Impact of Parenting on children‘s academic performance

Presented By - Sheetal More

Roll no- SMSC2425201

MSC Data Science

OVERVIEW

INTRODUCTION

This research explores the impact of parenting practices on academic performance, focusing on parental involvement, emotional support, and the home environment as crucial factors.

Parenting styles and socioeconomic status (SES) influence a child's early academic foundation, study habits, and motivation. Previous studies suggest that high parental involvement and a supportive emotional environment enhance academic outcomes, while SES affects access to resources and, consequently, learning opportunities. This study utilizes survey data from 170 students across various education levels to analyze the relationship between these parenting factors and academic success. By examining the role of family dynamics, this research aims to identify key contributors to students' academic motivation, focus, and overall performance.

ABSTRACT

This study examines how parenting practices—particularly parental involvement, emotional support, and the home environment—impact children's academic success. It aims to reveal how these factors affect students' motivation, focus, and performance. A quantitative survey was conducted with 170 responses from secondary, undergraduate, and postgraduate students to assess the relationship between academic outcomes and reported parenting practices. Findings indicate that high parental involvement and a supportive emotional climate correlate strongly with better academic performance and study habits. Family socioeconomic status (SES) and parenting stress also play critical roles; high SES often provides resources that enhance early academic skills, while lower SES families face constraints that increase stress, negatively affecting home learning environments. Parenting stress impacts parent-child interactions essential for early learning. Finally, parenting styles (authoritative, authoritarian, permissive, neglectful) significantly influence children's emotional, social, and behavioral development

Objective

First Objective

To examine the relationship between parental involvement and students' academic performance.

Second Objective

To explore the role of home-related factors (e.g., parental support, physical space, and resources) in influencing educational outcomes.

Third Objective

To identify strategies for parents to balance emotional support and stress management to benefit their children’s overall development.

Literature Review

1

Parenting Styles, Emotional Well-Being, and Academic Activities of Senior High School Students in Asikuma Odoben-Brakwa District
Gabriel Amponsah Adu, Charity Amoah Nyasapoh, Emmanuel Kobina Kakra Arkorful

Parenting styles play a critical role in children's emotional well-being and academic performance. The four main types identified by Baumrind (1967)—authoritative, authoritarian, permissive, and neglectful—differ in their impact. Authoritative parenting, which balances support and independence, is linked to higher self-esteem, emotional stability, and academic motivation (Steinberg, 2001).

2

Pathways Among Family Socioeconomic Status, Parenting Stress, Home Learning Environment, and Toddlers' Early Academic Skills - Zhong, Yeung, Caldwell, and Cheung's

study examines the interplay of family socioeconomic status (SES), parenting stress, and the home learning environment on toddlers' early academic skills. Higher SES is associated with better access to resources that support early learning, while lower SES can limit resources and heighten parenting stress. Thus, SES, stress, and learning resources in the home collectively shape early academic outcomes.

3

The Impact of Parenting Styles and Socio-Economic Status on Adolescents' Academic and Emotional Outcomes -Pandey Mangesh, Krishna Dwivedi, Behera Narayan

performance, emotional health, and behavior. Authoritative parenting, marked by warmth and structure, is linked to Research shows that parenting style and socioeconomic status (SES) significantly influence adolescents' academic
positive academic and emotional outcomes.high SES can buffer negative effects of less supportive parenting, while SES may worsen them, underscoring the need for a nurturing and resourceful environment for holistic adolescent development.

Literature Review

4

Association of Preschool Children's Behavior and Emotional Problems with the Parenting Behavior of Both Parents
-Su-Mei Wang, Shuang-Qin Yan, Fang-Fang Xie, Zhi-Ling Cai

Study explores how different parenting styles and impact preschool children's emotional and behavioral well- being. Warm, responsive parenting is associated with fewer behavioral issues and better emotional regulation, while harsh or inconsistent approaches can increase anxiety and aggression in children.parenting practices show potential for reducing children’s emotional and behavioral problems, highlighting the importance of supportive resources for parents.

5

Relationship Between Single Parenting Attributes and Academic Performance of Higher Secondary Students in Ranchi
Keerti Singh, Ankit Halder

study examines the impact of single parenting on the academic performance of higher secondary students in Ranchi. Findings reveal that single-parent households often face challenges like limited financial resources, time constraints, and emotional stress, which can hinder students' academic success. However, active parental involvement, even with time limitations, can help mitigate these challenges. Socioeconomic status is also a critical factor, as lower-income singleparent families may struggle to access essential educational resources, further affecting academic outcomes.

Methodology

- 1. Data Cleaning

- Checked for missing, duplicate, and inconsistent entries
  - Standardized data types
  - Renamed columns for consistency

- 2. Data Transformation

  - Encoded categorical variables
- Created new variables (e.g., SES levels)

- 3. Data Splitting

Split into training and testing sets (e.g., 80/20 split)

- 4.Exploratory Data Analysis (EDA)

  - Descriptive statistics and distribution analysis
- Visualized relationships (histograms, bar charts, box plots)
  - Correlation analysis

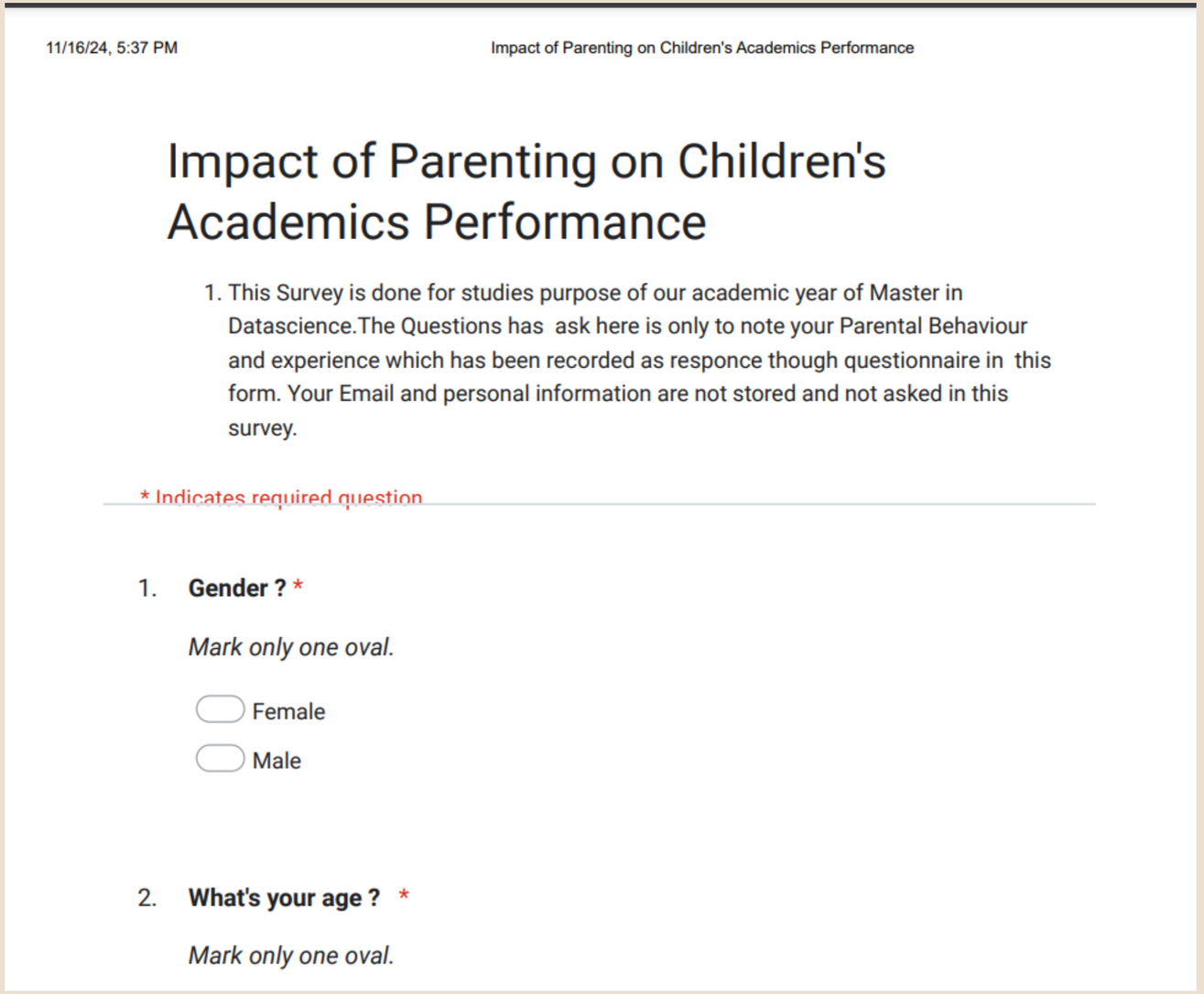
- 5.Statistical Analysis and Modeling

  - Regression analysis
  - Hypothesis testing

- 6. Result Interpretation

- Summarized key findings

Google Form Made for Collecting the response from Students



Impact of Parenting on Children's Academics Performance

1. This Survey is done for studies purpose of our academic year of Master in Datascience.The Questions has ask here is only to note your Parental Behaviour and experience which has been recorded as responce though questionnaire in this form. Your Email and personal information are not stored and not asked in this survey.

* Indicates required question

1. **Gender ?** *

Mark only one oval.

- Female
- Male

2. **What's your age ?** *

Mark only one oval.

3. **What is the highest level of education you have completed ? (e.g., high school, college, graduate degree)** *

Mark only one oval.

- ◯ Secondary school(8 - 9 std)
- ◯ 10th
- ◯ 12th
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ P.H.D
- ◯ No education
- ◯ Other: _____

4. **How much time do you spend on self-learning every day in hour?** *

Mark only one oval.

