

THE STUDENT EQAUTION

UNPACKING THE FACTORS
THAT ADD UP TO SUCCESS



ABSTRACT

This study explores the complex relationship between various factors, including anxiety, sleep, and social support, and their impact on students' academic performance. It aims to inform targeted interventions to improve student well-being and academic achievement.

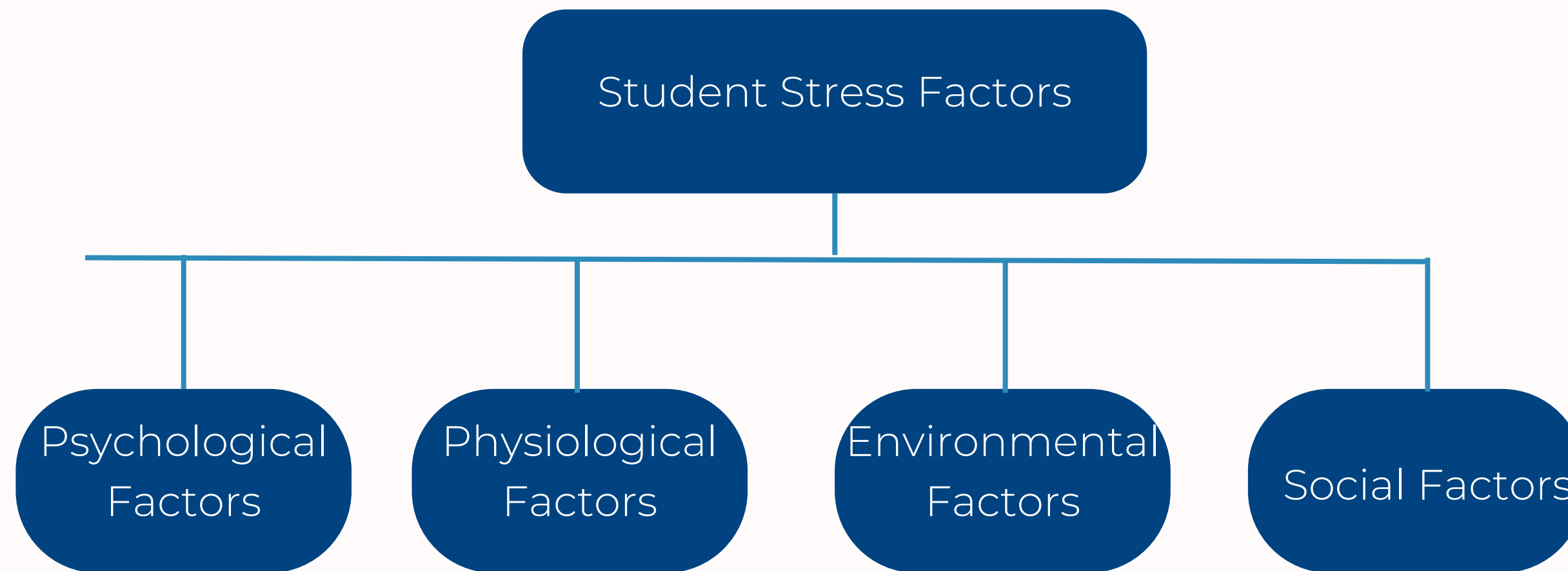
Specifically, the study examines how these factors influence academic outcomes through four dimensions: social, environmental, physiological, and psychological. The findings reveal that academic performance is significantly affected by certain key factors, such as anxiety level, bullying, and sleep quality.

Overall, this study provides valuable insights into the complex interplay between various factors and their influence on student academic success. It highlights the importance of addressing academic factors and social, emotional, and physical well-being to support students' holistic development and academic achievement.



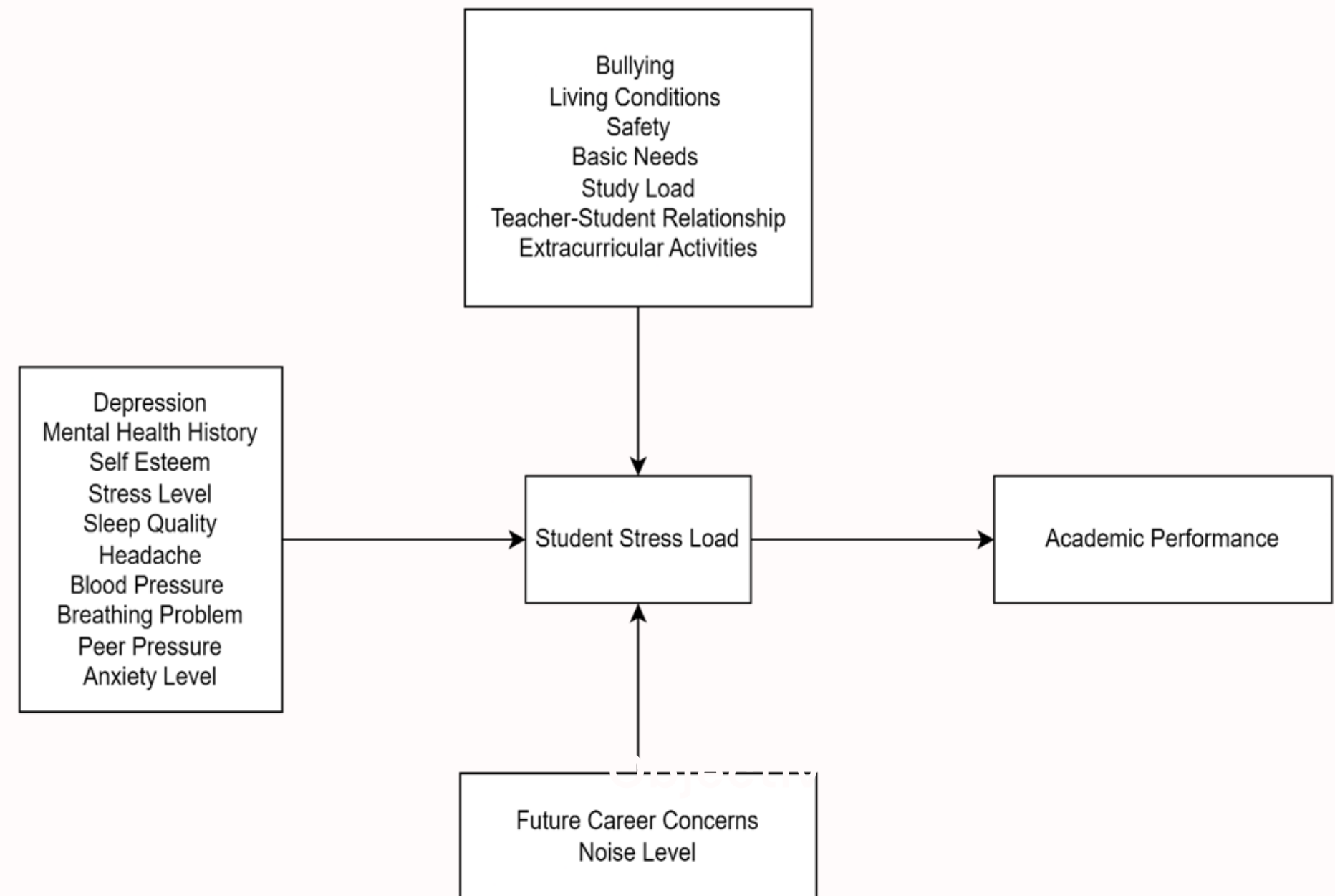
METHODOLOGY

The system under investigation involves a comprehensive examination of various factors affecting students, organized into four distinct dimensions: social, environmental, physiological, and psychological. This system encompasses a multitude of variables, each representing a crucial aspect of the student's experience.



P-DIAGRAM

- **Inputs:** Depression, Mental Health History, Self Esteem, Stress Level, Sleep Quality, Headache, Blood pressure, Breathing Problem, Peer Pressure, Anxiety Level
- **Control Factors:** Bullying, Living Conditions, Safety, Basic Needs, Study Load, Teacher-Student Relationship, Extracurricular Activities
- **Noise Factors:** Future Career Concerns, Noise Level
- **Output:** Academic Performance



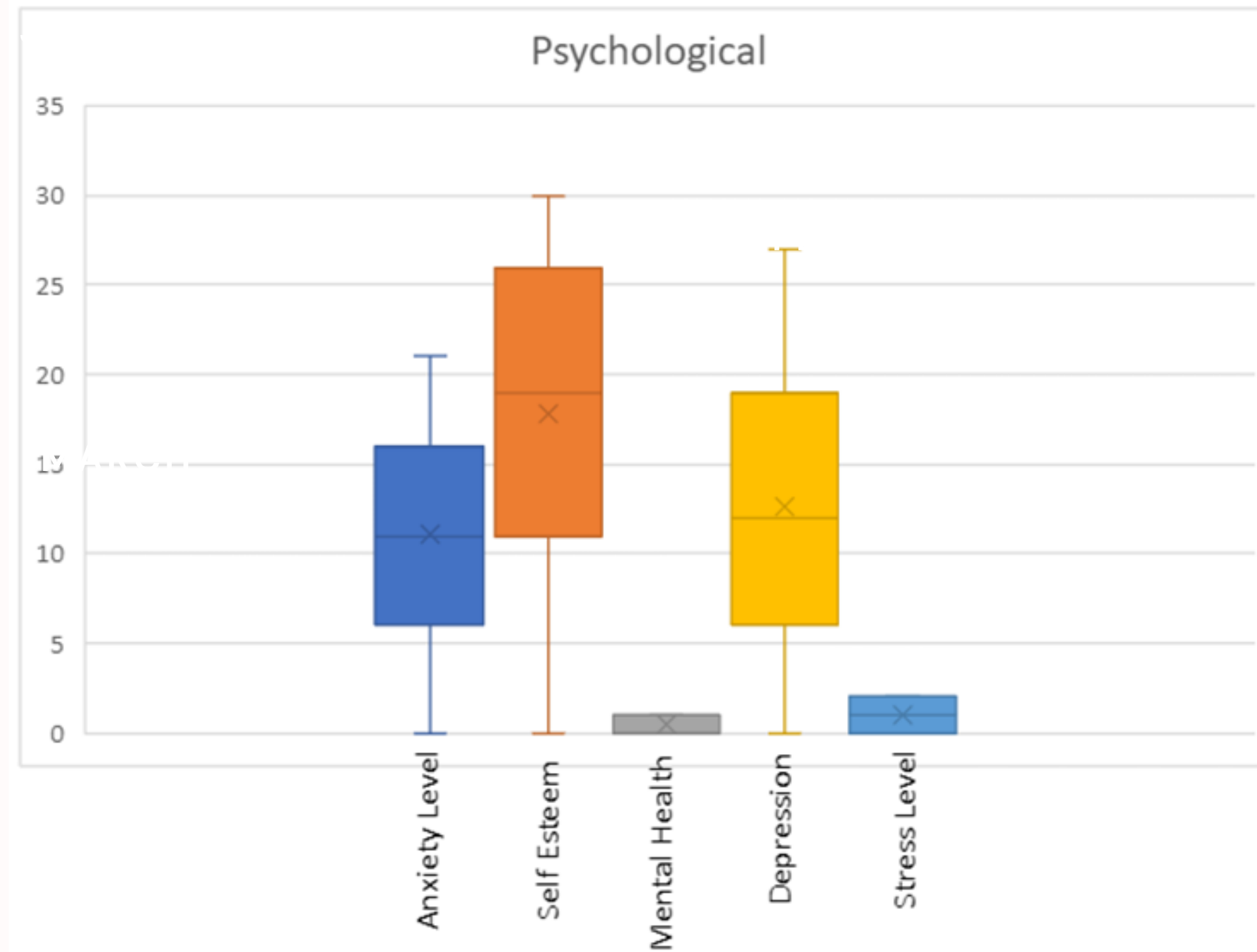
DATA

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------|----------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Exploring the Impact of Social, Environmental, Physiological, and Psychological Factors on Students' Academic Performance | Academics | academic_performance | 3 | 1 | 2 | 2 | 4 | 2 | 5 | 1 | 3 | 2 | 1 | 1 | 5 | 1 | 4 | 3 | 5 | 4 | 2 | 1 | 5 | 2 | 4 | 1 |
| | Psychological | anxiety_level | 14 | 15 | 12 | 16 | 16 | 20 | 4 | 17 | 13 | 6 | 17 | 17 | 5 | 9 | 2 | 11 | 6 | 7 | 11 | 21 | 3 | 18 | 7 | 20 |
| | | self_esteem | 20 | 8 | 18 | 12 | 28 | 13 | 26 | 3 | 22 | 8 | 12 | 15 | 28 | 23 | 28 | 21 | 28 | 25 | 23 | 1 | 27 | 1 | 27 | 5 |
| | | mental_health_history | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | depression | 11 | 15 | 14 | 15 | 7 | 21 | 6 | 22 | 12 | 27 | 25 | 22 | 8 | 24 | 3 | 14 | 1 | 3 | 12 | 25 | 0 | 21 | 5 | 26 |
| | | stress_level | 1 | 2 | 1 | 2 | 1 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 2 |
| | Physiological | headache | 2 | 5 | 2 | 4 | 2 | 3 | 1 | 4 | 3 | 4 | 4 | 3 | 1 | 4 | 1 | 3 | 1 | 1 | 3 | 4 | 1 | 4 | 1 | 3 |
| | | blood_pressure | 1 | 3 | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 3 | 2 | 3 | 2 | 3 |
| | | sleep_quality | 2 | 1 | 2 | 1 | 5 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 4 | 1 | 4 | 2 | 4 | 4 | 2 | 1 | 4 | 1 | 4 | 1 |
| | | breathing_problem | 4 | 4 | 2 | 3 | 1 | 4 | 1 | 5 | 4 | 2 | 3 | 5 | 2 | 0 | 2 | 4 | 2 | 2 | 2 | 4 | 1 | 3 | 1 | 4 |
| | Environmental | noise_level | 2 | 3 | 2 | 4 | 3 | 3 | 1 | 3 | 3 | 0 | 4 | 5 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 4 | 1 | 5 | 1 | 4 |
| | | living_conditions | 3 | 1 | 2 | 2 | 2 | 2 | 4 | 1 | 3 | 5 | 2 | 2 | 3 | 2 | 3 | 2 | 4 | 4 | 2 | 1 | 3 | 1 | 3 | 2 |
| | | safety | 3 | 2 | 3 | 2 | 4 | 2 | 4 | 1 | 5 | 2 | 1 | 1 | 5 | 4 | 4 | 2 | 5 | 5 | 3 | 2 | 5 | 1 | 5 | 1 |
| | | basic_needs | 2 | 2 | 2 | 2 | 3 | 1 | 4 | 1 | 3 | 2 | 1 | 1 | 5 | 3 | 4 | 2 | 4 | 4 | 3 | 1 | 4 | 2 | 5 | 2 |
| | Social | social_support | 2 | 1 | 2 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 0 | 3 | 2 | 3 | 3 | 3 | 1 | 3 | 1 | 3 | 1 |
| | | peer_pressure | 3 | 4 | 3 | 4 | 5 | 4 | 2 | 4 | 3 | 5 | 4 | 5 | 1 | 1 | 1 | 3 | 2 | 1 | 3 | 4 | 1 | 4 | 1 | 5 |
| | | extracurricular_activities | 3 | 5 | 2 | 4 | 0 | 4 | 2 | 4 | 2 | 3 | 4 | 5 | 1 | 0 | 2 | 2 | 2 | 1 | 2 | 4 | 2 | 4 | 2 | 4 |

