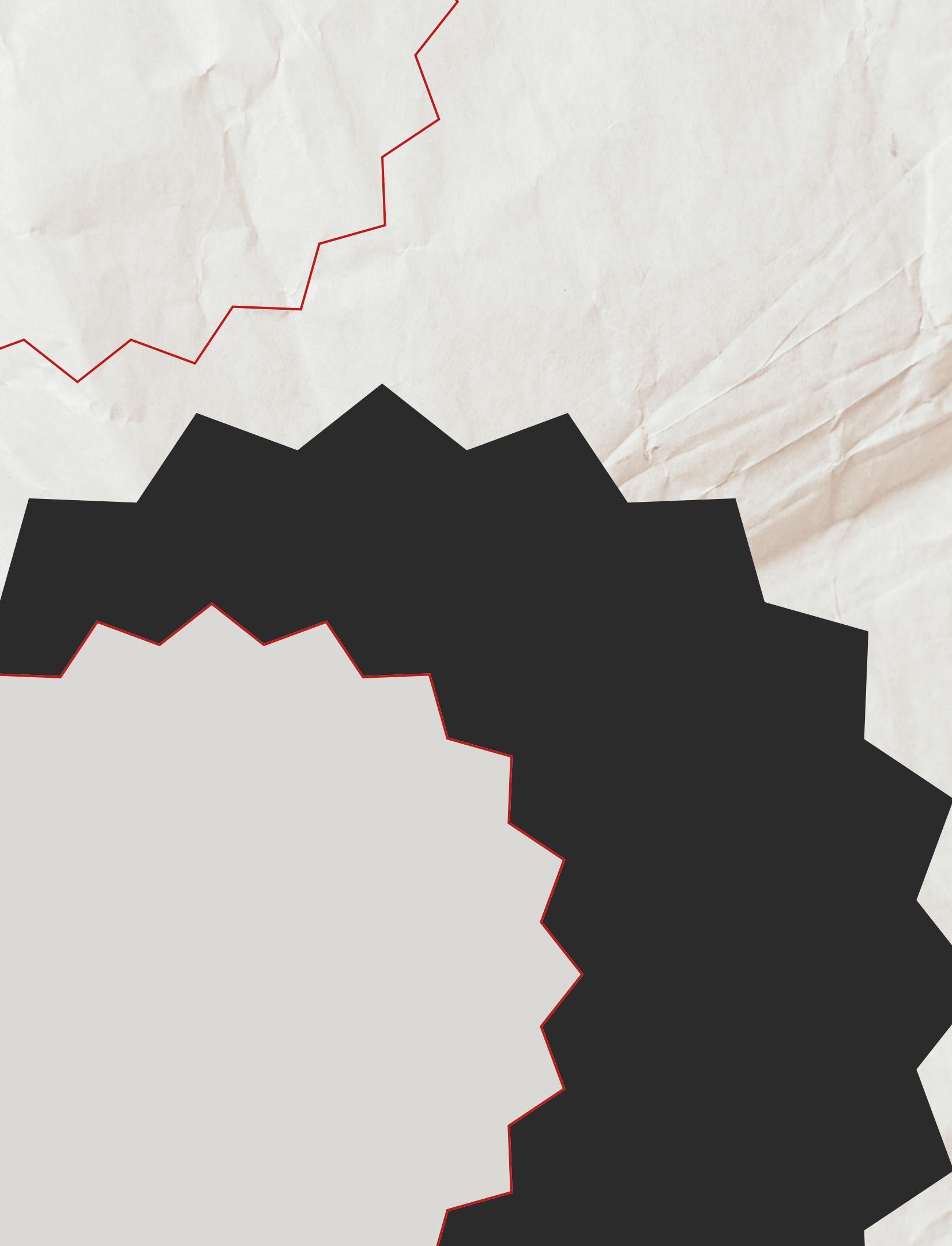
STUDY HABITS

Students across all groups exhibit a preference for studying "Sometimes" and note-taking on paper, particularly those with no tech-savvy parents. Traditional note-taking methods remain popular regardless of tech-savvy influence.

03.

LIFESTYLE

Parental tech background has minimal impact on lifestyle habits, emphasizing the role of individual and societal choices.



**THANK
YOU**