- ◯ Less than 1 hour
- ◯ 1 - 2 hour

Data Gathered from Google Form-
this data contain 170 rows and 36 column

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	
1	Gender	Age	Highest_ec	self learnir	Status	Stay	Academic_	Percentag	playing tir	What type	family_me	Annal_inc	parenting	parent exp	time of	proud to a	positive fe	academic	parents pe	communic	siblings_he	Sibling	study_are	st
2	Male	19-22	Bachelor's	More than	Student	Urban(city	A+	90	Less than 1	blended fa	4	6Lakh - 10	My parent	They dont	More than	5	5	5	5	Everyday	No	1	No, I donâ	A
3	Male	19-22	Bachelor's	More than	Student	Rural (villa	A	65	less than 1	Joint famil	5	6Lakh - 10	Dont expe	They dont	Less than 1	3	3	4	3	Everyday	Yes	1	Yes, but I s	A
4	Female	19-22	Bachelor's	1 - 2 hour	Student	Urban(city	A	70	Less than 1	Joint famil	5	Less than 2	My parent	They expe	More than	2	3	3	3	Everyday	Yes	2	Yes, I have	Bc
5	Female	19-22	Master's c	2-3 hour	Student	Suburban	O	84	Dont play	Individual	4	Less than 2	My parent	They expe	More than	4	4	4	4	Everyday	Yes	1	No, I donâ	A
6	Female	30+	Master's c	More than	Full-Time e	Urban(city	B	60	less than 2	Joint famil	6	6Lakh - 10	Dont expe	They dont	More than	3	3	3	3	Everyday	Yes	2	Yes, I have	All
7	Male	19-22	Bachelor's	1 - 2 hour	Student	Rural (villa	A	64.64	less than 2	Joint famil	14	Less than 2	My parent	They expe	More than	4	5	4	4	Everyday	Yes	3	Yes, I have	Bc
8	Female	19-22	Master's c	2-3 hour	Student	Urban(city	A+	86	less than 2	Joint famil	3	More than	My parent	They expe	Less than 1	5	5	4	5	Everyday	No	0	Yes, I have	A
9	Male	15-18	Bachelor's	Less than 1	Student	Suburban	A	80	Dont play	Joint famil	6	6Lakh - 10	My parent	They expe	More than	5	5	4	5	Everyday	Yes	2	No, I donâ	A
10	Male	19-22	Master's c	More than	Student	Urban(city	A	64	less than 2	Joint famil	13	Less than 2	My parent	They expe	Less than 1	4	4	3	4	During a w	Yes	3	Yes, but I s	All
11	Female	23-26	Bachelor's	1 - 2 hour	Student	Urban(city	A	80	More than	blended fa	5	2Lakh - 6L	My parent	They expe	no time	3	2	3	1	Everyday	Yes	3	Yes, but I s	A
12	Male	19-22	Bachelor's	1 - 2 hour	Full-Time e	Urban(city	A+	91	Less than 1	Individual	3	2Lakh - 6L	Dont expe	They expe	Less than 1	4	4	4	5	Everyday	Yes	2	Yes, but I s	Bc
13	Male	23-26	Bachelor's	1 - 2 hour	Student	Urban(city	B	65	less than 2	Joint famil	19	More than	My parent	They expe	More than	5	4	4	5	Everyday	Yes	5	Yes, I have	Bc
14	Male	15-18	12th	1 - 2 hour	Student	Urban(city	B	67.17	less than 2	blended fa	4	6Lakh - 10	My parent	They expe	Once in a v	3	3	2	3	Everyday	Yes	1	Yes, I have	A
15	Female	15-18	12th	1 - 2 hour	Student	Urban(city	B	55	Dont play	Joint famil	3	More than	My parent	They expe	More than	3	5	1	5	Everyday	No	0	Yes, I have	A
16	Male	19-22	Bachelor's	Less than 1	Student	Urban(city	A	70	More than	with one p	4	Less than 2	My parent	They expe	no time	4	3	3	4	Everyday	Yes	2	No, I donâ	A
17	Female	15-18	12th	Less than 1	Student	Urban(city	B	62	More than	Joint famil	6	6Lakh - 10	My parent	They expe	no time	3	2	2	4	Everyday	Yes	1	Yes, I have	Bc
18	Male	15-18	12th	Less than 1	Student	Urban(city	A	60	More than	Joint famil	4	2Lakh - 6L	My parent	They expe	More than	4	4	4	5	Everyday	Yes	1	I study aro	A
19	Female	23-26	Master's c	Less than 1	Student	Suburban	A	70	Less than 1	blended fa	5	2Lakh - 6L	My parent	They expe	no time	3	3	3	3	Sometime	Yes	2	Yes, I have	All
20	Female	19-22	Bachelor's	2-3 hour	Full-Time e	Rural (villa	O	89	Less than 1	Joint famil	8	Less than 2	My parent	They expe	More than	2	3	2	2	Everyday	Yes	2	Yes, I have	A
21	Female	19-22	12th	More than	Student	Urban(city	A+	76	More than	Joint famil	9	Less than 2	My parent	They expe	no time	3	3	2	4	During a w	Yes	1	No, I donâ	Bc
22	Male	19-22	Bachelor's	More than	Full-Time e	Urban(city	A	73.8	Less than 1	Joint famil	4	Less than 2	My parent	They expe	no time	4	4	4	4	Everyday	Yes	1	Yes, but I s	A
23	Male	19-22	Bachelor's	1 - 2 hour	Student	Urban(city	A+	89	More than	Joint famil	9	2Lakh - 6L	My parent	They expe	no time	4	4	2	5	Everyday	No	3	Yes, I have	All
24	Male	19-22	Bachelor's	1 - 2 hour	Student	Rural (villa	A+	70	More than	Joint famil	14	2Lakh - 6L	My parent	They expe	Less than 1	4	4	3	4	Sometime	Yes	1	Yes, but I s	A
25	Male	15-18	12th	2-3 hour	Student	Urban(city	A	89	Less than 1	blended fa	4	Less than 2	My parent	They expe	Once in a v	4	4	4	5	Everyday	Yes	1	No, I donâ	All
26	Female	19-22	Master's c	2-3 hour	Student	Urban(city	B	86	less than 2	Joint famil	4	6Lakh - 10	My parent	They expe	no time	5	5	5	5	Everyday	Yes	1	Yes, but I s	A
27	Male	15-18	12th	2-3 hour	Student	Urban(city	O	84	More than	Joint famil	4	6Lakh - 10	Dont expe	They dont	More than	4	4	3	3	Sometime	Yes	1	Yes, I have	A
28	Female	19-22	Master's c	2-3 hour	Student	Urban(city	A+	80	less than 2	blended fa	5	More than	My parent	They expe	Once in a v	4	4	4	4	Everyday	Yes	1	No, I donâ	A
29	Male	19-22	Master's c	More than	Student	Rural (villa	C	55	less than 2	Joint famil	5	2Lakh - 6L	My parent	They dont	Less than 1	3	2	3	3	Everyday	No	0	Yes, I have	A
30	Male	23-26	Bachelor's	1 - 2 hour	Unemploy	Urban(city	A+	89	less than 2	with one p	4	2Lakh - 6L	My parent	They expe	no time	1	1	4	1	Everyday	No	0	I study aro	A
31	Male	19-22	Bachelor's	Less than 1	Full-Time e	Urban(city	A+	83	Less than 1	Joint famil	4	More than	My parent	They expe	More than	4	4	4	4	Everyday	Yes	1	Yes, I have	A
32	Male	19-22	Bachelor's	2-3 hour	Full-Time e	Urban(city	A	80	Less than 1	Joint famil	8	2Lakh - 6L	My parent	They expe	no time	2	2	2	3	Everyday	No	0	I study aro	Bc
33	Male	19-22	12th	1 - 2 hour	Full-Time e	Urban(city	B	50	less than 2	with one p	2	Less than 2	Dont expe	They expe	no time	2	2	2	2	Sometime	No	0	I study aro	Bc
34	Female	23-26	Master's c	Less than 1	Full-Time e	Urban(city	O	80.23	Less than 1	Joint famil	4	2Lakh - 6L	My parent	They donâ	More than	5	4	3	5	Everyday	Yes	1	Yes, but I s	A
35	Male	30+	Master's c	More than	Bussiness	Urban(city	B	59	More than	Joint famil	7	More than	My parent	I donâ€™t	more than	3	3	3	3	Sometime	Yes	3	Yes, but I s	Bc
36	Male	27-29	Master's c	Less than 1	Full-Time e	Suburban	A	80	less than 2	Individual	3	More than	My parent	They expe	more than	3	4	4	4	Everyday	Yes	2	Yes, I have	All
37	Male	19-22	Master's c	1 - 2 hour	Student	Suburban	A	74	Dont play	with one p	5	2Lakh - 6L	My parent	They expe	Once in a v	4	4	5	5	Everyday	No	0	No, I donâ	A

Remaining Column of Excel

	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	study_area	study_resc	secure fam	Home dis	ability to	stressed_l	emotionsl	level of en	parents' er	emotional challenges	
2	No, I donâ	A compute	moderatel	Often	The enviro	Slightly: I n	Sometime:	Very Suppo	All of abov	Anxiety	
3	Yes, but I s	A compute	very secur	Sometime:	The enviro	Moderatel	Sometime:	Very Suppo	All of abov	Stress	
4	Yes, I have	Books	secure	Often	The enviro	Not at all:	Often	Supportive	Increases ı	Anxiety	
5	No, I donâ	A compute	secure	Always	The enviro	Not at all:	Always	Supportive	Increases ı	Anger or Frustration	
6	Yes, I have	All above	very secur	Never	The enviro	Significant	Never	Very Suppo	All of abov	Sadness	
7	Yes, I have	Books;edu	very secur	Never	The enviro	Not at all:	Sometime:	Very Suppo	All of abov	Anger or Frustration	
8	Yes, I have	A compute	very secur	Rarely	The enviro	Moderatel	Rarely	Very Suppo	Increases ı	Fear of Failure	
9	No, I donâ	A compute	very secur	Sometime:	The enviro	Moderatel	Rarely	Neutral	Increases ı	Stress	
10	Yes, but I s	All above	secure	Never	The enviro	Moderatel	Never	Supportive	Increases ı	Sadness	
11	Yes, but I s	A compute	secure	Often	The enviro	Completel	Sometime:	Supportive	Helps me r	Anxiety	
12	Yes, but I s	Books;edu	secure	Sometime:	The enviro	Slightly: I n	Often	Supportive	Increases ı	Anxiety	
13	Yes, I have	Books;edu	secure	Sometime:	The enviro	Moderatel	Sometime:	Neutral	Helps me r	Anger or Frustration	
14	Yes, I have	A compute	very secur	Often	The enviro	Moderatel	Rarely	Supportive	Increases ı	Anger or Frustration	
15	Yes, I have	A compute	very secur	Rarely	The enviro	Slightly: I n	Never	Very Suppo	Increases ı	Fear of Failure	
16	No, I donâ	A compute	very secur	Sometime:	The enviro	Moderatel	Sometime:	Neutral	All of abov	Fear of Failure	
17	Yes, I have	Books;edu	moderatel	Sometime:	The enviro	Significant	Sometime:	Supportive	Increases ı	Loneliness	
18	I study aro	A compute	very secur	Always	The enviro	Significant	Sometime:	Very Suppo	All of abov	Stress	
19	Yes, I have	All above	secure	Sometime:	The enviro	Slightly: I n	Sometime:	Neutral	Makes me	Anxiety	
20	Yes, I have	A compute	Not Secure	Always	The enviro	Not at all:	Always	Very Suppo	Increases ı	Sadness	
21	No, I donâ	Books;edu	secure	Always	The enviro	Completel	Sometime:	Very Suppo	Increases ı	Anger or Frustration	
22	Yes, but I s	A compute	very secur	Sometime:	The enviro	Not at all:	Always	Unsupport	Increases ı	Stress	
23	Yes, I have	All above	very secur	Rarely	The enviro	Not at all:	Rarely	Supportive	Increases ı	Stress	
24	Yes, but I s	A compute	very secur	Sometime:	The enviro	Significant	Sometime:	Supportive	All of abov	Anger or Frustration	
25	No, I donâ	All above	very secur	Often	The enviro	Slightly: I n	Sometime:	Supportive	All of abov	Sadness	
26	Yes, but I s	A compute	very secur	Sometime:	The enviro	Moderatel	Rarely	Very Suppo	All of abov	Stress	
27	Yes, I have	A compute	secure	Sometime:	The enviro	Significant	Rarely	Neutral	All of abov	Fear of Failure	
28	No, I donâ	A compute	secure	Often	The enviro	Completel	Often	Supportive	All of abov	Stress	
29	Yes, I have	A compute	slightly sec	Sometime:	The enviro	Significant	Sometime:	Very Suppo	All of abov	Anger or Frustration	
30	I study aro	A compute	secure	Often	The enviro	Significant	Often	Neutral	Encourage	Sadness	
31	Yes, I have	A compute	very secur	Often	The enviro	Moderatel	Sometime:	Very Suppo	All of abov	Fear of Failure	
32	I study aro	Books	moderatel	Sometime:	The enviro	Moderatel	Rarely	Supportive	Encourage	Fear of Failure	
33	I study aro	Books	very secur	Always	The enviro	Significant	Sometime:	Supportive	Helps me r	Anxiety	
34	Yes, but I s	A compute	very secur	Sometime:	The enviro	Moderatel	Rarely	Supportive	Helps me r	Fear of Failure	
35	Yes, but I s	Books;edu	secure	Sometime:	The enviro	Moderatel	Sometime:	Neutral	Helps me r	Stress	
36	Yes, I have	All above	very secur	Sometime:	The enviro	Moderatel	Often	Very Suppo	All of abov	Anger or Frustration	
37	No, I donâ	A compute	secure	Always	The enviro	Moderatel	Sometime:	Neutral	Helps me r	Anxiety	