DESCRIPTIVE STATISTICS

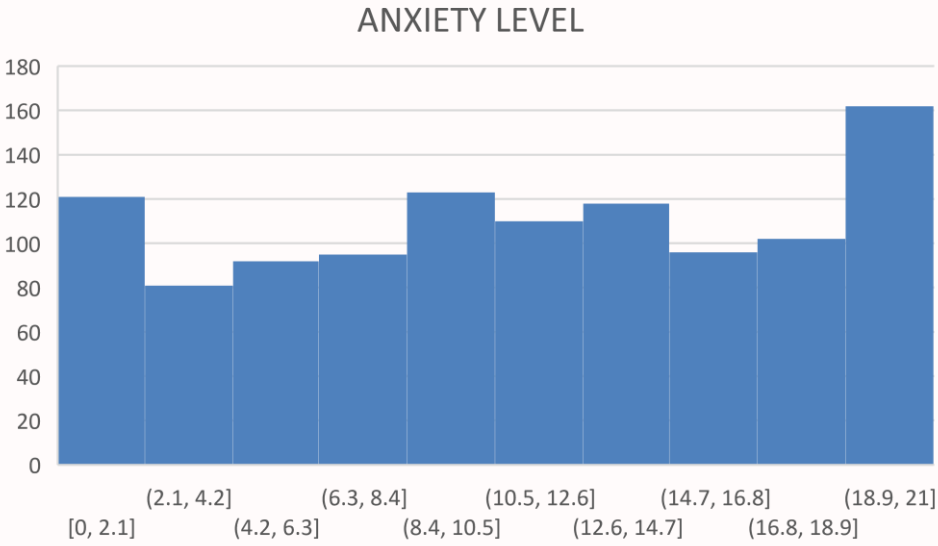
We dug deep into each factor, using stats like mean, standard deviation, and even box plots to understand how data is spread. We found outliers in noise, living conditions, and study load, meaning some students were way outside the norm on these.

PSYCHOLOGICAL FACTOR

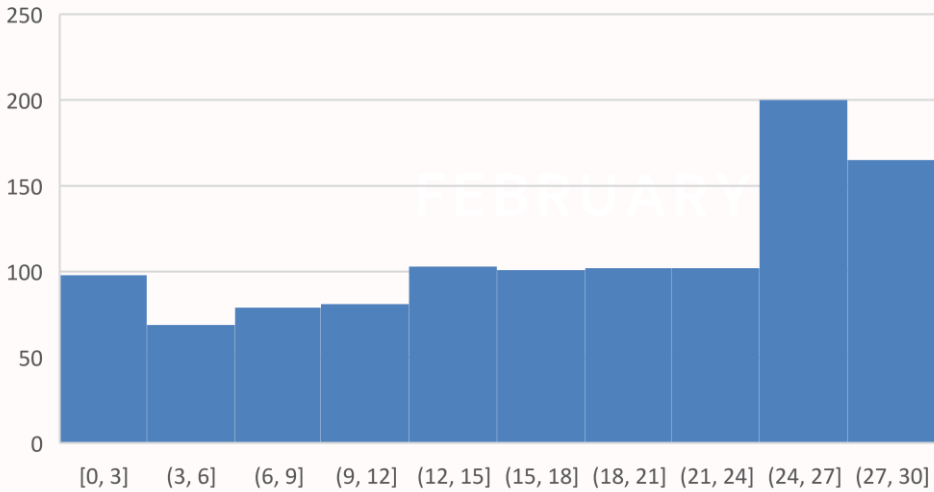


PSYCHOLOGICAL FACTOR

JANUARY

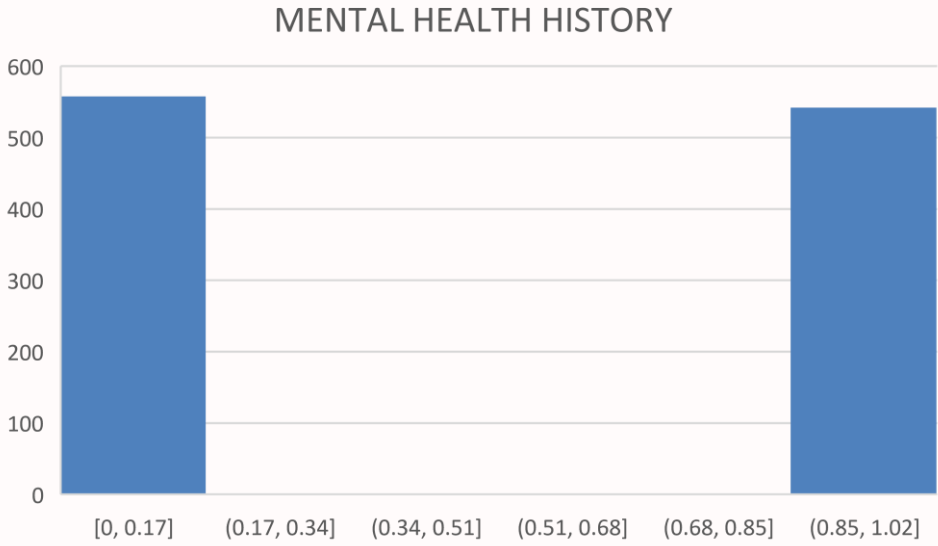


SELF ESTEEM

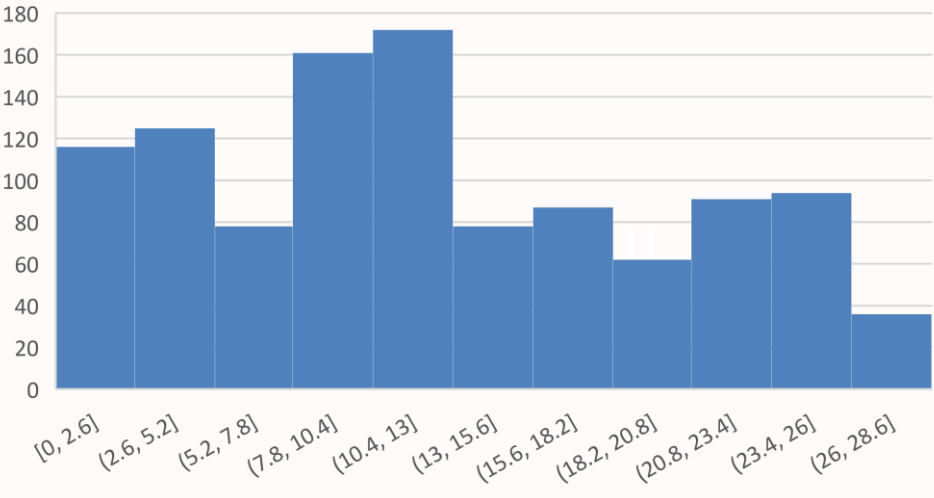


FEBRUARY

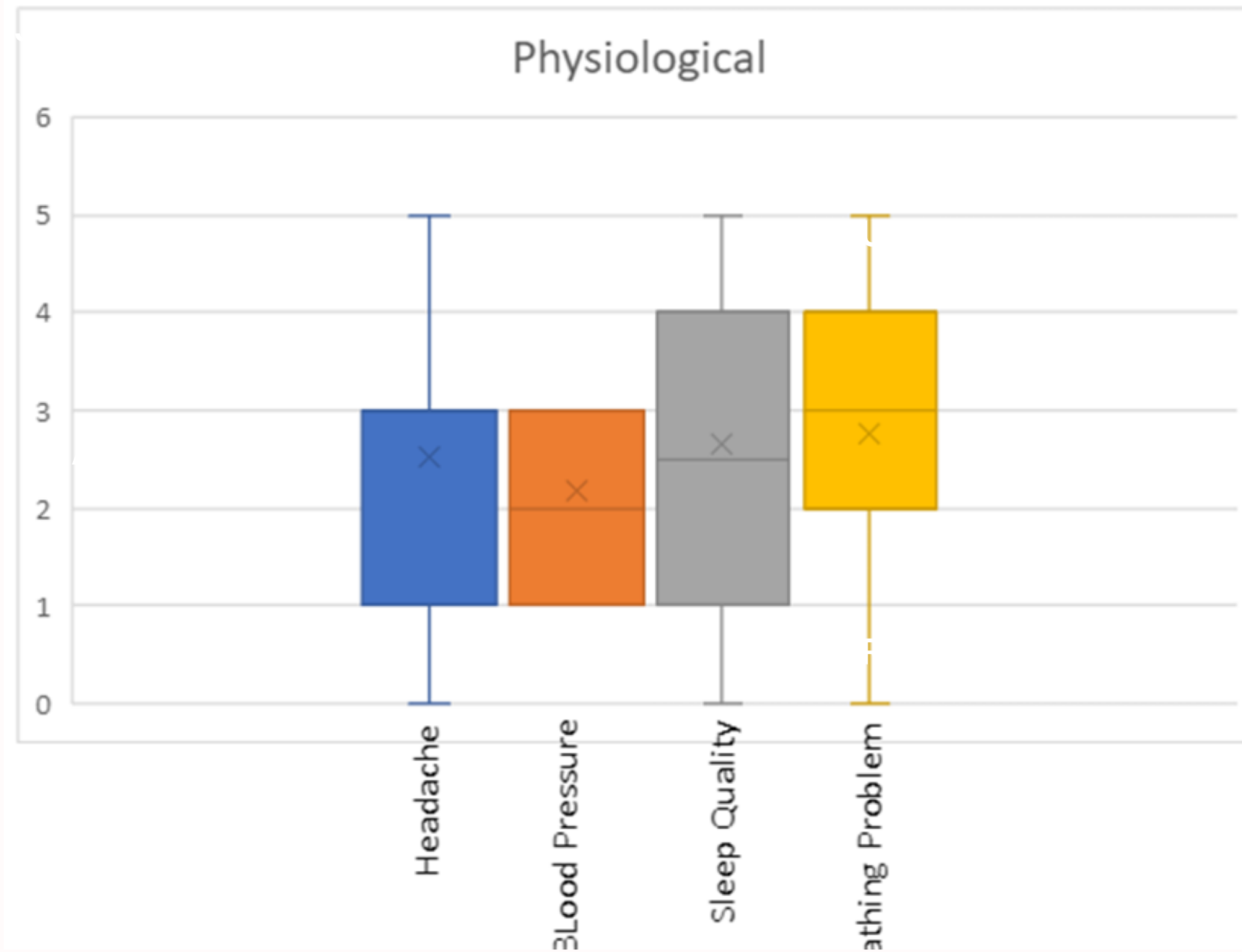
MARCH



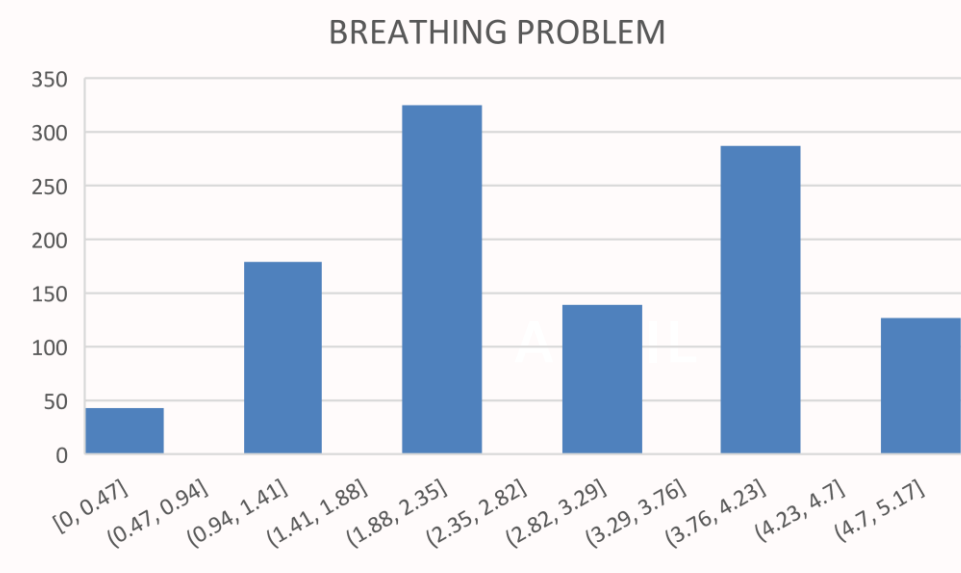
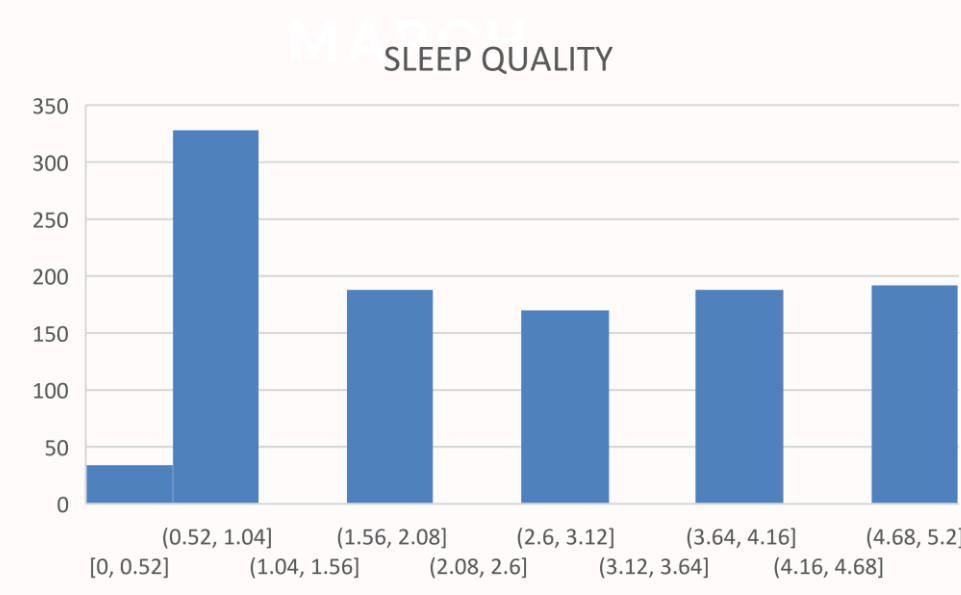
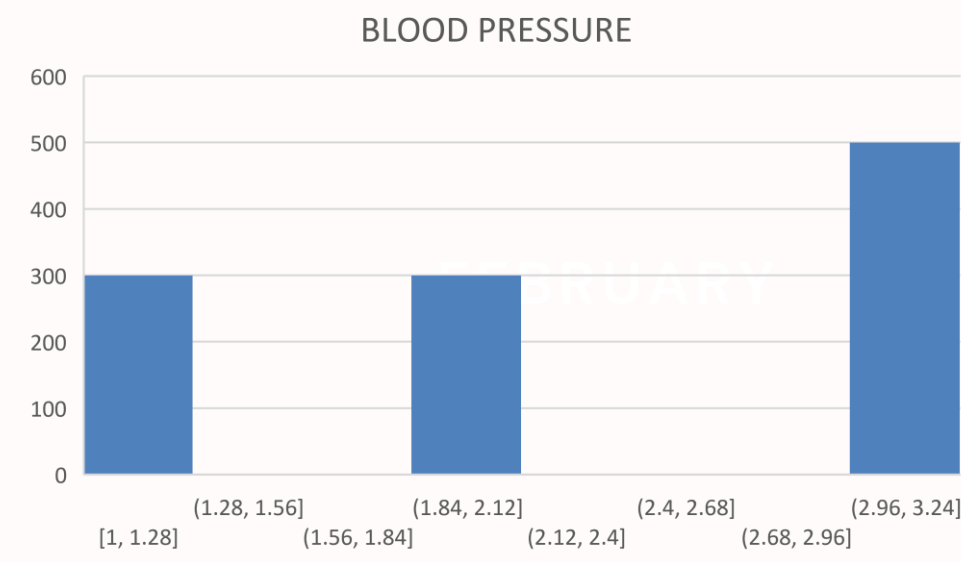
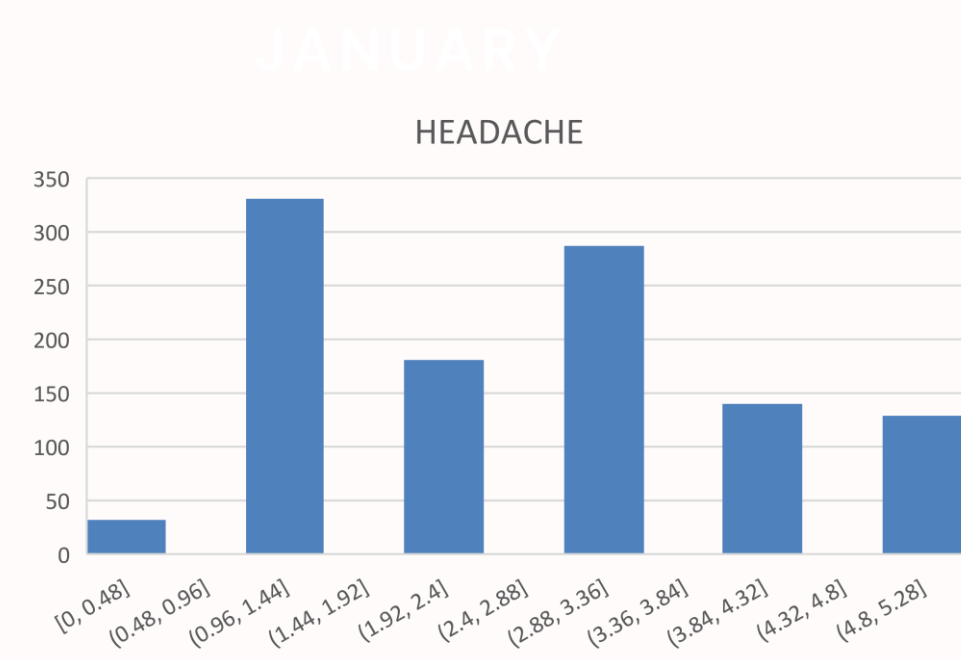
DEPRESSION



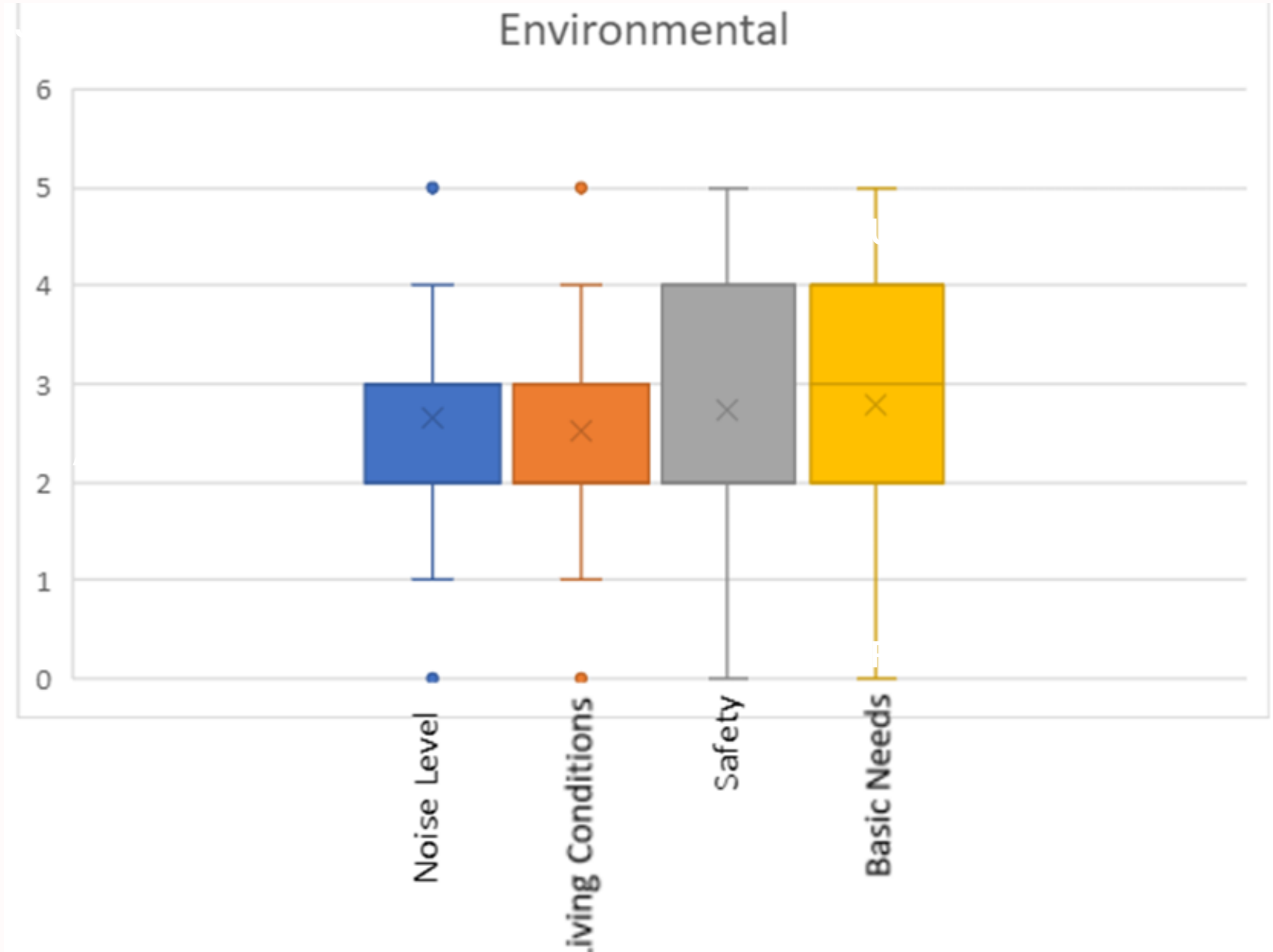
PHYSIOLOGICAL FACTOR



PHYSIOLOGICAL FACTOR

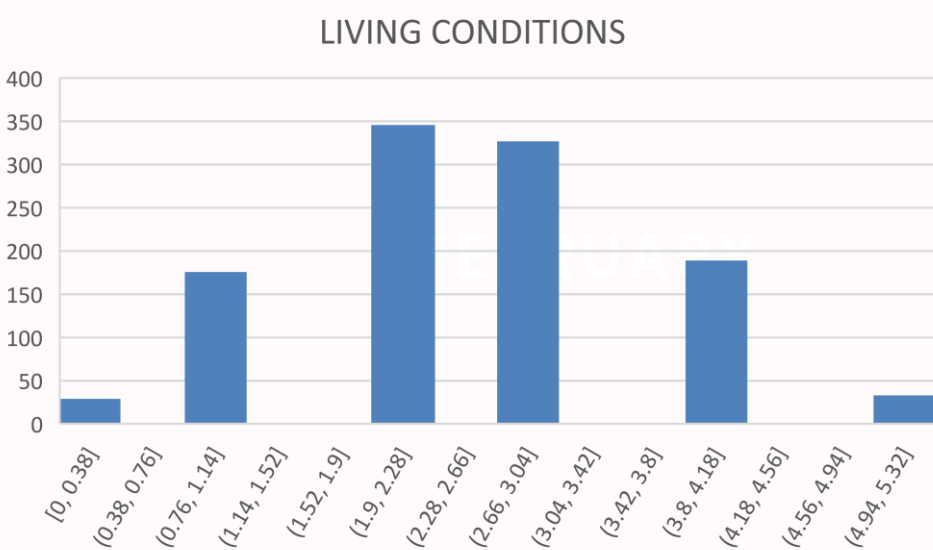
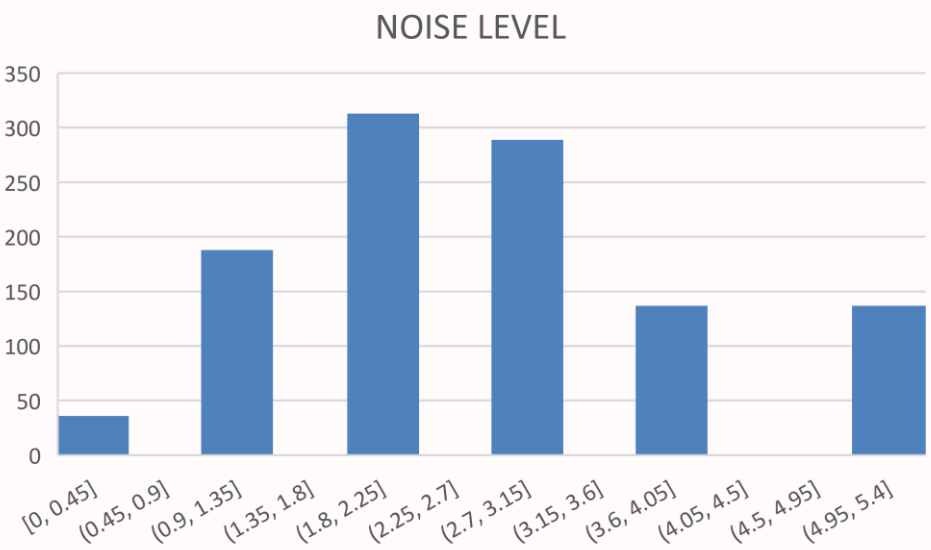


ENVIRONMENTAL FACTOR

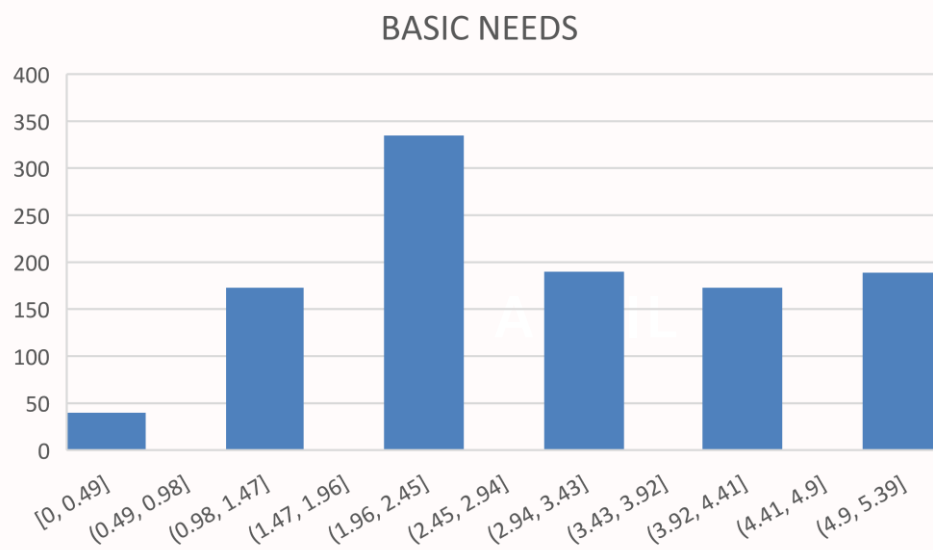
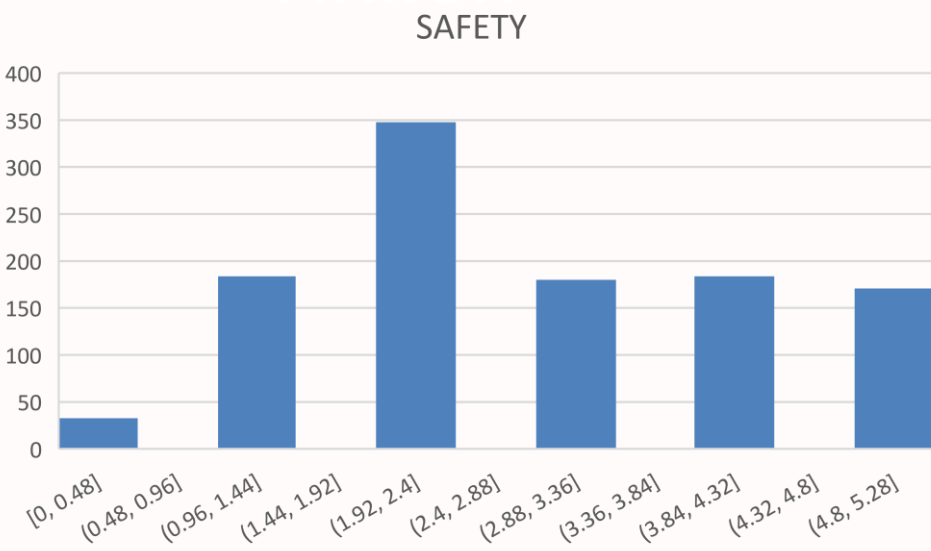