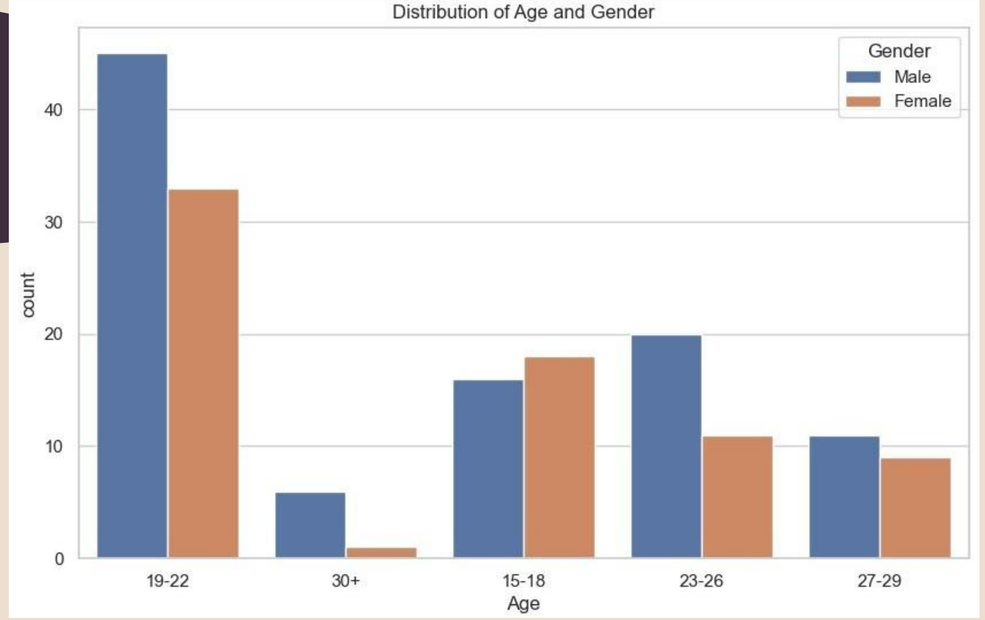
```
[ ] # 34 variable and 170 observation
    data.shape
```

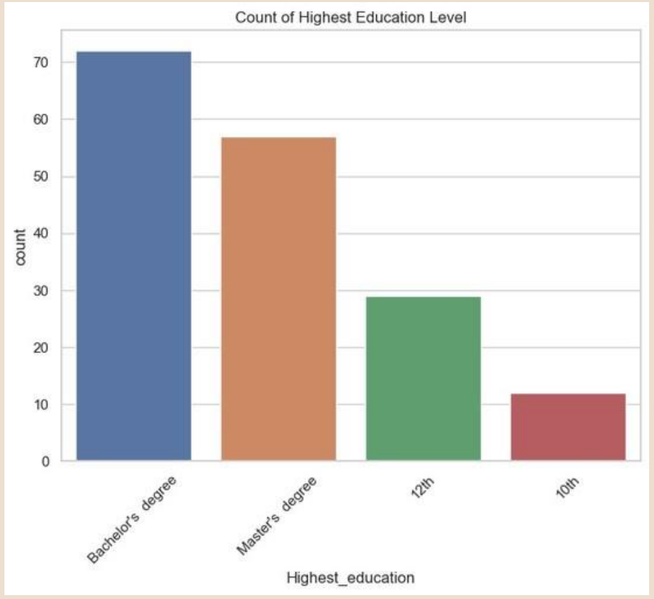
```
(170, 32)
```

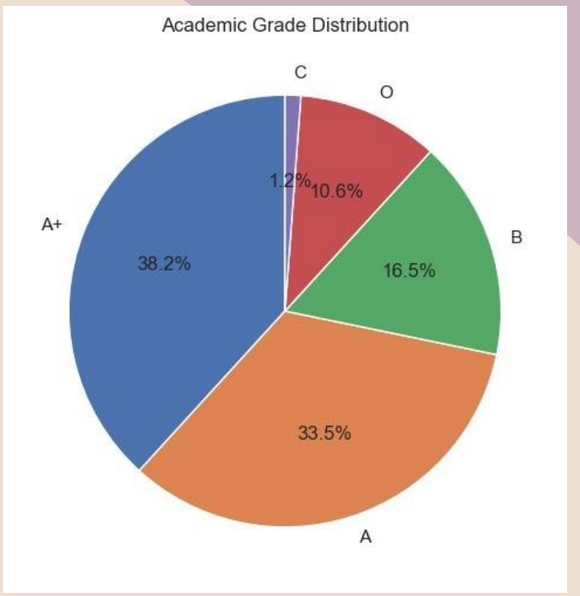
```
[ ] data.columns
```

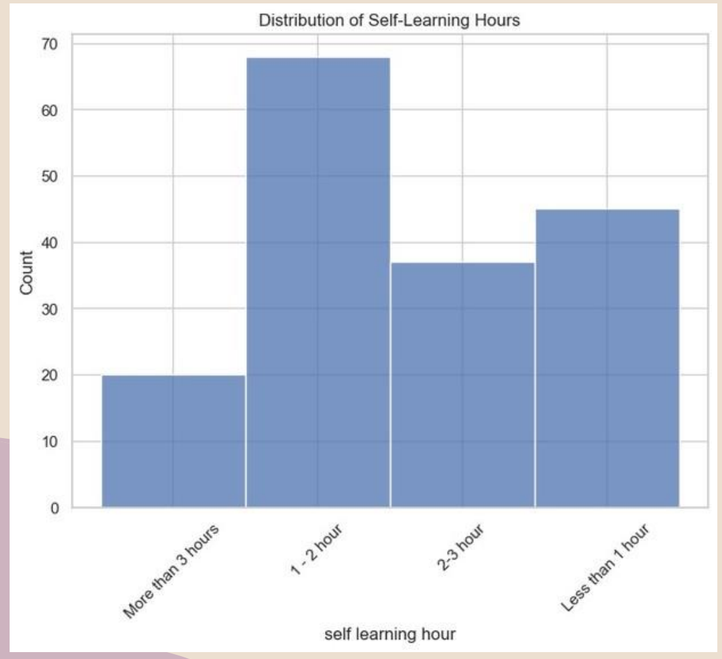
```
Index(['Gender', 'Age', 'Highest_education', 'self learning hour', 'Status',
       'Stay', 'Academic_Grade', 'Percentage', 'playing time',
       'What type of family you stay?', 'family_members', 'Annal_income',
       'parenting act', 'parent expect acedemic performance ',
       'time of parent communiocation\n', 'proud to acedemic result',
       'positive feedback to parents acedemic result',
       'academic performance satisfaction', 'parents performance motivates',
       'communication', 'siblings_help', 'Sibling', 'study_area  ',
       'study_resources', 'secure family environment',
       '  Home distracted by noise', 'ability to concentrate\n   \n',
       'stressed_level', 'emotionsl stress\n', 'level of emotional support',
       'parents' emotional support reaction', 'emotional challenges'],
      dtype='object')
```