ENVIRONMENTAL FACTOR

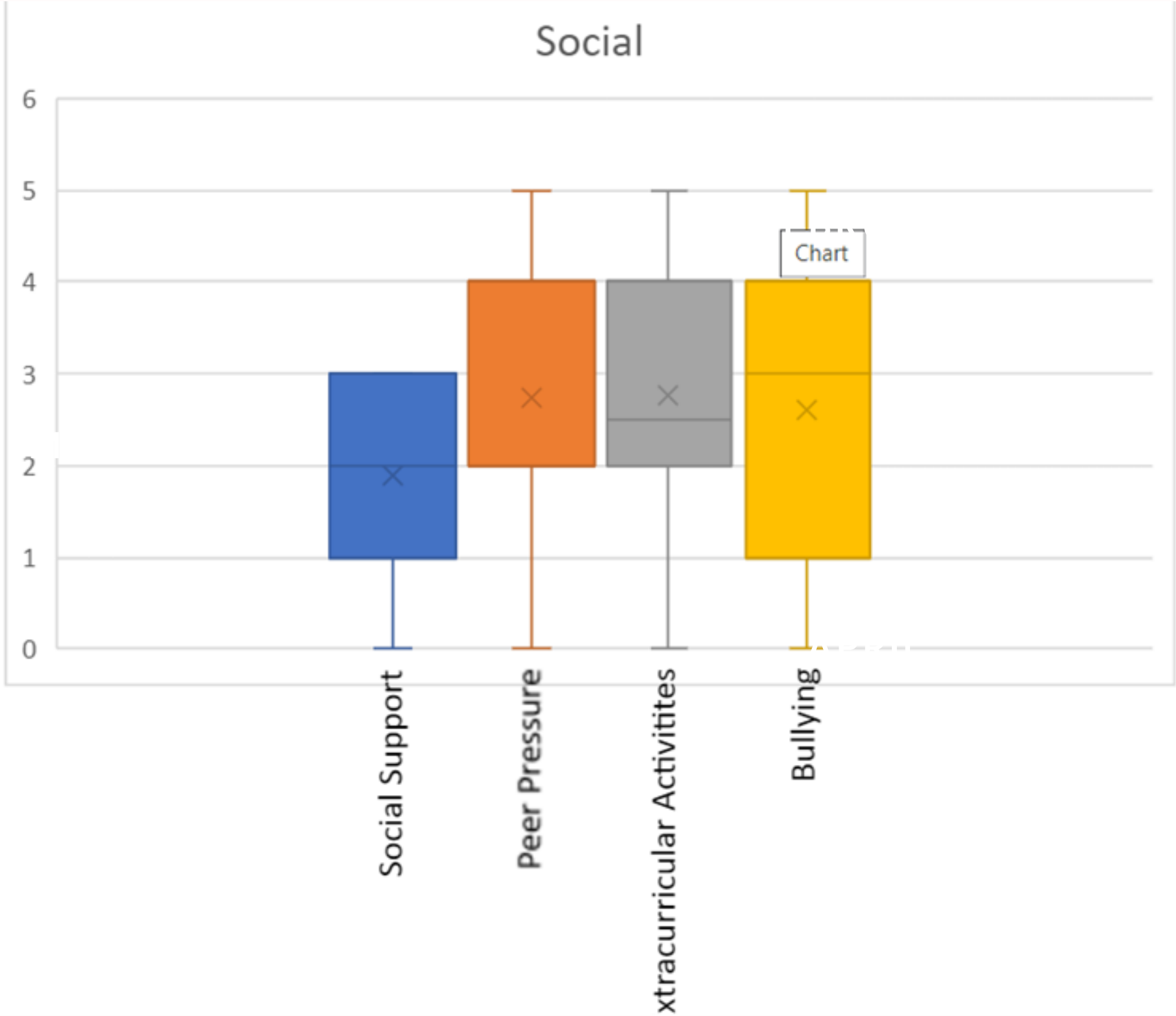
JANUARY



MARCH

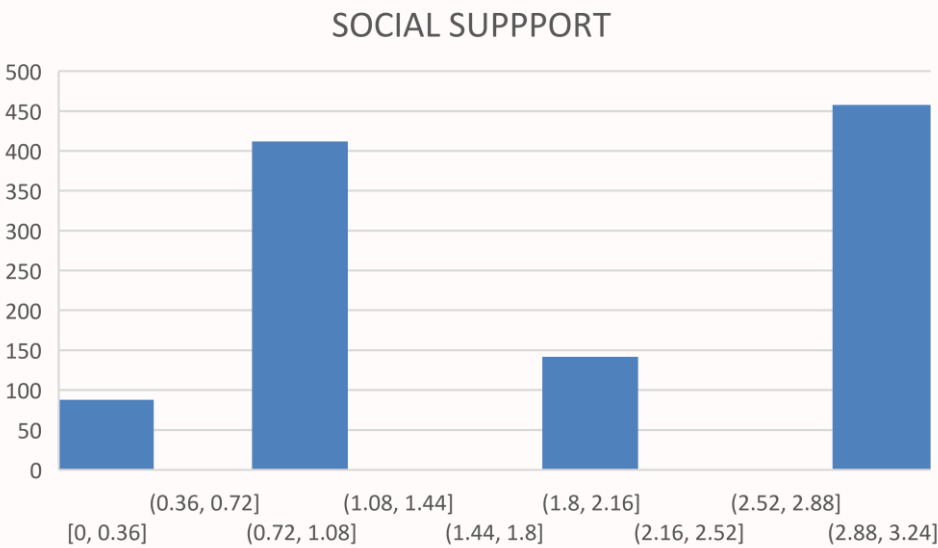


SOCIAL FACTOR

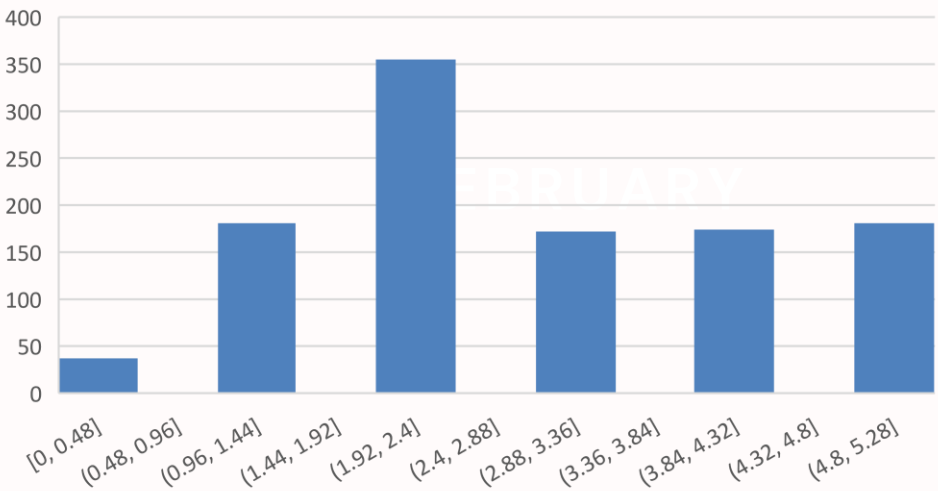


SOCIAL FACTOR

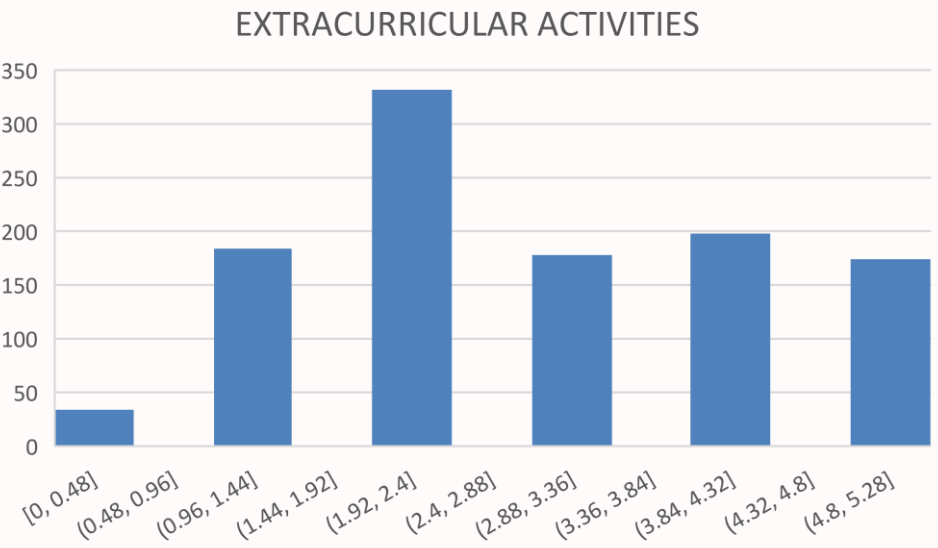
JANUARY



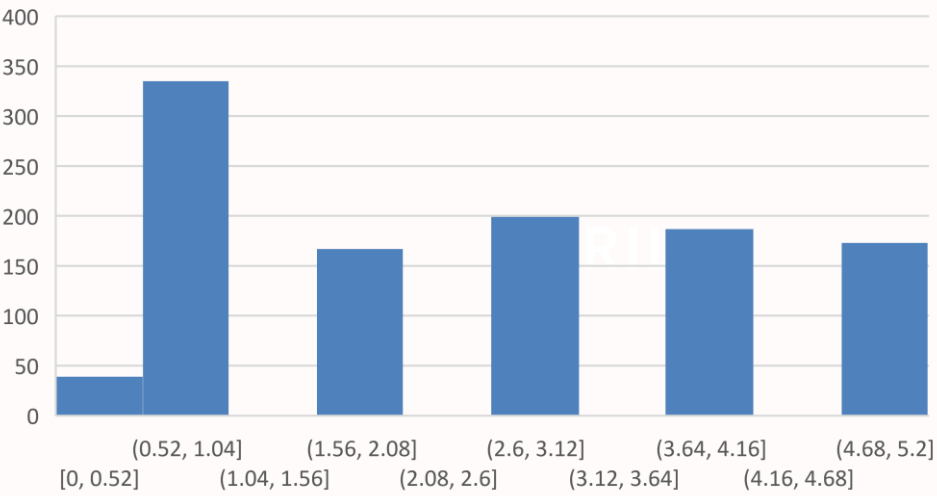
PEER PRESSURE



MARCH



BULLYING



INFERENTIAL STATISTICS

Statistical Question:

$H_0: r=0$

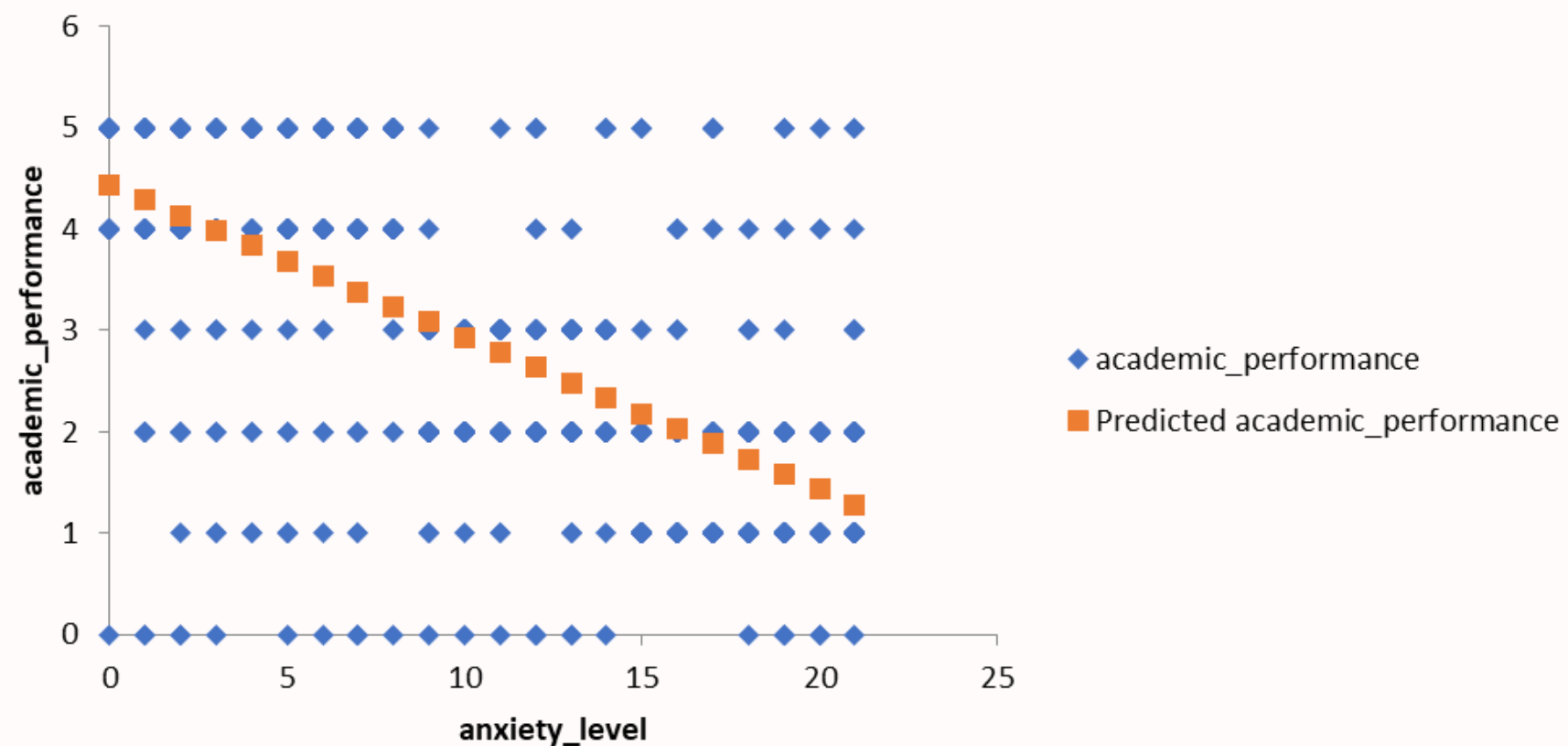
$H_1: r \neq 0$

In this case, we determined that the hypothesized correlation coefficient for 16 factors should be zero.

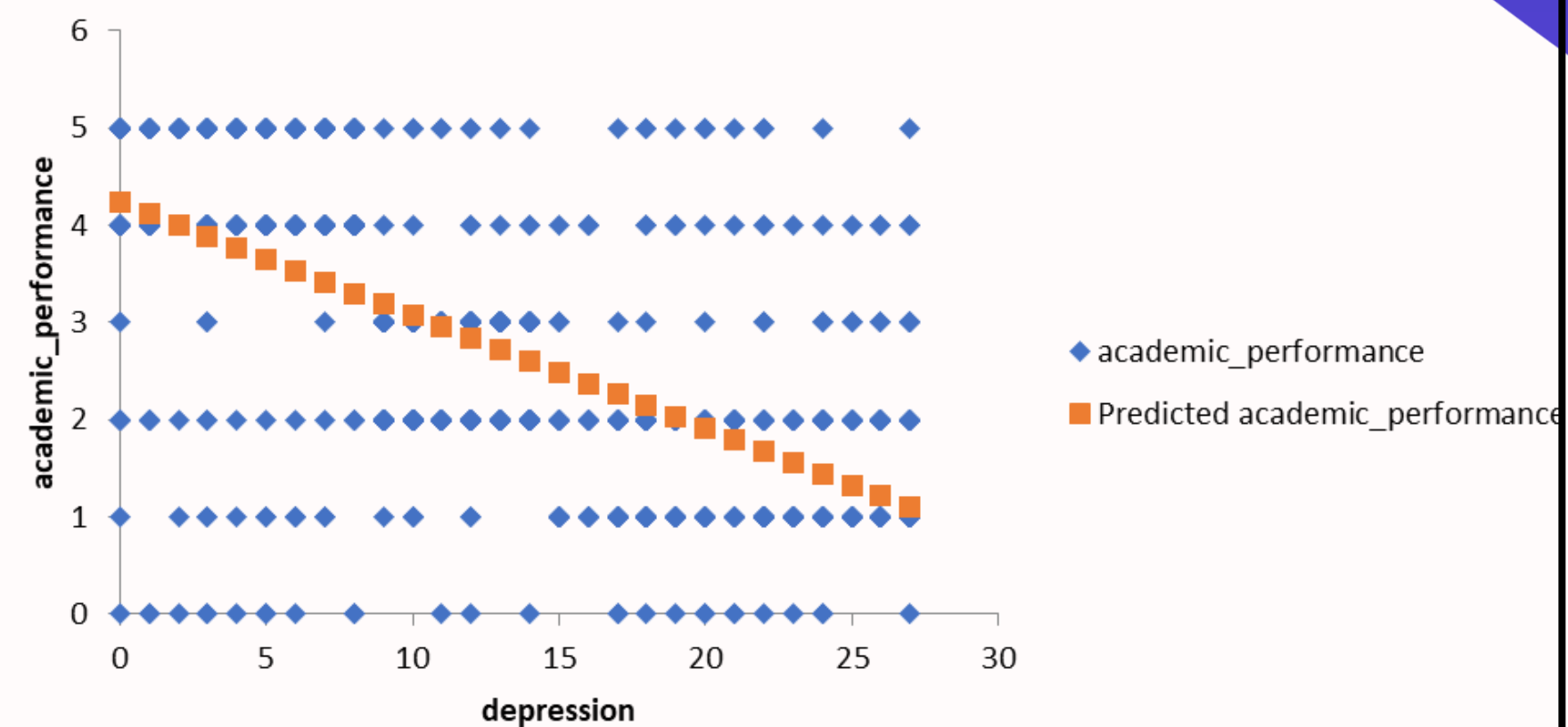
$D_0 = 0$

If we do not reject the hypothesis this indicates that factor has no impact on academic performance, and both the variables are independent. If we reject the hypothesis this indicates that that factor has significant impact on academic performance, and both the variables are dependent. Factor can positively/negatively affect academic performance of student.