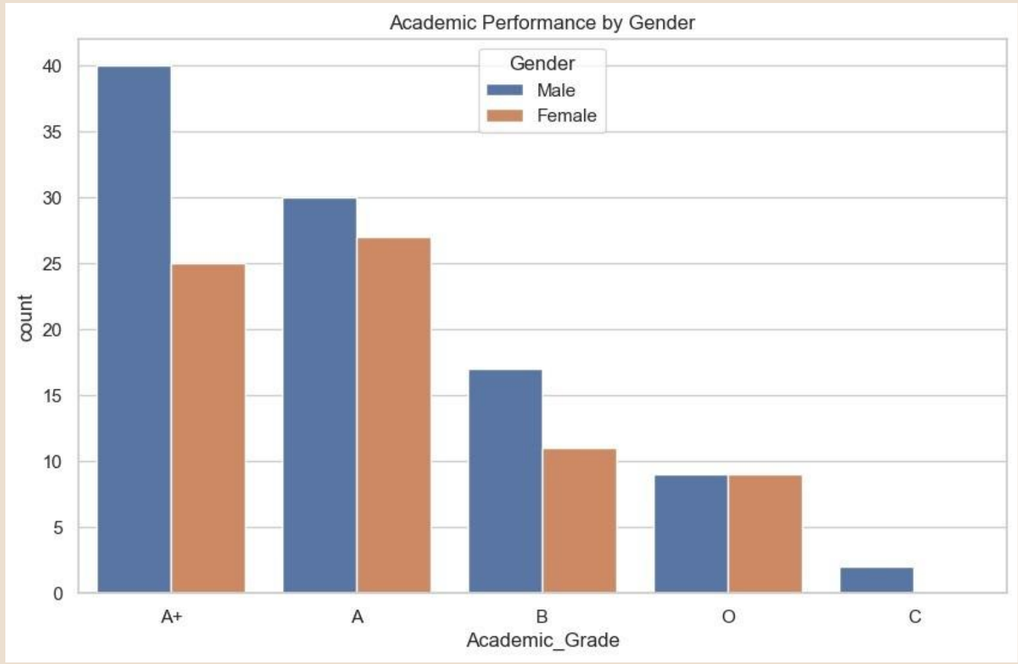
Exporatory Data Anyalsis

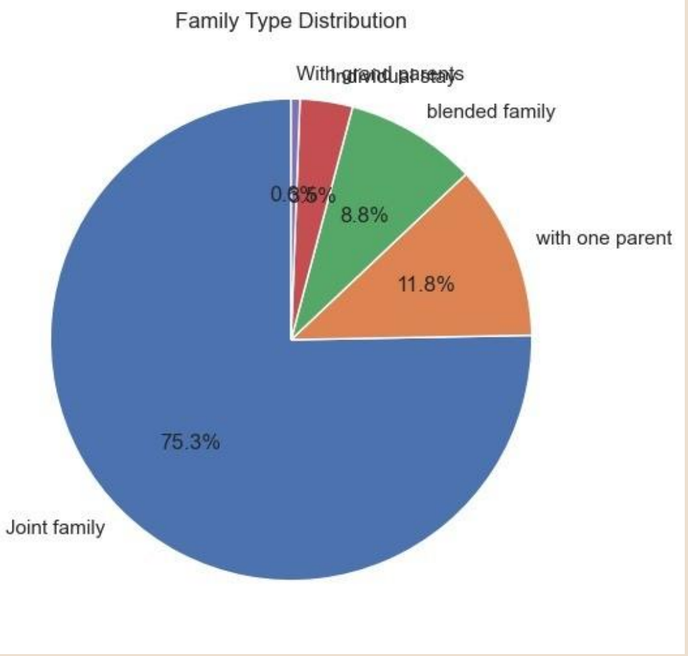


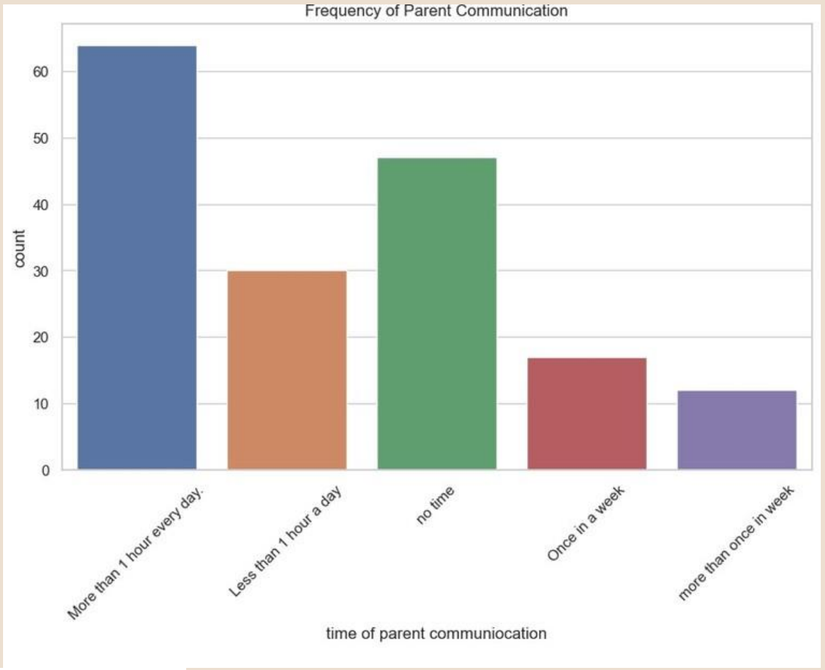


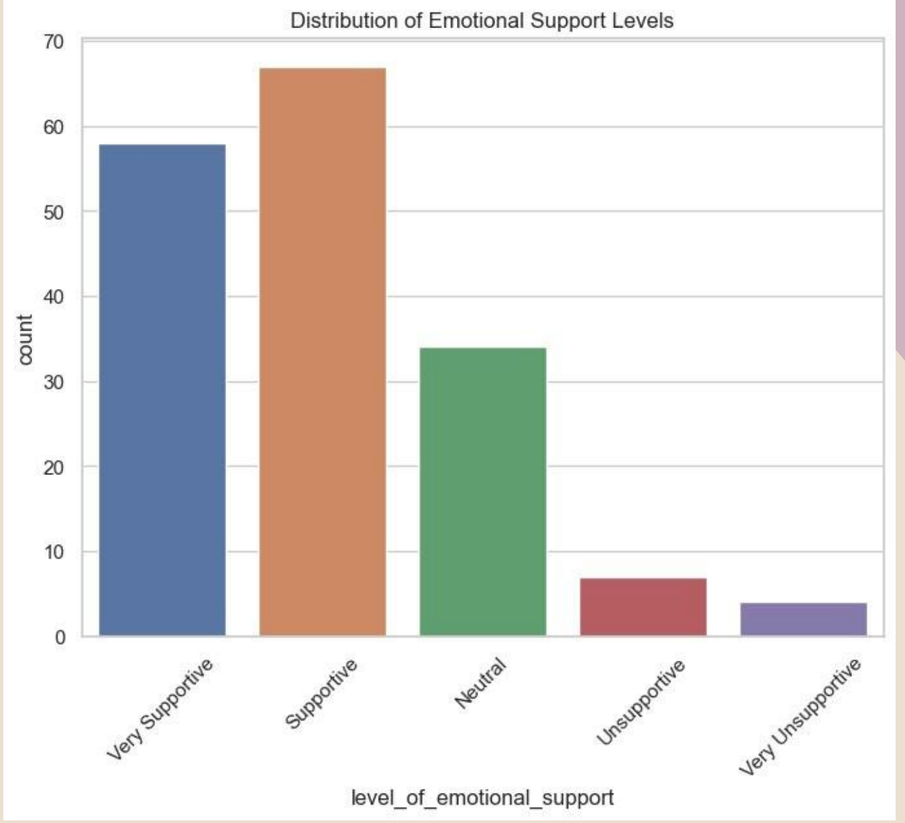


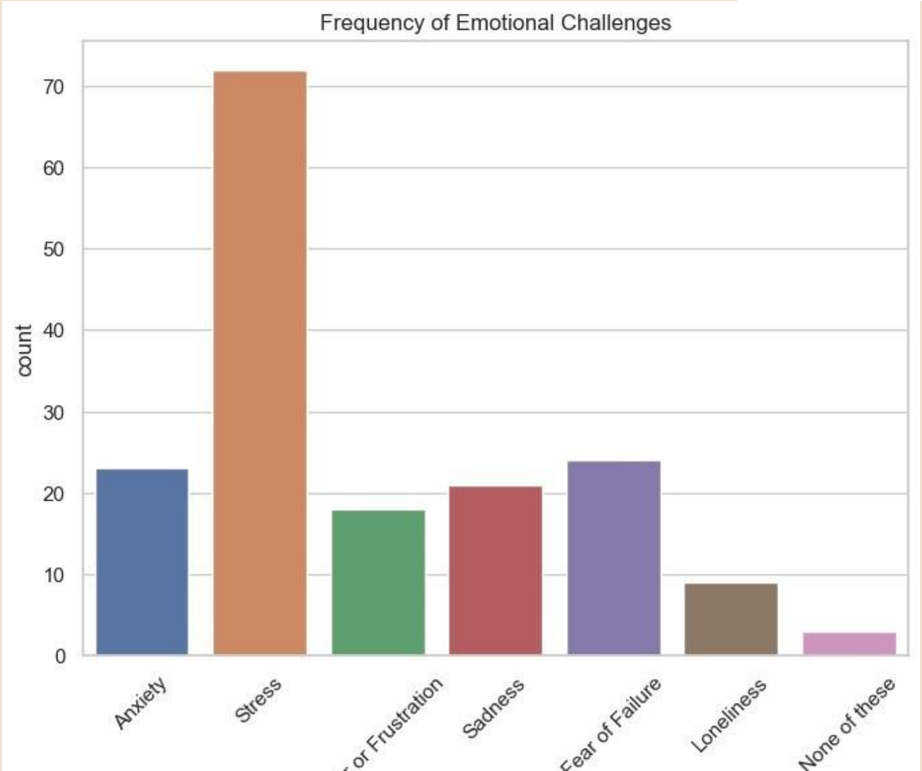


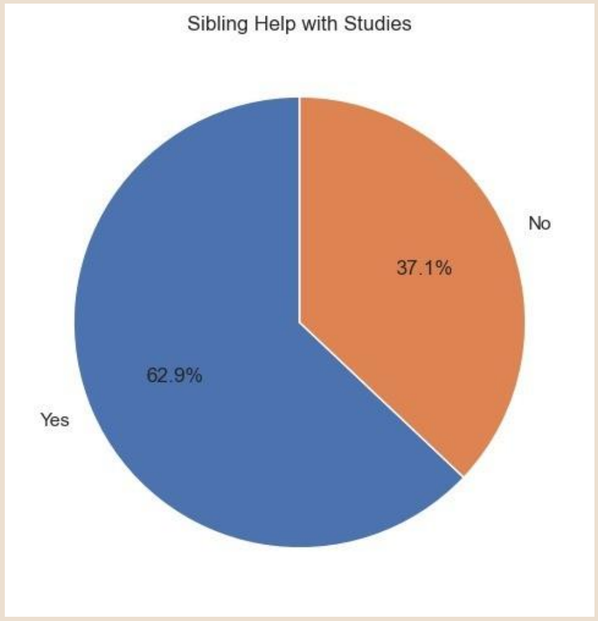


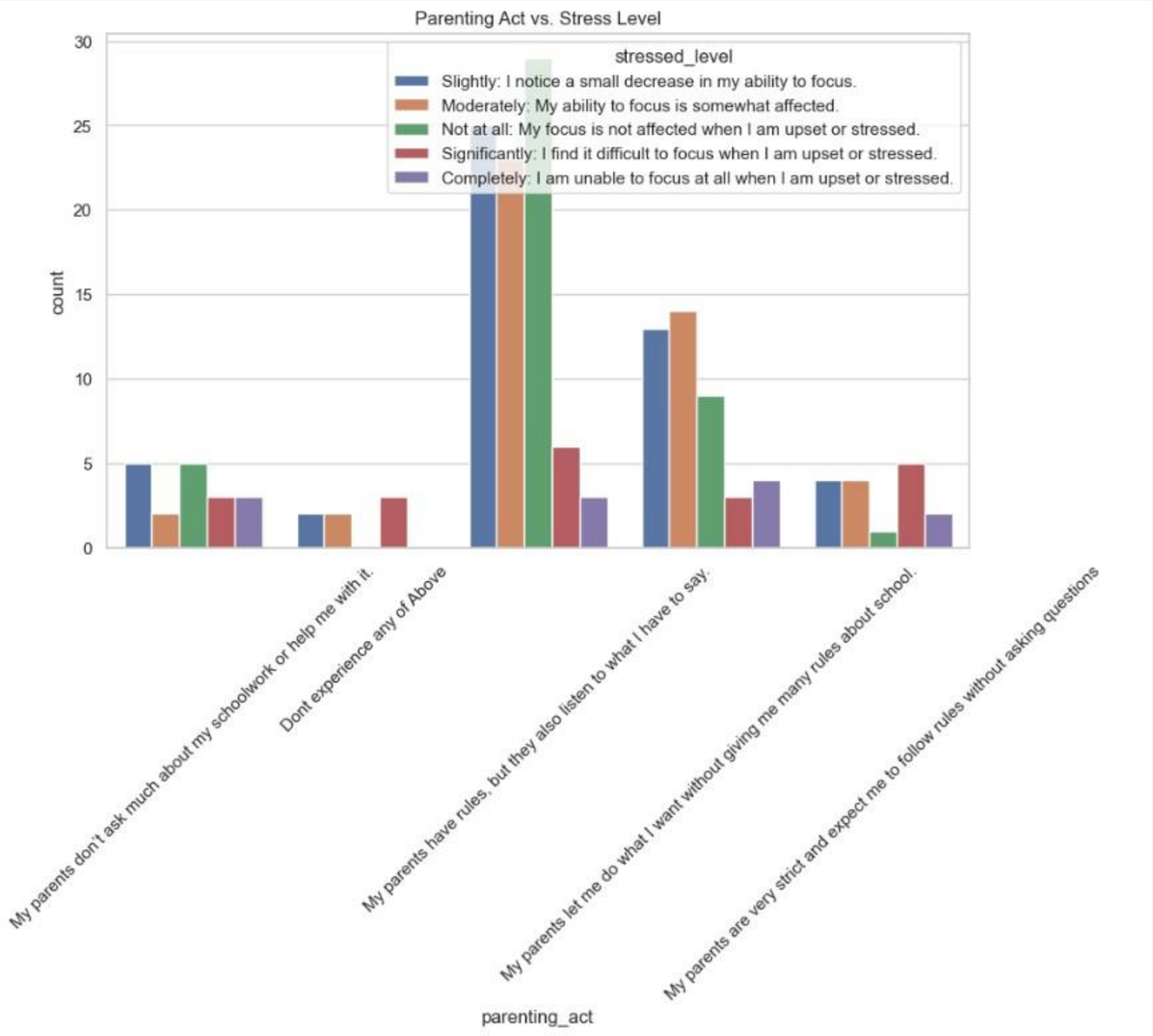

Family Type Distribution
With grandparents
Individual stay
blended family
with one parent
0.6%
8.8%
11.8%
75.3%
Joint family

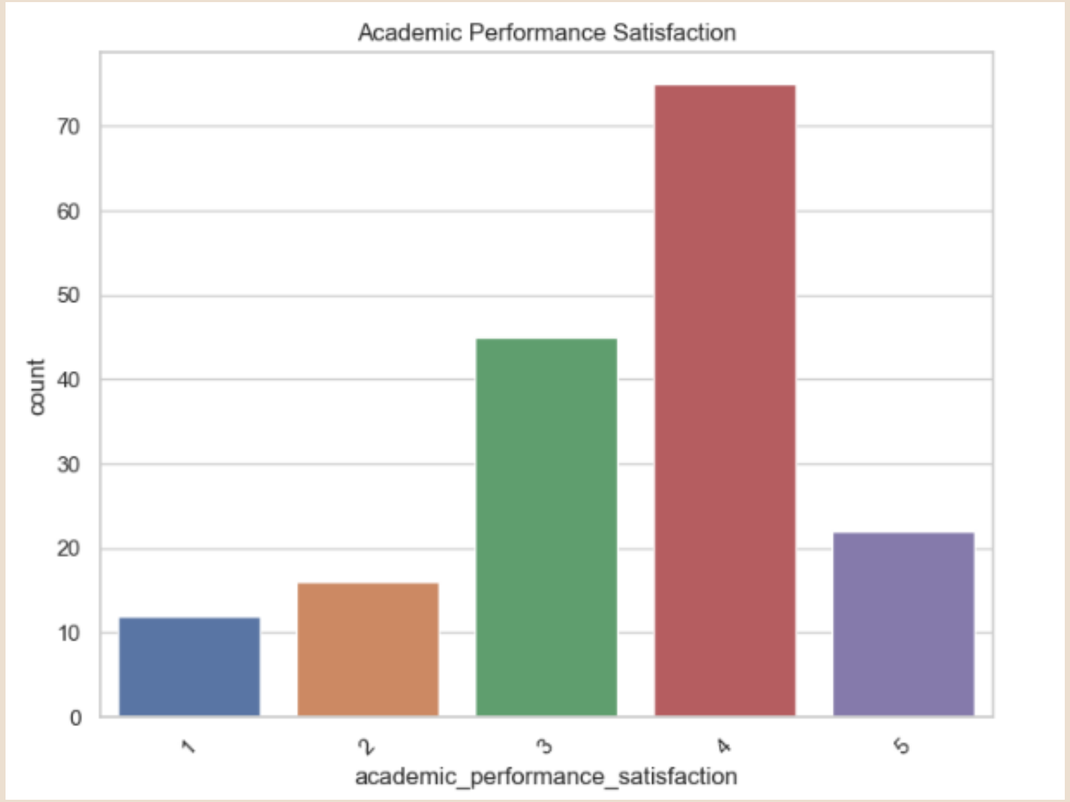

Frequency of Parent Communication
count
time of parent communiocation
More than 1 hour every day.
Less than 1 hour a day
no time
Once in a week
more than once in week

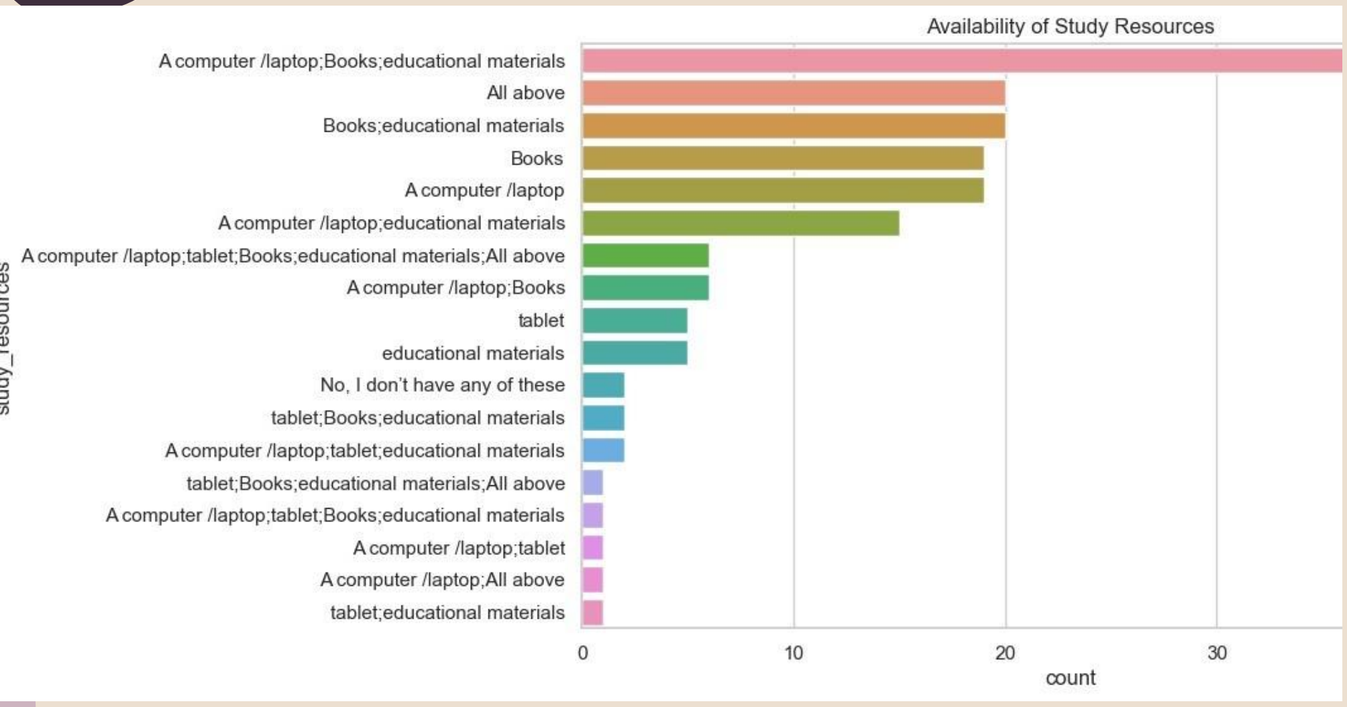

Distribution of Emotional Support Levels
count
level_of_emotional_support
Very Supportive
Supportive
Neutral
Unsupportive
Very Unsupportive

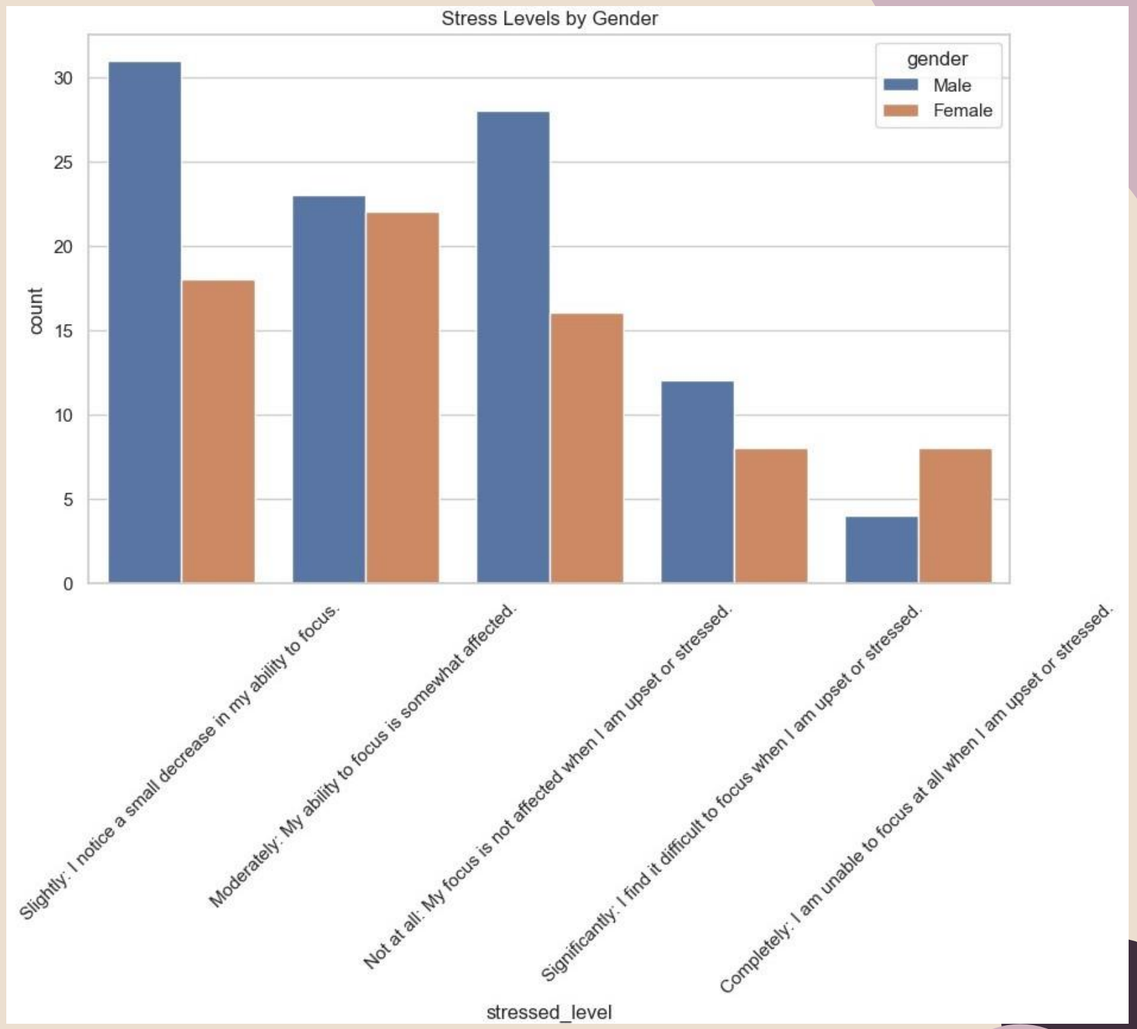

Frequency of Emotional Challenges
count
Anxiety
Stress
Sadness
Fear of Failure
Loneliness
None of these