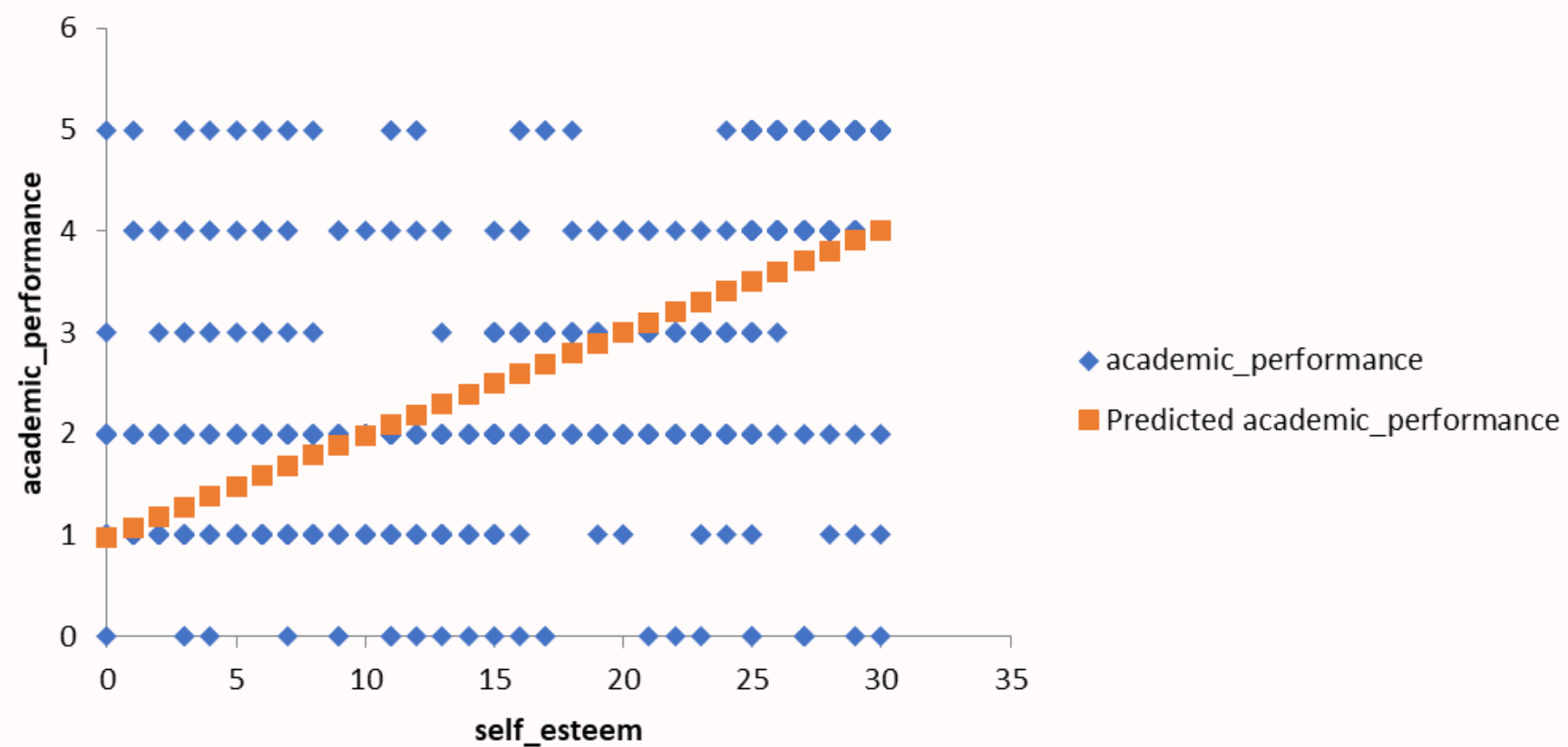
Anxiety_level Line Fit Plot



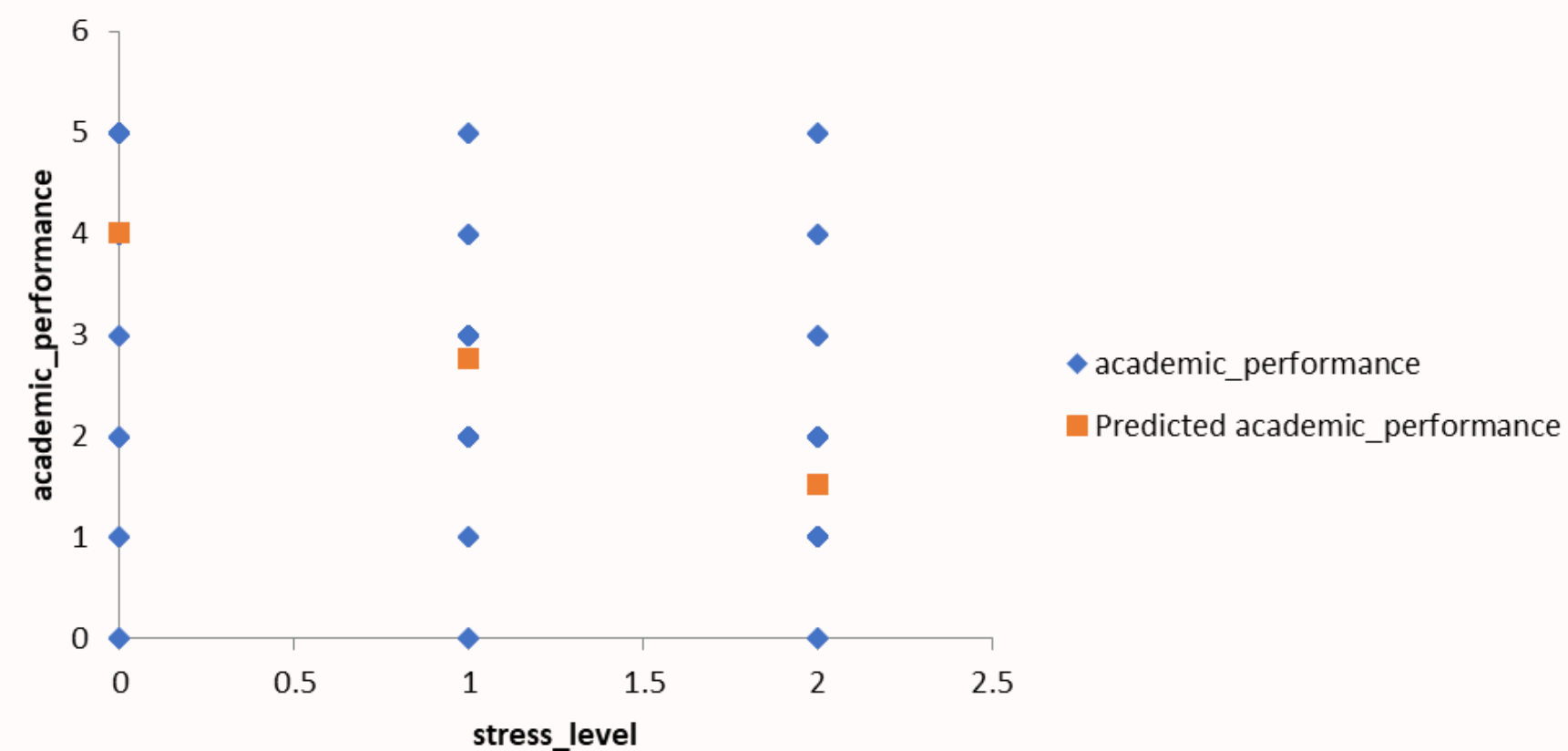
depression Line Fit Plot



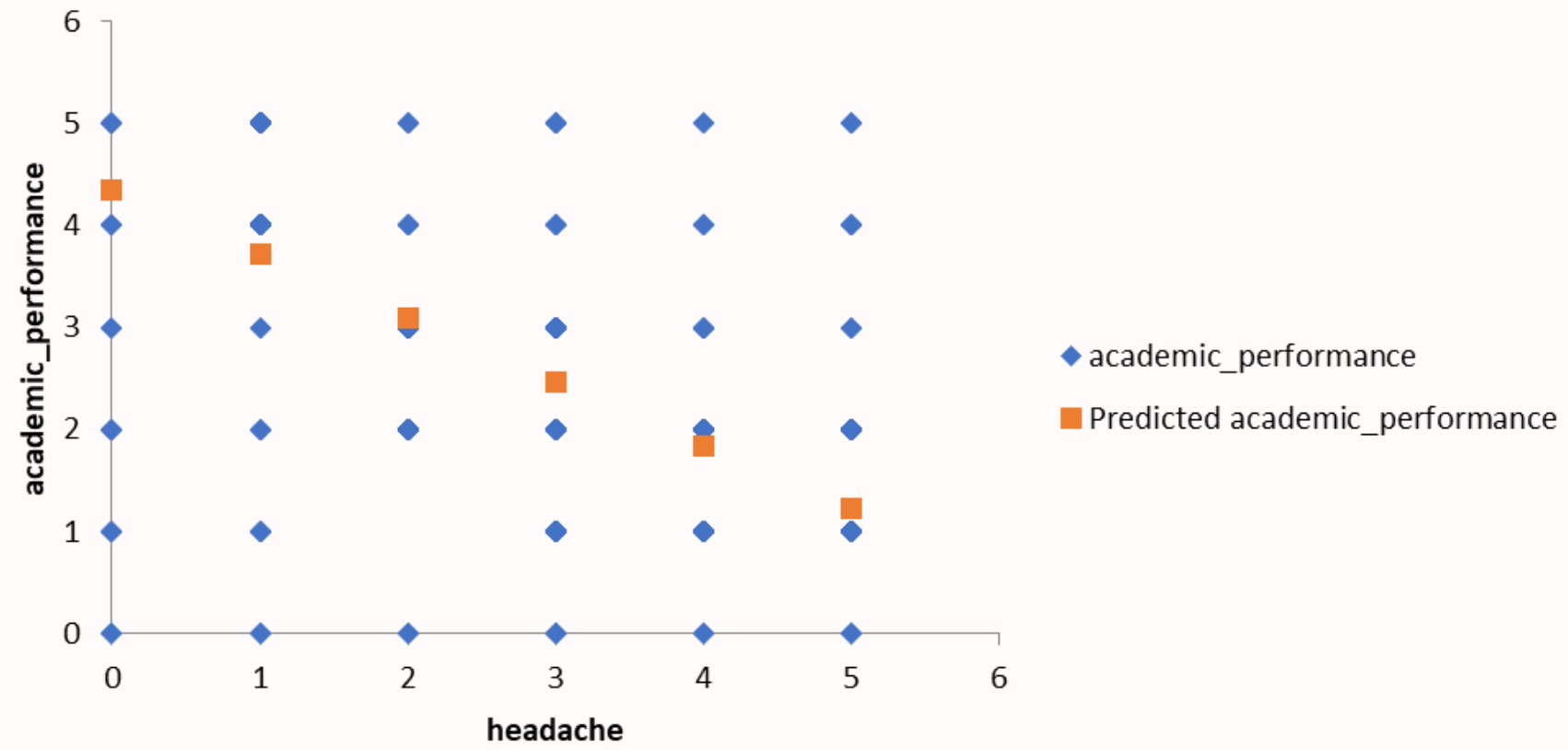
self_esteem Line Fit Plot



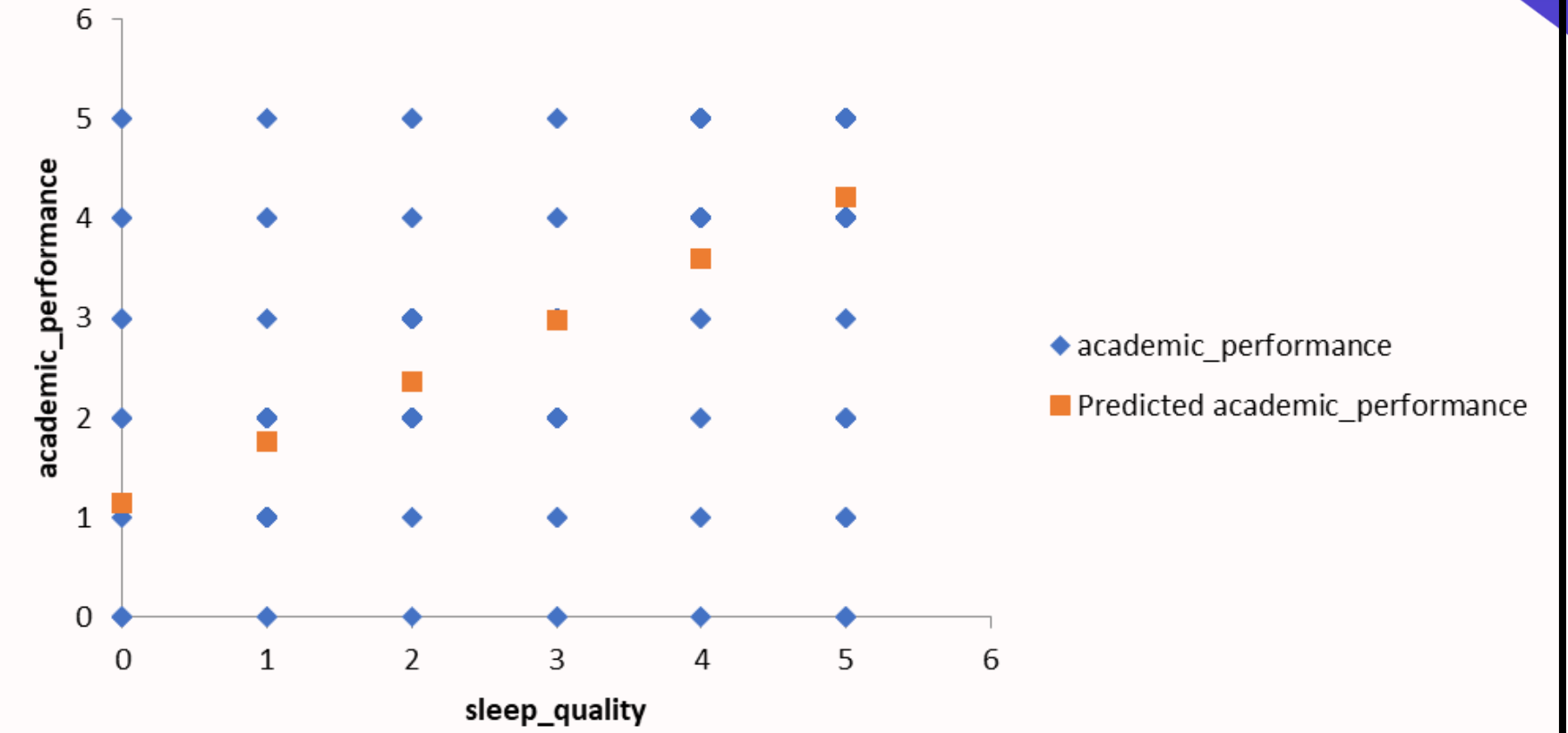
stress_level Line Fit Plot



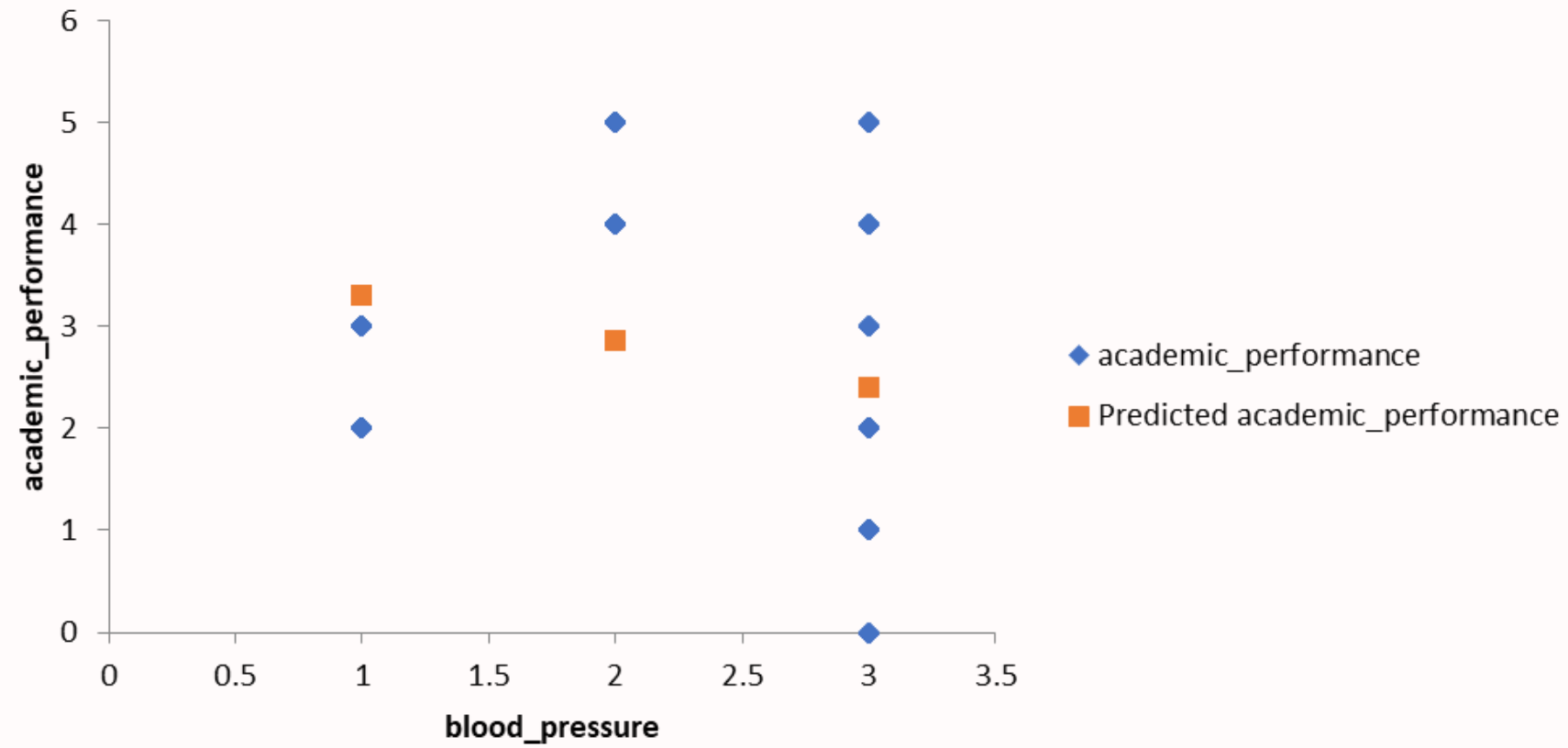
headache Line Fit Plot



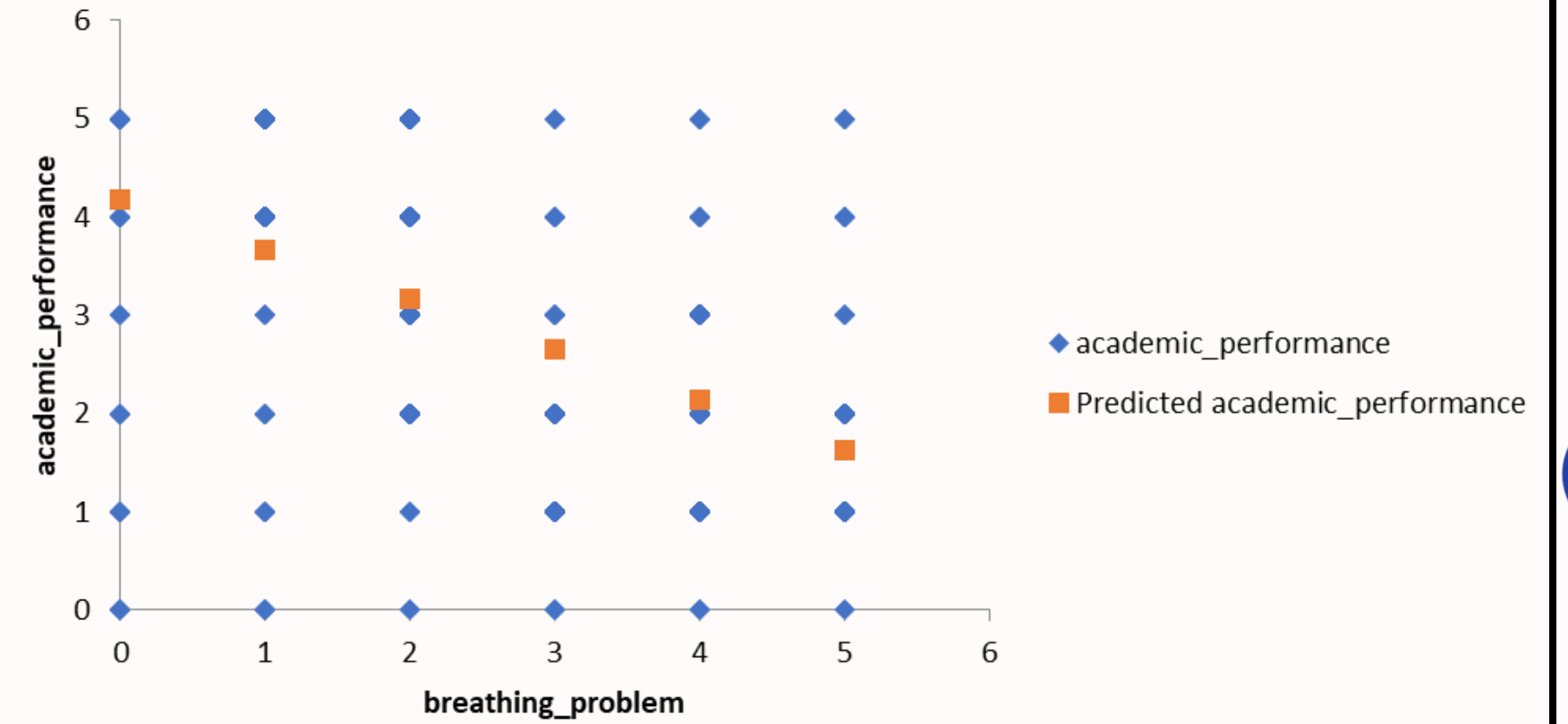
sleep_quality Line Fit Plot



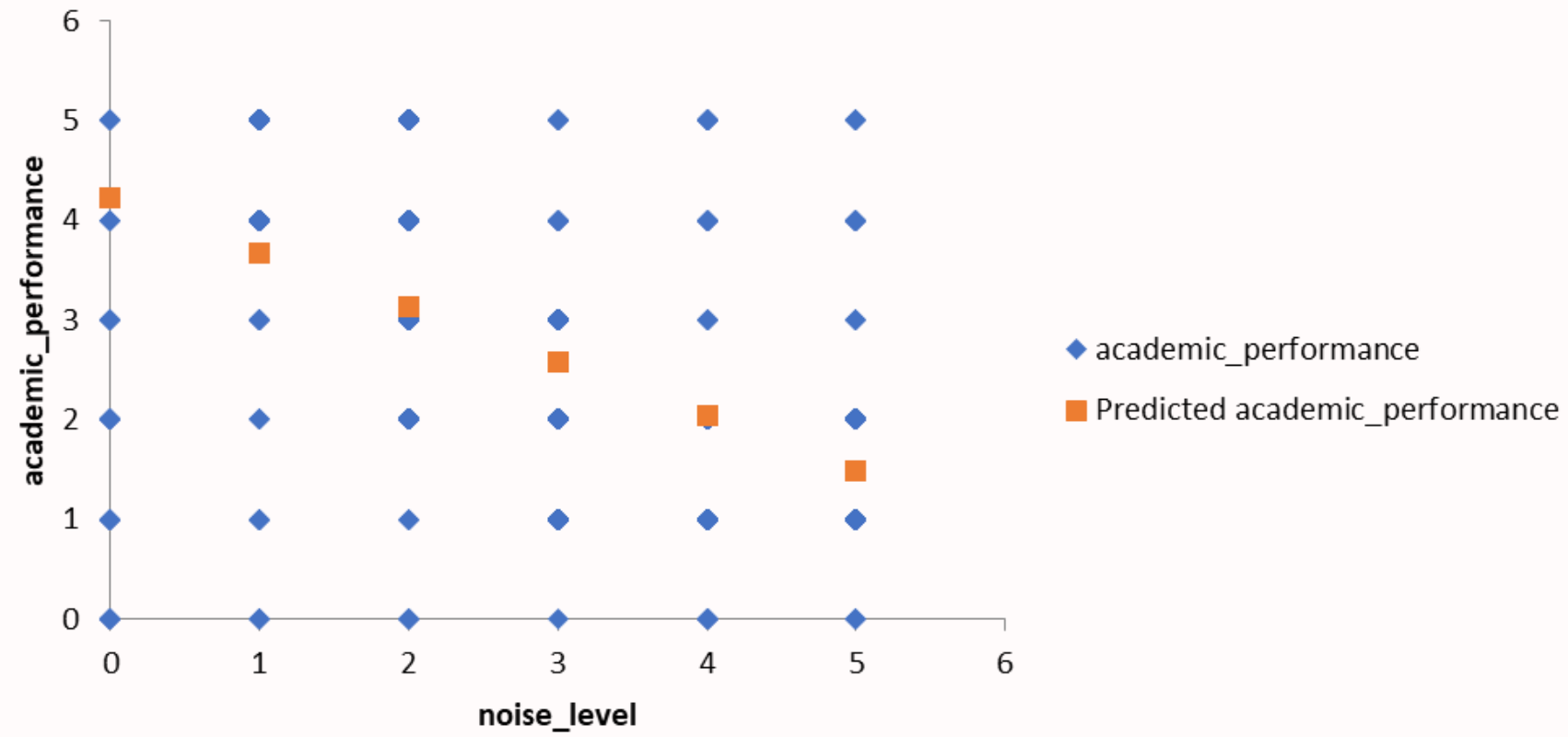
blood_pressure Line Fit Plot



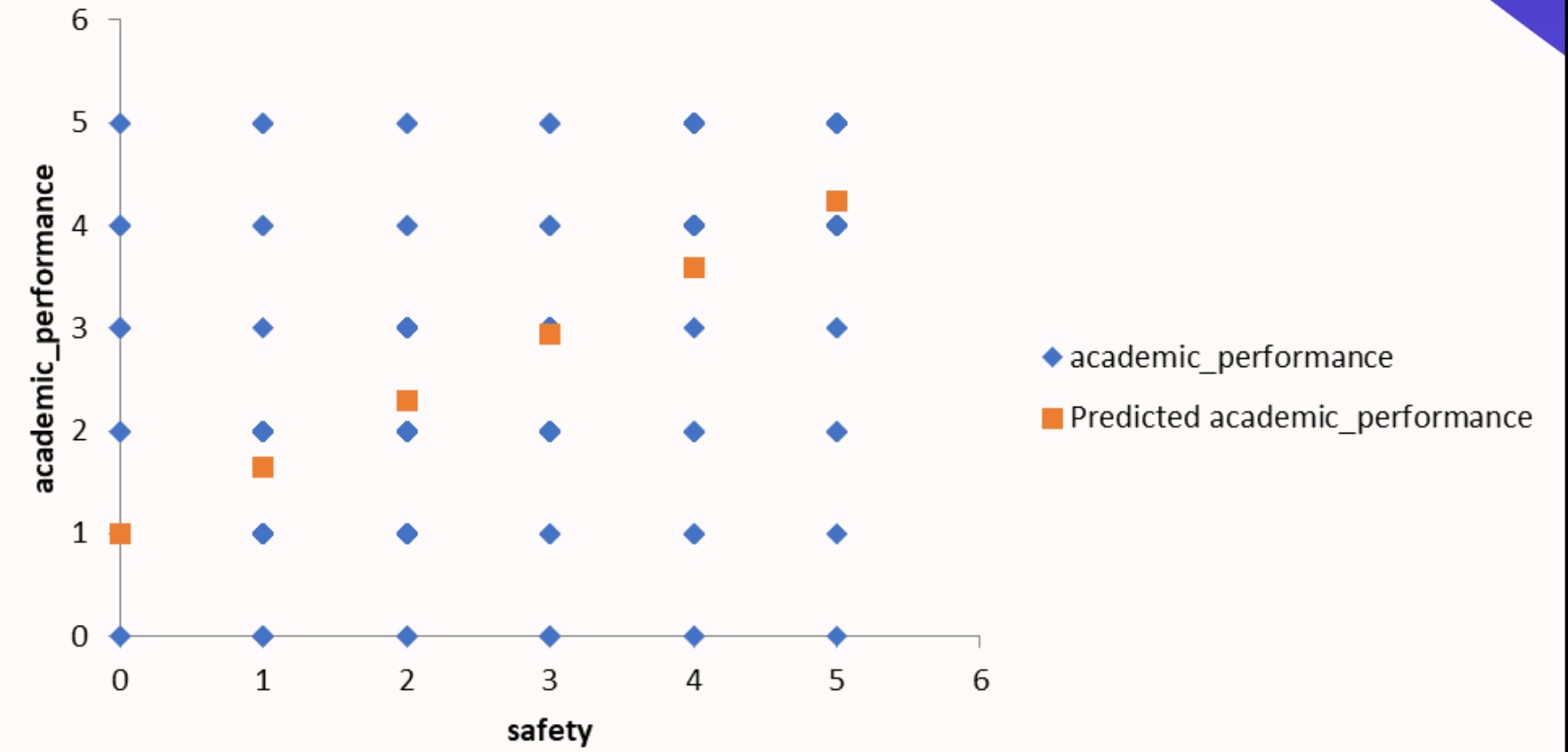
breathing_problem Line Fit Plot



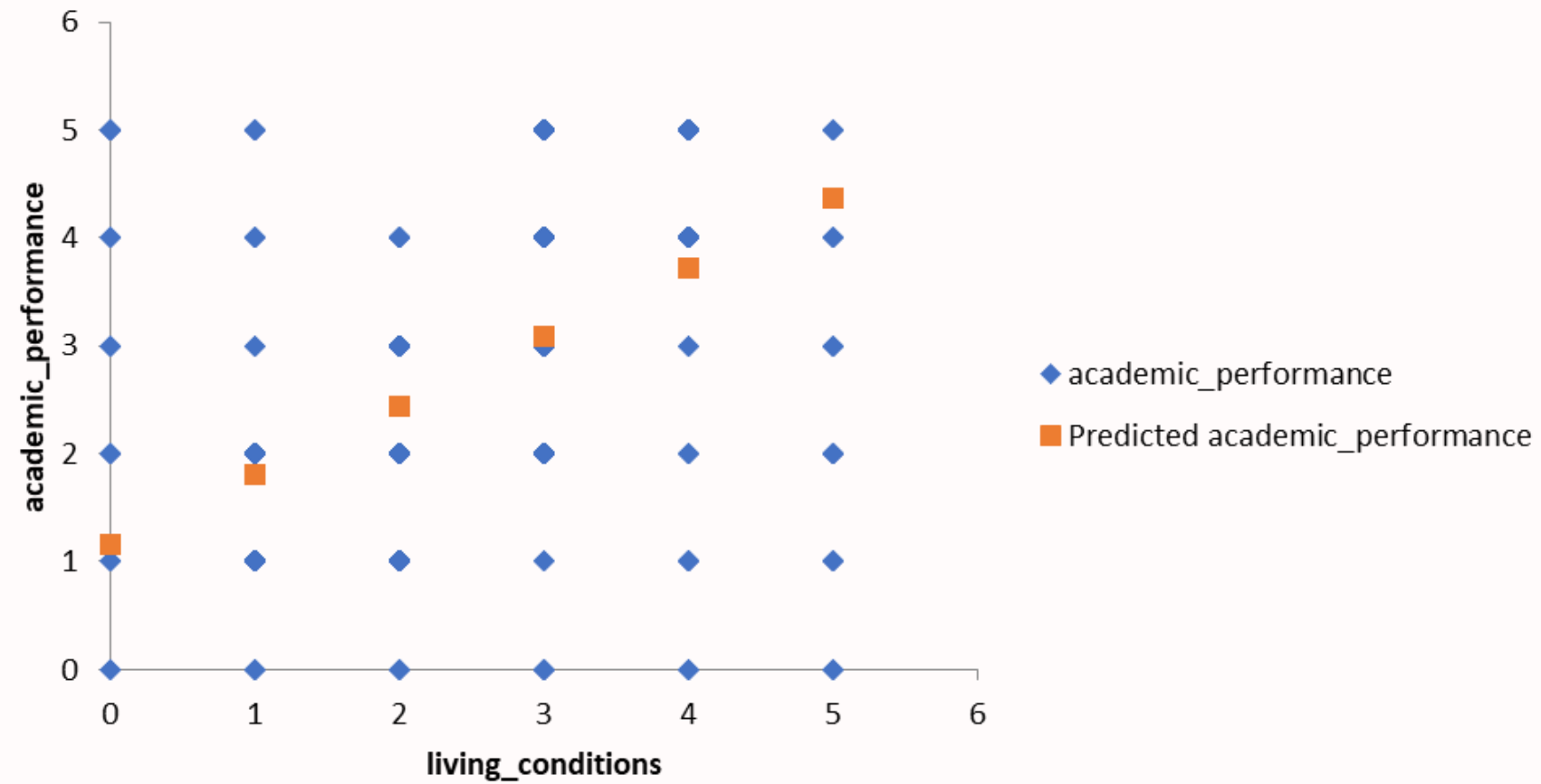
noise_level Line Fit Plot



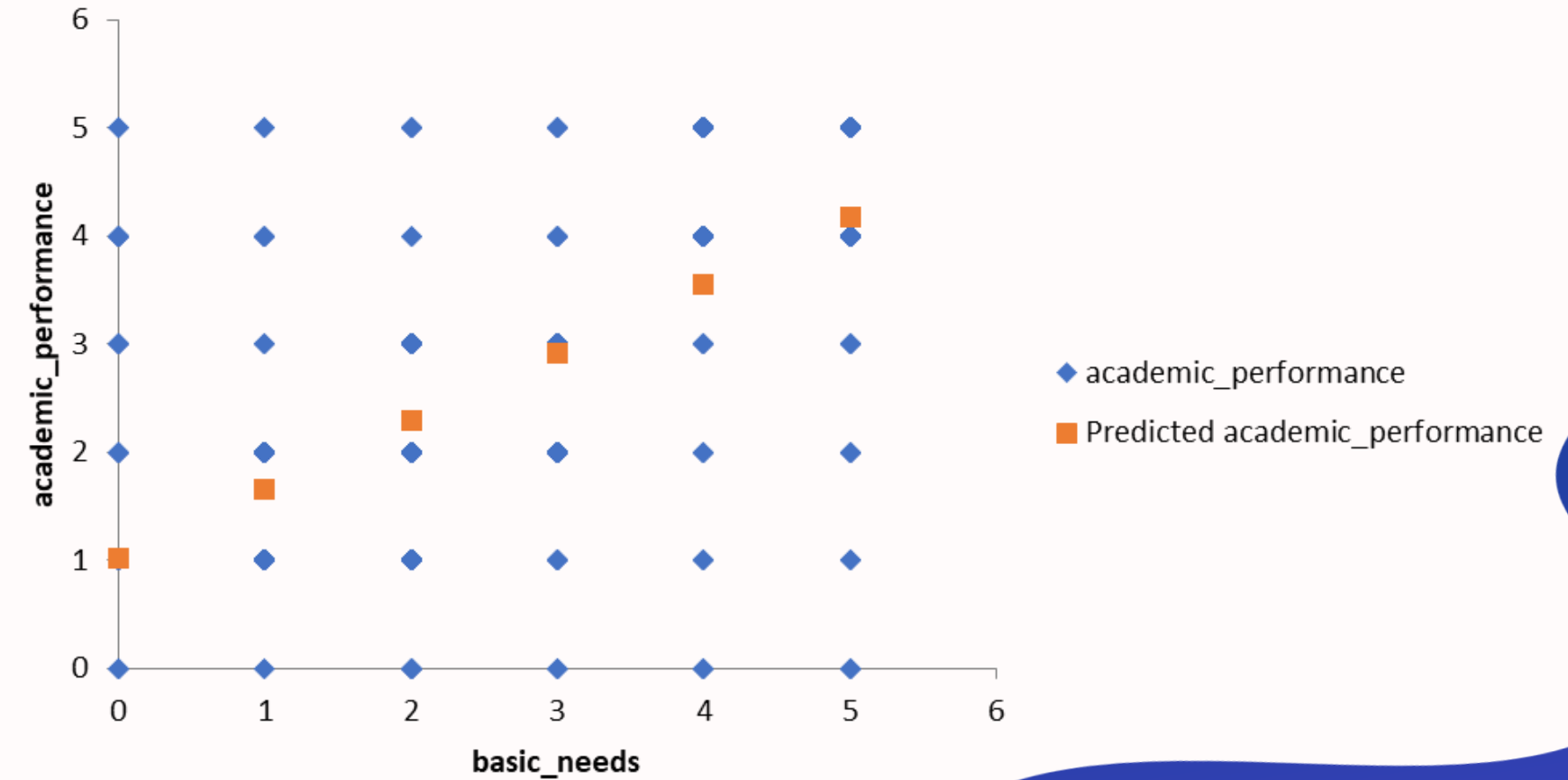
safety Line Fit Plot



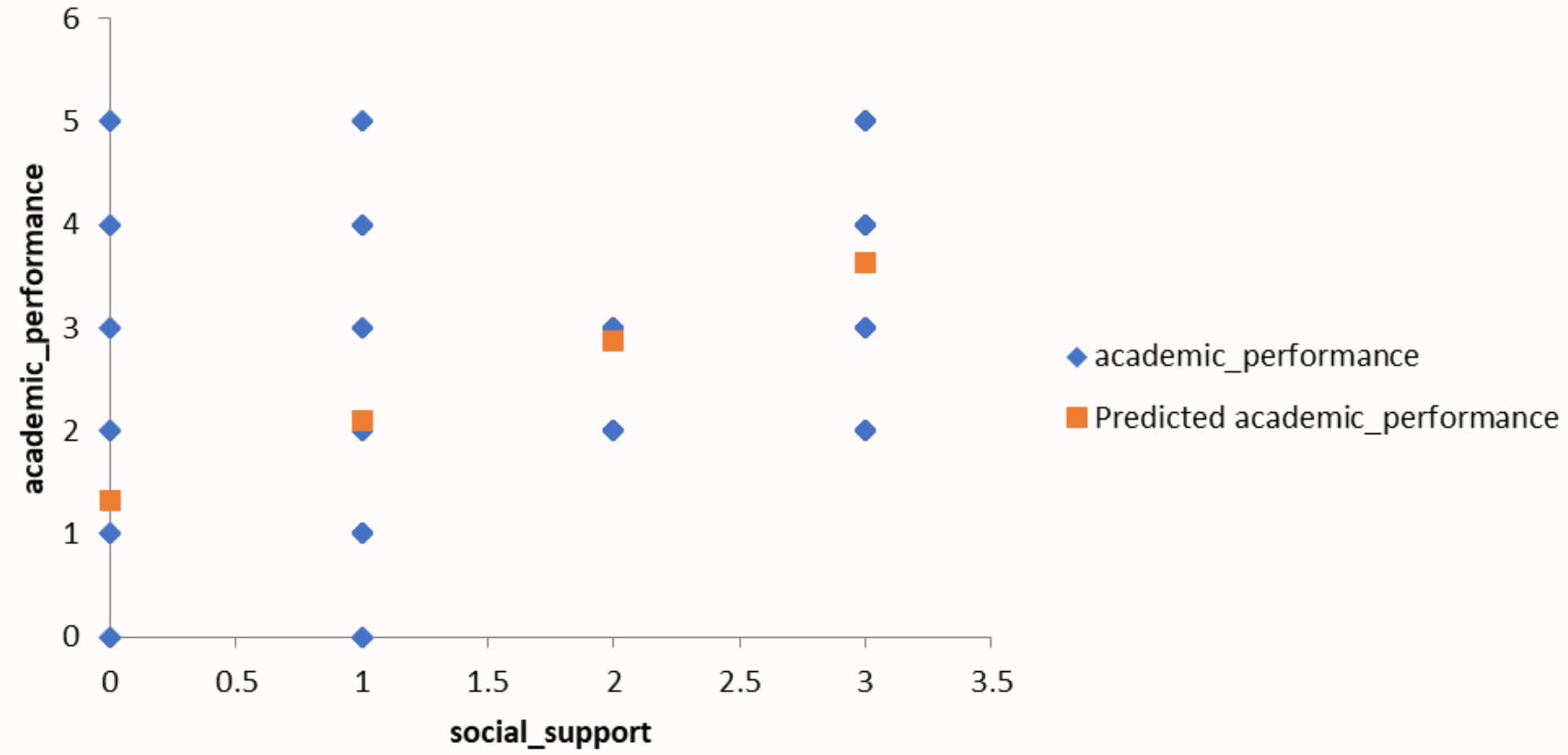
living_conditions Line Fit Plot



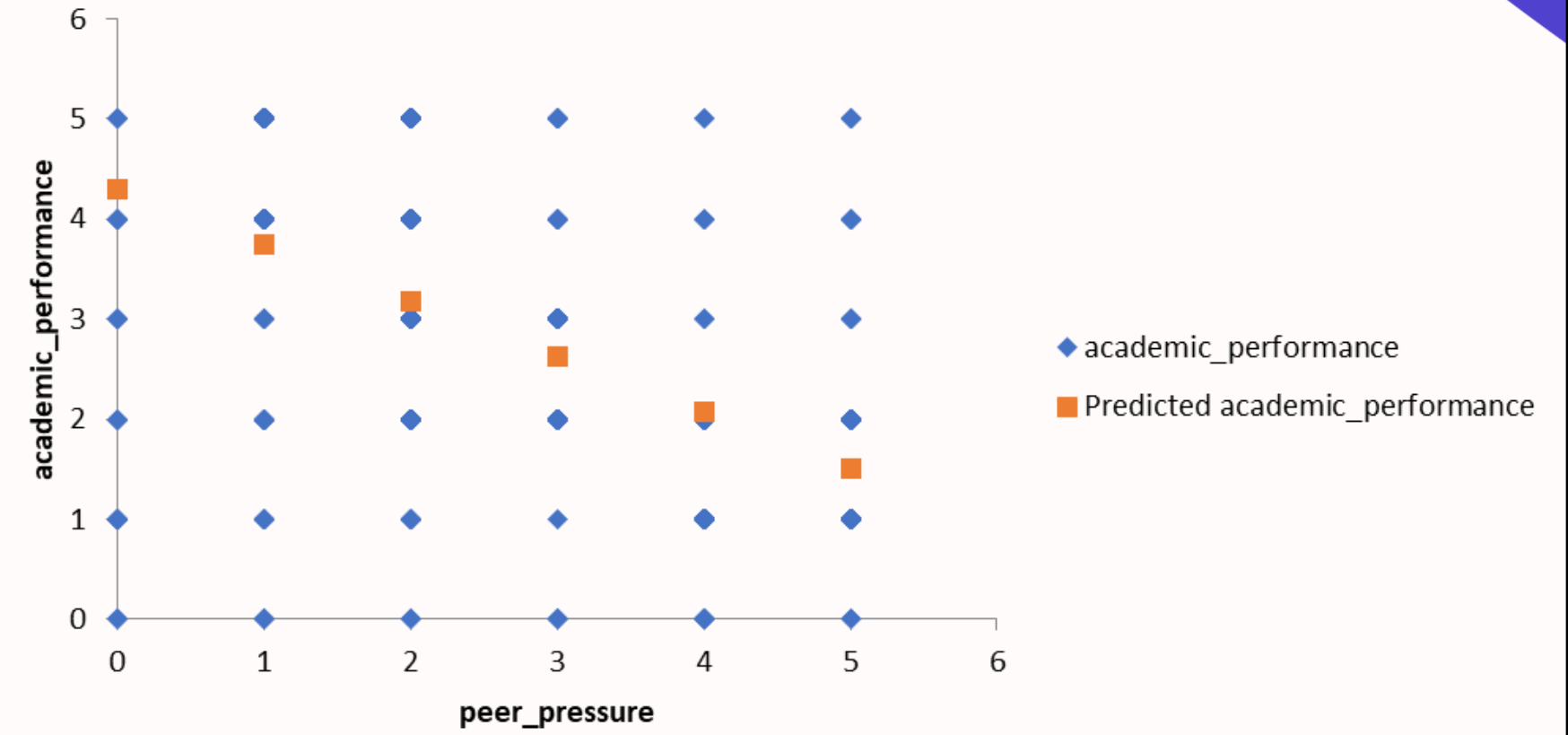
basic_needs Line Fit Plot



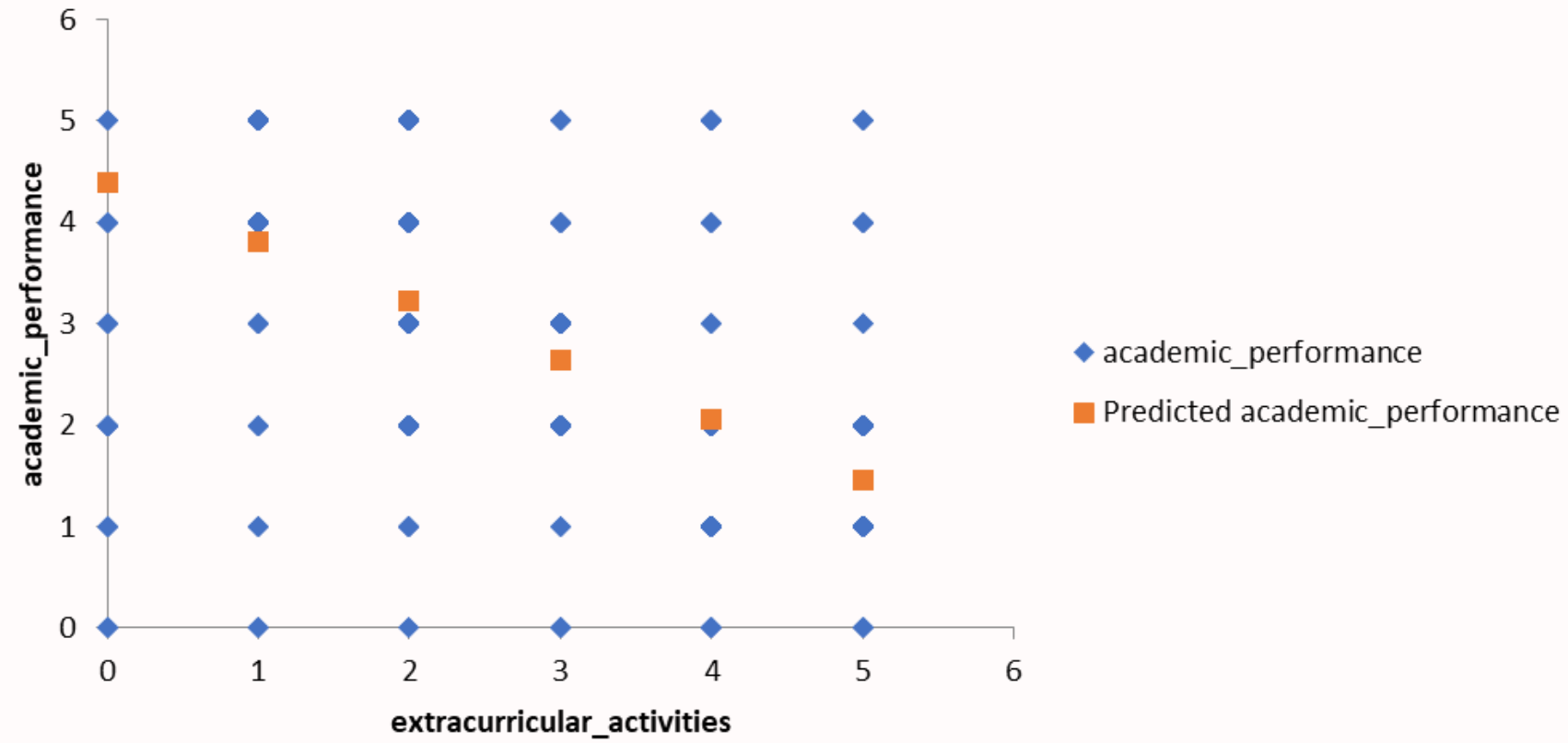
social_support Line Fit Plot



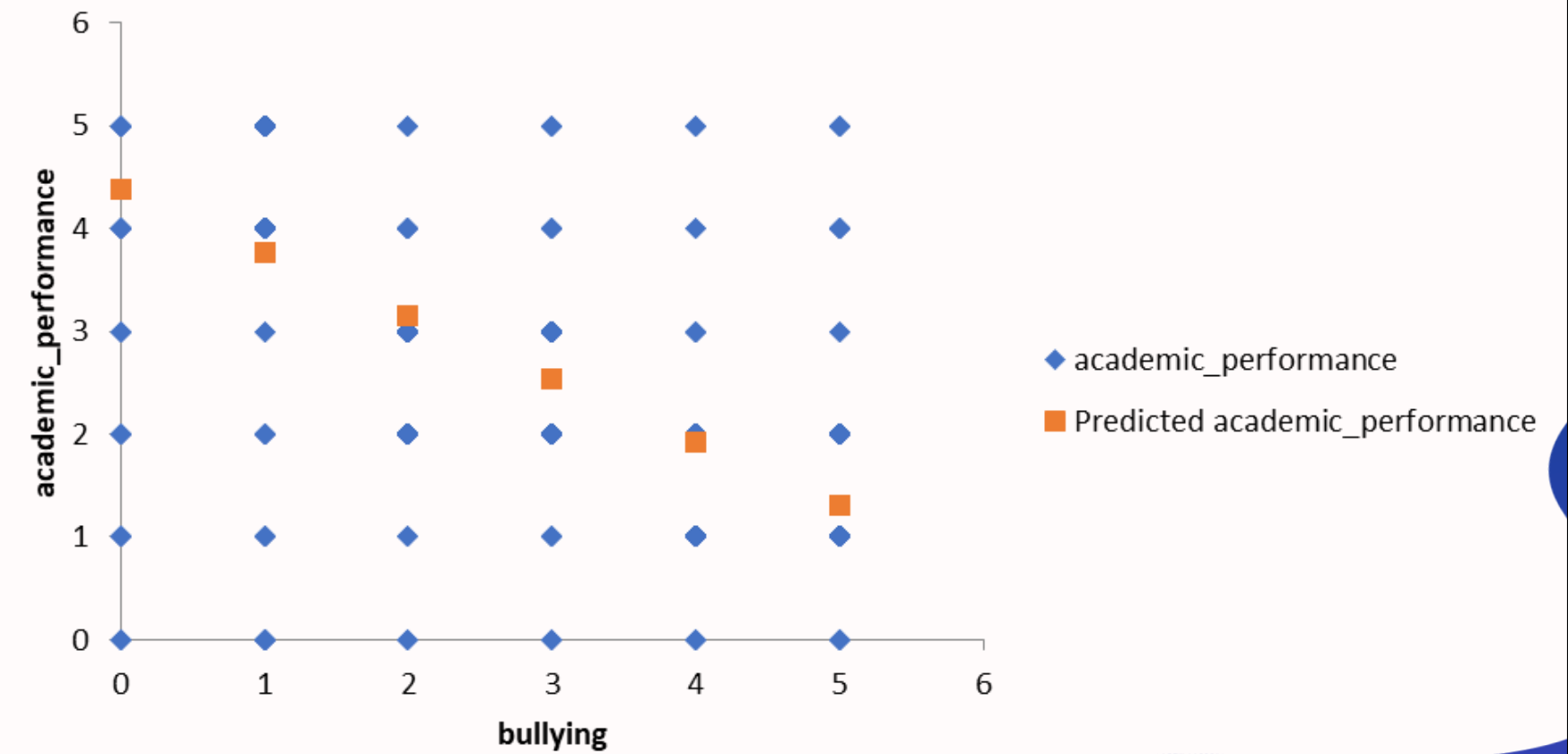
peer_pressure Line Fit Plot



extracurricular_activities Line Fit Plot



bullying Line Fit Plot



FINDINGS

| Factor Name | p-value | Coefficient | Result |
|---------------|--------------------------------------|--------------------|------------------------------------|
| Anxiety Level | 7.48714039095952x10 ⁻¹³³ | -0.150210532132398 | Correlated and Negatively Affected |
| Self Esteem | 2.67587583770562x10 ⁻¹²⁷ | 0.101065379295656 | Correlated and Positively Affected |
| Mental Health | 1.69899047362653x10 ⁻¹⁰² | -1.65787141742383 | Correlated and Negatively Affected |
| Depression | 2.64650961657943 x10 ⁻¹²⁴ | -0.115916070710445 | Correlated and Negatively Affected |
| Headache | 8.31140506351876 x10 ⁻¹¹⁹ | -0.624370371881962 | Correlated and Negatively Affected |

FINDINGS

| Factor Name | p-value | Coefficient | Result |
|-------------------|--------------------------------------|--------------------|------------------------------------|