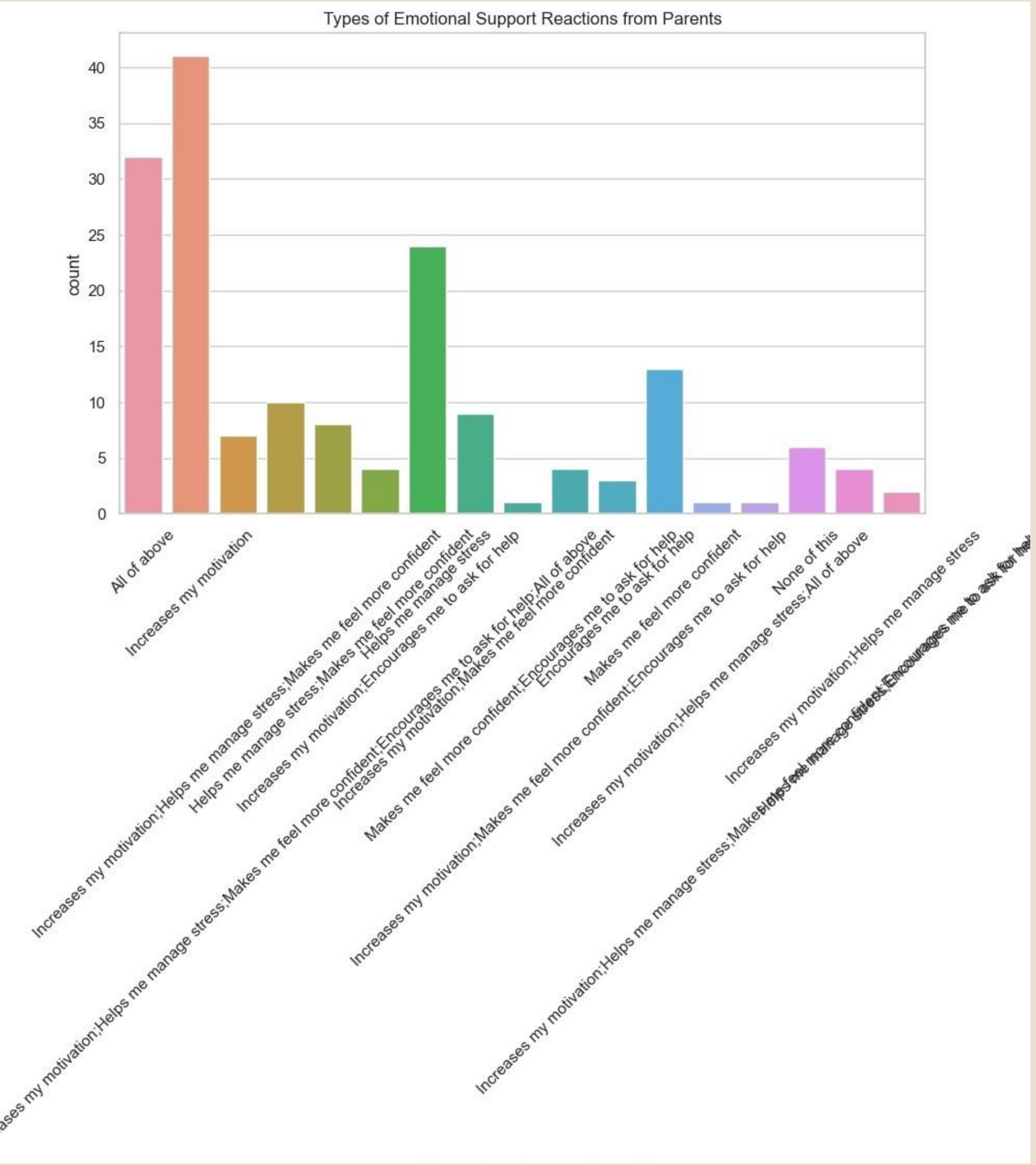

Sibling Help with Studies
No
37.1%
62.9%
Yes

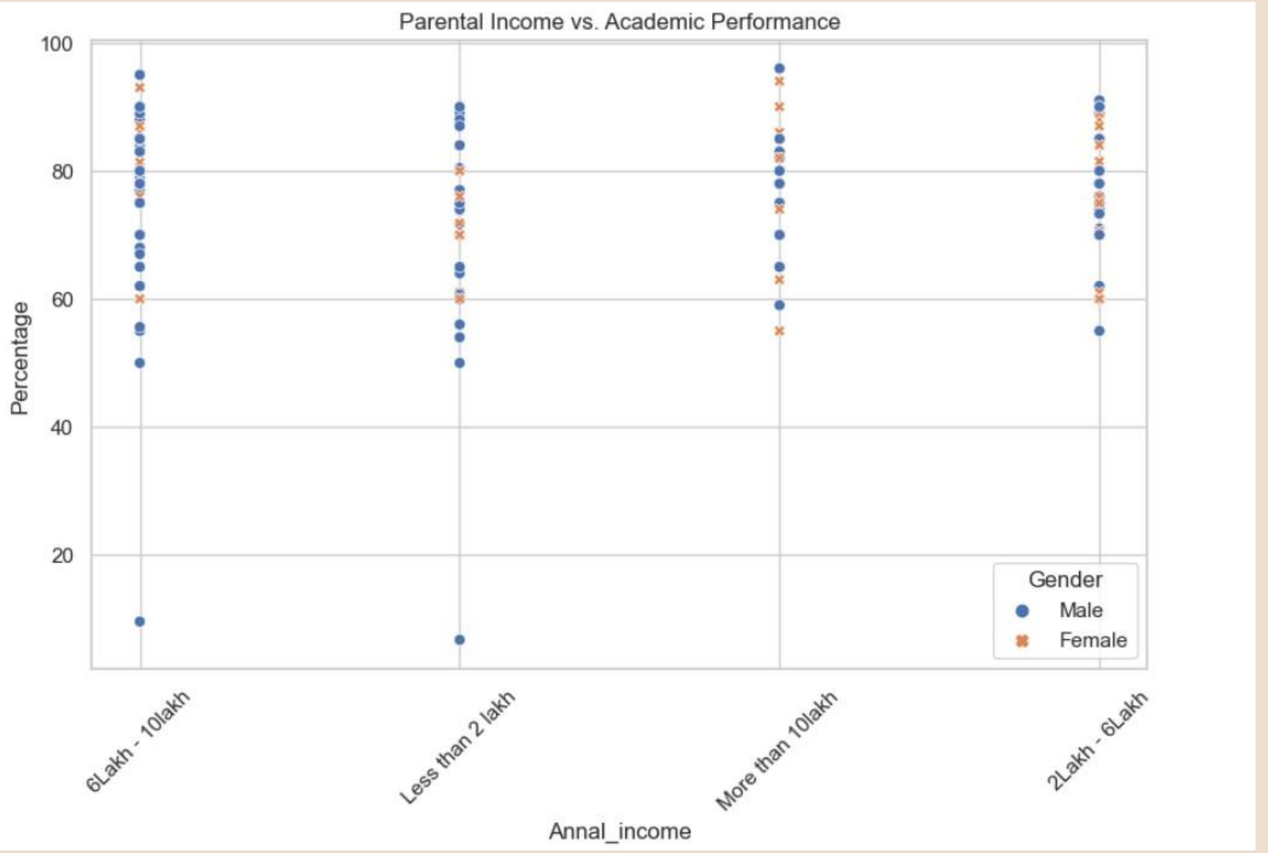

Parenting Act vs. Stress Level
stressed_level
Slightly: I notice a small decrease in my ability to focus.
Moderately: My ability to focus is somewhat affected.
Not at all: My focus is not affected when I am upset or stressed.
Significantly: I find it difficult to focus when I am upset or stressed.
Completely: I am unable to focus at all when I am upset or stressed.
count
0
5
10
15
20
25
30
My parents don't ask much about my schoolwork or help me with it.
Dont experience any of Above
My parents have rules, but they also listen to what I have to say.
My parents let me do what I want without giving me many rules about school.
My parents are very strict and expect me to follow rules without asking questions
parenting_act

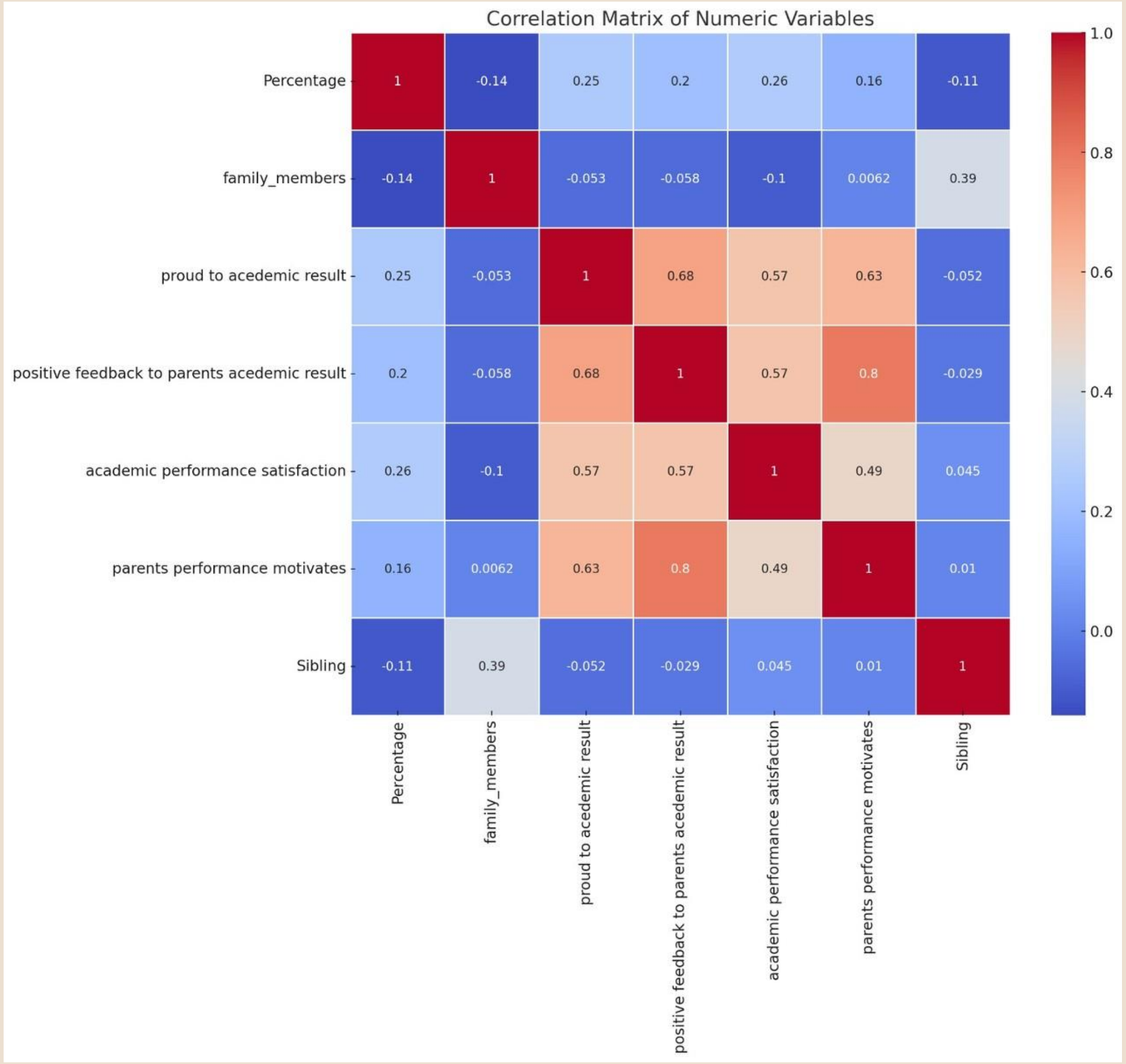

Academic Performance Satisfaction
count
0
10
20
30
40
50
60
70
1
2
3
4
5
academic_performance_satisfaction

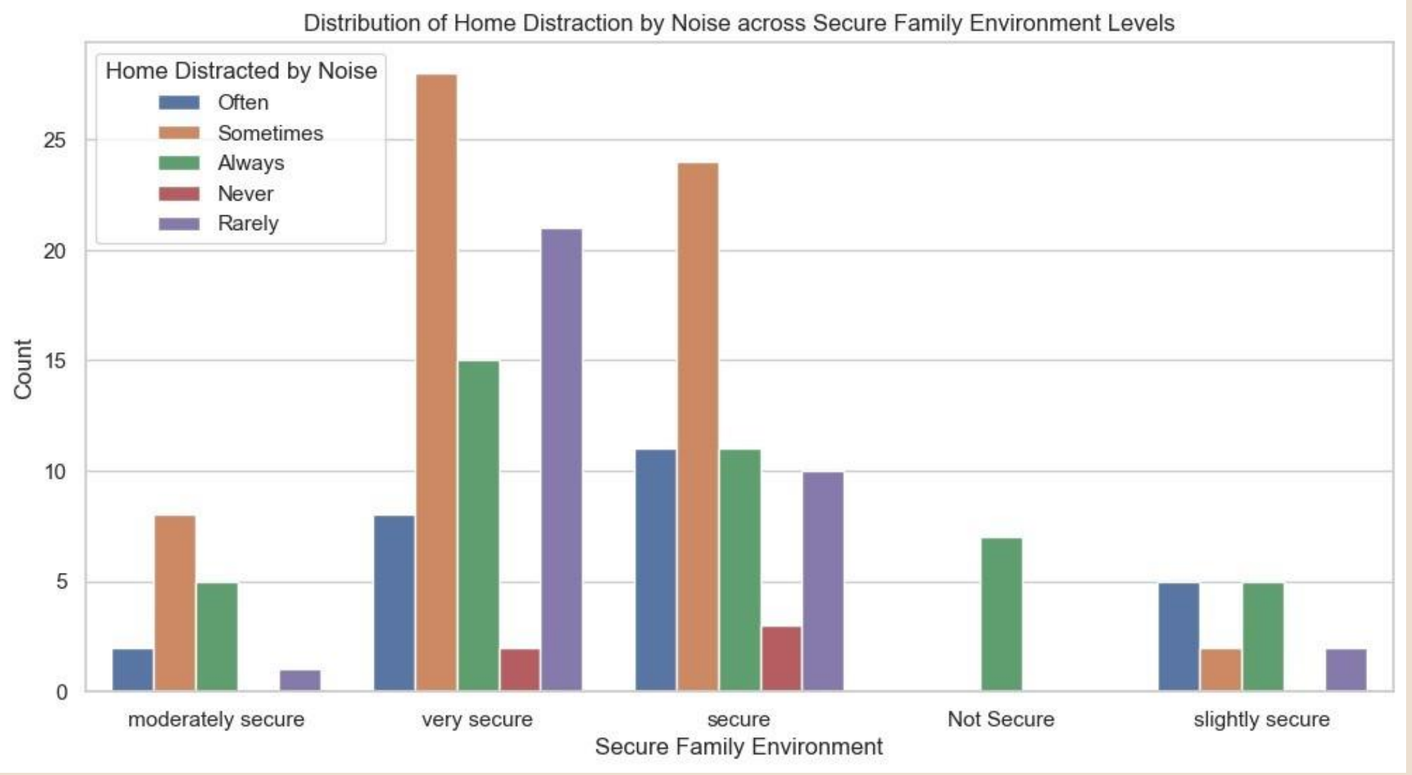

Availability of Study Resources
study_resources
A computer /laptop;Books;educational materials
All above
Books;educational materials
Books
A computer /laptop
A computer /laptop;educational materials
A computer /laptop;tablet;Books;educational materials;All above
A computer /laptop;Books
tablet
educational materials
No, I don't have any of these
tablet;Books;educational materials
A computer /laptop;tablet;educational materials
tablet;Books;educational materials;All above
A computer /laptop;tablet;Books;educational materials
A computer /laptop;tablet
A computer /laptop;All above
tablet;educational materials
0
10
20
30
count