| Blood Pressure | 7.86613496794322 x10 ⁻¹⁹ | -0.445952380952393 | Correlated and Negatively Affected |
| Sleep Quality | 5.23248916392227 x10 ⁻¹⁴⁵ | 0.613319973888354 | Correlated and Positively Affected |
| Breathing Problem | 5.6317970354532 x10 ⁻⁷³ | -0.512277500475373 | Correlated and Negatively Affected |
| Noise Level | 4.09346660584719 x10 ⁻⁷⁵ | -0.547175863485526 | Correlated and Negatively Affected |
| Living Conditions | 5.76139623679818 x10 ⁻⁷³ | 0.641088291619892 | Correlated and Positively Affected |

FINDINGS

| Factor Name | p-value | Coefficient | Result |
|------------------------------|--------------------------------------|--------------------|------------------------------------|
| Safety | 2.8388404197178 x10 ⁻¹²⁹ | 0.646696611708852 | Correlated and Positively Affected |
| Basic Needs | 1.78165663456395 x10 ⁻¹²⁷ | 0.630839805239226 | Correlated and Positively Affected |
| Study Load | 2.26986095532146 x10 ⁻⁷⁷ | -0.559498964138555 | Correlated and Negatively Affected |
| Teacher Student Relationship | 6.28283957514316 x10 ⁻¹⁴⁴ | 0.683982220734055 | Correlated and Positively Affected |
| Future Career Concerns | 8.92668048097906 x10 ⁻¹³⁰ | -0.595486496694728 | Correlated and Negatively Affected |

FINDINGS

| Factor Name | p-value | Coefficient | Result |
|----------------------------|-------------------------------------|--------------------|------------------------------------|
| Social Support | $8.94508324063265 \times 10^{-95}$ | 0.766141791607016 | Correlated and Positively Affected |
| Peer Pressure | $5.73568393397004 \times 10^{-93}$ | -0.558732697651538 | Correlated and Negatively Affected |
| Extracurricular Activities | $5.73568393397004 \times 10^{-93}$ | -0.587379551995996 | Correlated and Negatively Affected |
| Bullying | $4.6047422398357 \times 10^{-142}$ | -0.615590343816514 | Correlated and Negatively Affected |