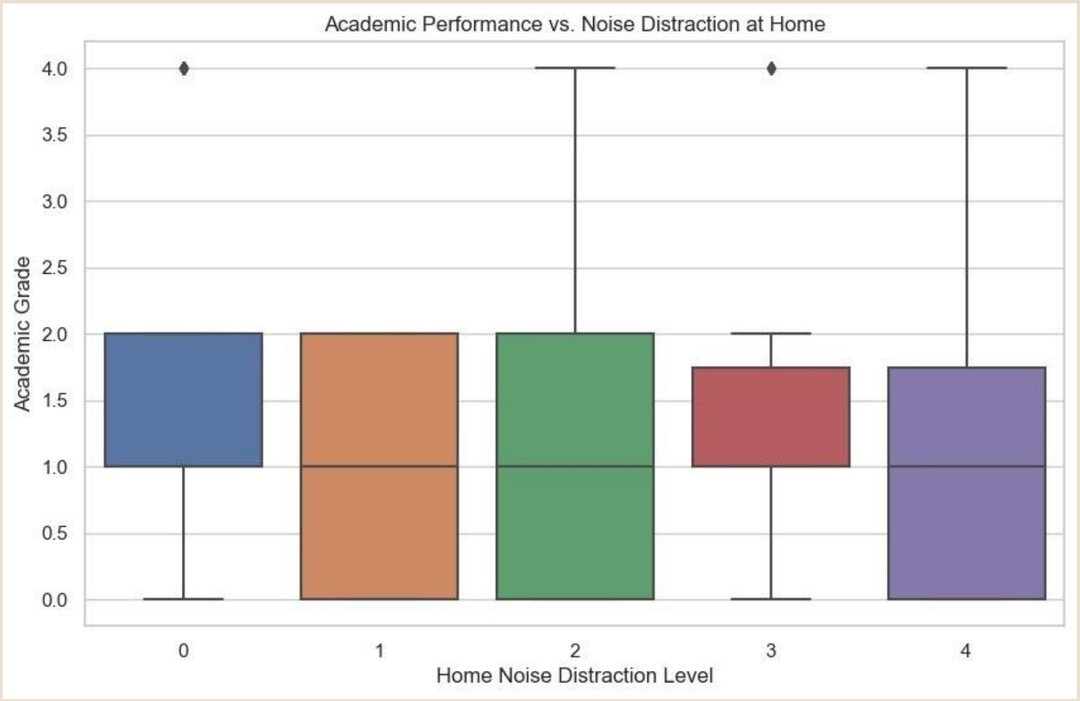

Stress Levels by Gender
gender
Male
Female
count
0
5
10
15
20
25
30
Slightly: I notice a small decrease in my ability to focus.
Moderately: My ability to focus is somewhat affected.
Not at all: My focus is not affected when I am upset or stressed.
Significantly: I find it difficult to focus when I am upset or stressed.
Completely: I am unable to focus at all when I am upset or stressed.
stressed_level

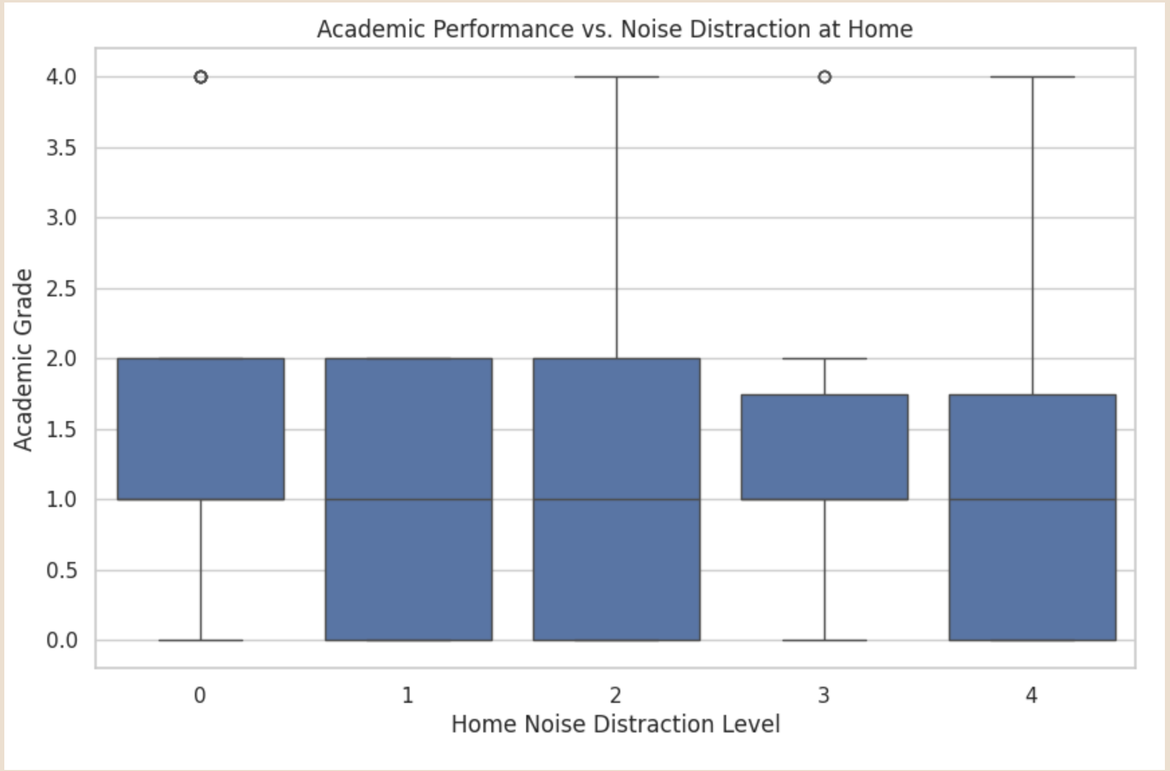

Types of Emotional Support Reactions from Parents
count
0
5
10
15
20
25
30
35
40
All of above
Increases my motivation
Increases my motivation;Helps me manage stress;Makes me feel more confident
Helps me manage stress;Makes me feel more confident
Increases my motivation;Encourages me to ask for help
Helps me manage stress
Increases my motivation;All of above;Encourages me to ask for help
Increases my motivation;Makes me feel more confident
Makes me feel more confident;Encourages me to ask for help
Encourages me to ask for help
Makes me feel more confident
Makes me feel more confident;Encourages me to ask for help
None of this
Increases my motivation;Helps me manage stress
Increases my motivation;Helps me manage stress;All of above
Increases my motivation;Helps me manage stress;Makes me feel more confident


Parental Income vs. Academic Performance
Percentage
20
40
60
80
100
6Lakh - 10lakh
Less than 2 lakh
More than 10lakh
2Lakh - 6Lakh
Annal_income
Gender
Male
Female


Correlation Matrix of Numeric Variables
Percentage
family_members
proud to acedemic result
positive feedback to parents acedemic result
academic performance satisfaction
parents performance motivates
Sibling
1 -0.14 0.25 0.2 0.26 0.16 -0.11
-0.14 1 -0.053 -0.058 -0.1 0.0062 0.39
0.25 -0.053 1 0.68 0.57 0.63 -0.052
0.2 -0.058 0.68 1 0.57 0.8 -0.029
0.26 -0.1 0.57 0.57 1 0.49 0.045
0.16 0.0062 0.63 0.8 0.49 1 0.01
-0.11 0.39 -0.052 -0.029 0.045 0.01 1
1.0
0.8
0.6
0.4
0.2
0.0


Distribution of Home Distraction by Noise across Secure Family Environment Levels
Home Distracted by Noise
Often
Sometimes
Always
Never
Rarely
Count
0
5
10
15
20
25
moderately secure
very secure
secure
Not Secure
slightly secure
Secure Family Environment


Academic Performance vs. Noise Distraction at Home
Academic Grade
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
1
2
3
4
Home Noise Distraction Level


Academic Performance vs. Noise Distraction at Home
Academic Grade
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
Home Noise Distraction Level


Emotional Stress vs. Secure Family Environment
Emotional Stress Level
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
Secure Family Environment

Analysis

ANOVA

(Anaylsis of Varience)

1.ANOVA - Effect of Number of Children on Academic Performance (Group data by number of siblings)

Hypothesis-

Null Hypothesis (H_0): The number of siblings has no effect on academic performance (mean percentage score).

Alternative Hypothesis (H_1): The number of siblings has a significant effect on academic performance (mean percentage score)

Test Results:

test Statistics: 1.10 P-value:0.0324 $p<0.05$

Then reject ho.

Conclusion :

If the p-value is significant, we can conclude that the number of siblings has a meaningful impact on academic performance, which might suggest that more slibings impact children's grades (positively or negatively depending on family dynamics).

2. ANOVA - Emotional Stress vs. Academic Satisfaction

Assuming 'academic_performance_satisfaction' is ordinal

Null Hypothesis (H_0): There is no significant difference in academic satisfaction across different levels of emotional stress.

Alternative Hypothesis (H_1): There is a significant difference in academic satisfaction across different levels of emotional stress.

Test Results:

F=2.65

p-value=0.0353

Interpretation : If significant, this result suggests that lower satisfaction with academic performance may correlate with higher stress levels, potentially showing the emotional impact of academic expectations.

3.ANOVA -Relationship between Home Environment and Academic Performance

ANOVA for Home Noise Distraction Effect on Academic Grades

Null Hypothesis (H_0): The level of noise distraction at home has no significant effect on academic performance.

Alternative Hypothesis (H_1): The level of noise distraction at home has a significant effect on academic performance.

Results

F=0.42, p-value=0.7945

Since the p-value (0.7945) is much higher than the common significance level (e.g., 0.05), we fail to reject the null hypothesis.

This means there is no statistically significant evidence to suggest that different levels of home noise distraction have an effect on academic performance. In other words, the variation in academic performance cannot be attributed to differences in the level of noise distraction at home based on this dataset.

#4. ANOVA for Secure Family Environment Effect on Emotional Stress

Null Hypothesis (H_0): The level of security in the family environment has no effect on emotional stress levels.
Alternative Hypothesis (H_1): The level of security in the family environment has a significant effect on emotional stress levels.

Since the p-value (0.0002) is much smaller than the common significance level (e.g., 0.05), we reject the null hypothesis. This indicates that there is a statistically significant effect of the level of security in the family environment on emotional stress levels.

Conclusion
The results suggest that differences in the perceived security of the family environment are associated with varying levels of emotional stress. In other words, the level of security in a family environment appears to have a significant impact on emotional stress.

Chi-Square

Chi-Square Test - Effect of Parental Support on Academic Performance

Cross-tabulate between parental support and academic performance,assuming 'parent_expect_acedemic_performance' and 'academic_grade'

Null Hypothesis (H_0): There is no association between parental support (expectations) and academic performance.

Alternative Hypothesis (H_1): There is a significant association between parental support (expectations) and academic performance

Chi2=26.75, p-value=0.0443

Since the p-value (0.0443) is less than the common significance level (0.05), we reject the null hypothesis. This indicates a statistically significant association between parental support and academic performance.

Decision Tree

Decision Tree Accuracy: 0.43137254901960786
Decision Tree Classification Report:

	precision	recall	f1-score	support
0	0.46	0.30	0.36	20
1	0.47	0.44	0.46	18
2	0.42	0.56	0.48	9
3	0.00	0.00	0.00	0
4	0.38	0.75	0.50	4
accuracy			0.43	51
macro avg	0.34	0.41	0.36	51
weighted avg	0.45	0.43	0.43	51

43%of observation is correctly predicted who's actaully decided correctly.

In conclusion, a 43% accuracy indicates that the current features and model might not be capturing the complexity of academic performance well. Enhancing feature quality, adding more relevant data, or trying more complex models like Random Forests or Gradient Boosting could improve the predictive performance.

Modeling
Random Forest

```
Random Forest Accuracy: 0.49019607843137253
Random Forest Classification Report:
              precision    recall  f1-score   support

           0       0.47      0.45      0.46        20
           1       0.48      0.67      0.56        18
           2       0.50      0.33      0.40         9
           4       1.00      0.25      0.40         4

    accuracy                           0.49        51
   macro avg       0.61      0.42      0.45        51
weighted avg       0.52      0.49      0.48        51
```

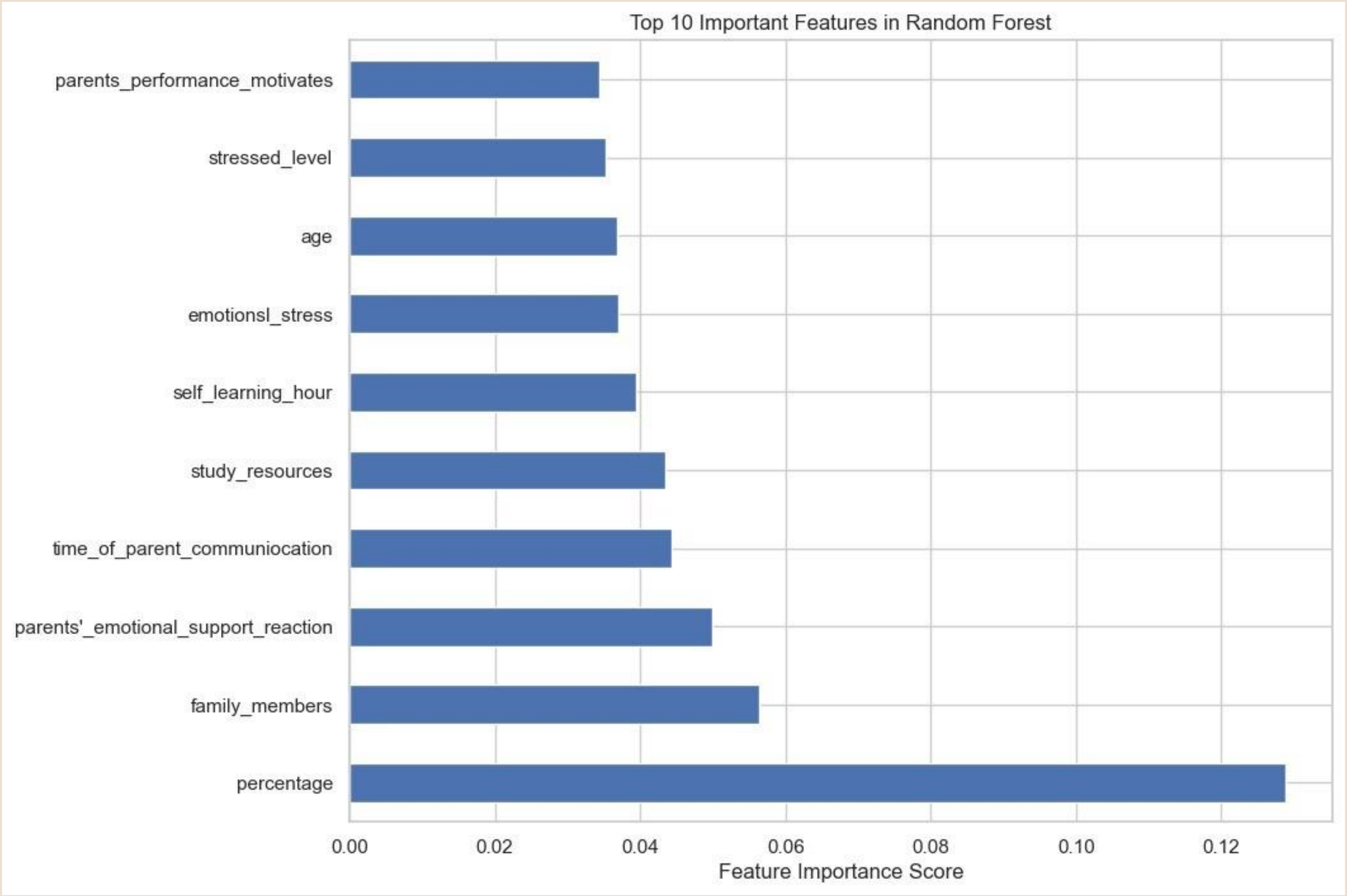
1. Hyperparameter Tuning

In [38]:
```
# increase accuracy
```

In [39]:
```
from sklearn.model_selection import GridSearchCV

# Define the parameter grid for Random Forest
param_grid = {
    'n_estimators': [100, 200, 300],
    'max_depth': [10, 20, 30, None],
    'min_samples_split': [2, 5, 10],
    'min_samples_leaf': [1, 2, 4],
    'max_features': ['auto', 'sqrt', 'log2']
}

# Initialize Grid Search
grid_search = GridSearchCV(estimator=RandomForestClassifier(random_state=42),
                           param_grid=param_grid,
                           cv=5, n_jobs=-1, verbose=2, scoring='accuracy')

# Fit Grid Search
grid_search.fit(X_train, y_train)
best_rf_model = grid_search.best_estimator_

# Evaluate the tuned model
y_pred_best_rf = best_rf_model.predict(X_test)
print("Tuned Random Forest Accuracy:", accuracy_score(y_test, y_pred_best_rf))
print("Best Parameters:", grid_search.best_params_)
```

Using hyperparamater(grid search) tuning I performed random forest model get 49% accurancy which can correctly classsified observation to be model.

Feature Selection



Sentiment Anyalsis

```python
# Select columns for sentiment analysis
text_columns = ['stressed_level', 'emotional challenges', 'level of emotional support', "parents' emotional support reaction"]

# Preprocess and analyze sentiment
sentiment_results = {}

for col in text_columns:
    # Drop nulls, lowercase and apply TextBlob
    data[col] = data[col].astype(str).str.lower()
    data[f'{col}_sentiment'] = data[col].apply(lambda x: TextBlob(x).sentiment.polarity)

    # Categorize sentiment scores into positive, neutral, negative
    data[f'{col}_sentiment_label'] = data[f'{col}_sentiment'].apply(
        lambda x: 'positive' if x > 0 else ('negative' if x < 0 else 'neutral')
    )

    # Save sentiment distribution for each column
    sentiment_results[col] = data[f'{col}_sentiment_label'].value_counts()

# Display sentiment analysis results for each column
sentiment_results
```



```python
    sentiment_results[col] = data[f'{col}_sentiment_label'].value_counts()

# Display sentiment analysis results for each column
sentiment_results
```

```
Out[11]: {'stressed_level': neutral     89
 negative    81
 Name: stressed_level_sentiment_label, dtype: int64,
 'emotional challenges': neutral     128
 negative     42
 Name: emotional challenges_sentiment_label, dtype: int64,
 'level of emotional support': positive    129
 neutral      41
 Name: level of emotional support_sentiment_label, dtype: int64,
 "parents' emotional support reaction": neutral     117
 positive     53
 Name: parents' emotional support reaction_sentiment_label, dtype: int64}
```

1. Stressed Level Sentiment (stressed_level_sentiment_label):

Neutral: 89 instances

Negative: 81 instances

Interpretation:

A significant portion of the data indicates a neutral stance regarding stress levels (89 instances). This suggests that many respondents neither express high nor low stress, possibly indicating a more stable emotional state.

The negative sentiment (81 instances) indicates that 81 individuals feel stressed or under strain, which might point to some emotional challenges or external stressors that have been identified in the data.

2. Emotional Challenges Sentiment (emotional_challenges_sentiment_label):

Neutral: 128 instances

Negative: 42 instances

Interpretation:

The neutral sentiment (128 instances) is dominant, suggesting that most respondents do not view their emotional challenges as severe or overwhelming.

However, negative sentiment (42 instances) still reflects that a subset of respondents perceive significant emotional challenges, which could indicate personal or psychological struggles.

The majority of people might not label their emotional challenges as severe, but there is a noticeable group facing struggles.

3.Level of Emotional Support Sentiment (level_of_emotional_support_sentiment_label): Positive: 129 instances
Neutral: 41 instances
Interpretation:

A majority of respondents (129 instances) feel they receive positive emotional support, which may indicate a supportive environment or healthy relationships that help maintain emotional stability.
A smaller group (41 instances) feel neutral, meaning they do not experience a strong positive or negative emotional support environment.
This could suggest that emotional support plays a significant role in maintaining well-being for most individuals.

4.Parents' Emotional Support Reaction Sentiment (parents' emotional support reaction_sentiment_label): Neutral: 117 instances
Positive: 53 instances
Interpretation:

The neutral sentiment (117 instances) suggests that many respondents feel their parents' emotional support reactions are neither particularly supportive nor unsupportive. It could reflect a more indifferent or distant emotional response from parents.
The positive sentiment (53 instances) indicates a smaller group who feel their parents are emotionally supportive, which could be a valuable insight into how family dynamics impact emotional well-being.

Conclusion

1.Result suggests that lower satisfaction with academic performance may correlate with higher stress levels, potentially showing the emotional impact of academic expectations.

2.The different levels of home noise distraction have an effect on academic performance. In other words, the variation in academic performance cannot be attributed to differences in the level of noise distraction at home based on this dataset.

3.The data reveals varying emotional experiences, with many respondents indicating neutral sentiments across various emotional challenges and stress levels, suggesting a relatively stable emotional state.
Negative sentiments, though less frequent, still point to a notable portion of individuals facing emotional difficulties or stress.

4.Emotional support appears to be a key factor in overall well-being, with a majority of respondents reporting positive emotional support, particularly from broader social networks, though some still experience emotional challenges or a lack of strong support from family (as seen in the parents' emotional support reaction).

5.The differences in the perceived security of the family environment are associated with varying levels of emotional stress. In other words, the level of security in a family environment appears to have a significant impact on emotional stress.

6. Single Parenting Challenges: Students from single-parent families face unique challenges, often due to limited resources or time constraints, impacting academic performance. However, active parental engagement can help mitigate some of these effects.

7. Home Environment: A stable home environment, free from excessive noise and distractions, supports students' concentration and study habits. Secure family dynamics are linked to lower emotional stress in students.

8. Gender Differences in Stress Response: Females tend to report higher levels of stress that interfere with academic focus, whereas males generally report lower stress-related disruption. This suggests a need for targeted support strategies to address these differences.

9. Supportive Sibling Influence: Sibling support positively affects students' academic resilience, particularly when both parental support and siblings' involvement are present.

10. Emotional Challenges: Stress is the most commonly reported emotional challenge impacting academic focus, followed by fear of failure and anxiety. Effective stress management and emotional support are essential to mitigate these issues.

THANK YOU