| Stress Level | $4.56326937006714 \times 10^{-177}$ | -1.2411417033414 | Correlated and Negatively Affected |

CONCLUSION

Physiological:

- Breathing problems and headaches negatively impact academic performance.
- Sleep quality significantly boosts academic performance.
- Blood pressure's influence is statistically relevant, but requires cautious interpretation.

Psychological:

- Anxiety, depression, and mental health history negatively impact academic performance.
- Self-esteem exerts a positive influence.
- Models for all factors are statistically robust.

Environmental:

- R-squared values are relatively high, suggesting environmental factors are important predictors of academic performance.
- Interventions aimed at improving environmental factors can positively impact student outcomes.

Social:

- R-squared values are relatively high, suggesting social factors are important predictors of academic performance.
- Interventions aimed at improving social factors can positively impact student outcomes.

Overall, the study suggests that all four dimensions (physiological, psychological, environmental, and social) play a role in academic performance. Interventions aimed at improving any of these factors can have a positive impact on student outcomes.

FUTURE IMPROVEMENTS

- **Longitudinal studies:** Conduct longitudinal studies to track changes in the dependent variable over time and evaluate the effectiveness of interventions.
- **Mediation and moderation analysis:** Investigate potential mediating factors (e.g., coping mechanisms) and moderating factors (e.g., personality traits) that might influence the relationships observed.
- **Multi-level analysis:** Consider incorporating data at individual, social, and environmental levels to gain a more comprehensive understanding of the factors at play.
- **Personalized interventions:** Develop personalized intervention plans that address the unique needs and challenges of everyone.