Understanding Student Well-being: A Holistic Approach

Embark on a journey of understanding as we delve into the complexities of student well-being.
This report encapsulates the participation of IEEE ENIT SB in the IEEE SMC & EdSoc Challenge, focusing on the holistic exploration of students' social, health, and emotional system resilience through data analysis.

Chapter 1

Data Collection

1.1   Introduction

In the pursuit of a deeper understanding of student well-being, comprehensive data analysis serves as the cornerstone of our exploration. This section delves into the methodologies and approaches employed to conduct a meticulous examination of the collected data, illuminating nuanced aspects that shape the intricate tapestry of student life.

1.2   Approach

Our data collection approach adopts a multi-faceted strategy to ensure the richness and diversity of the dataset. A purpose-designed form, comprising six distinct rubrics—Personal Information, Mental Health Assessment, Physical Health Assessment, Social Relationships Assessment, Emotional Resilience and Academic Performance Assessment—was disseminated among students from various fields of study and age groups. This anonymous survey allowed us to gather responses that provide a nuanced understanding of student experiences, facilitating a comprehensive analysis. The transparency and ethical considerations embedded in our approach ensure the integrity and confidentiality of the collected data.
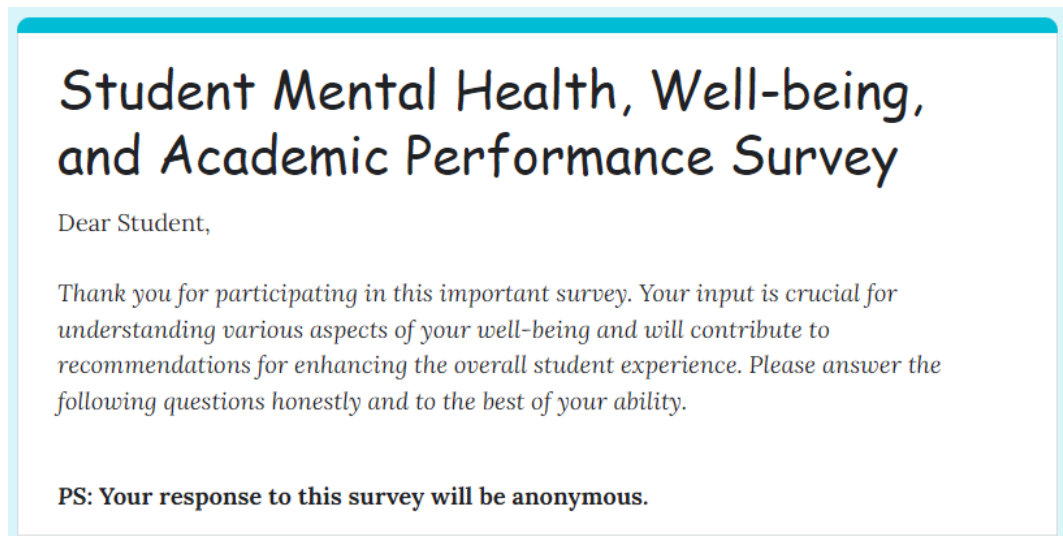
Link to the form : `https://forms.gle/EjKMN2uq48DsmP2z7`

Figure 1.1: Student Mental Health, Well-being, and Academic Performance Survey

1.3 Describing Survey Assessments and Rubrics

1.3.1 Introduction

This section provides an in-depth look into the rubrics and assessments embedded within our purpose-designed survey. Crafted to unveil specific dimensions, each rubric contributes to a comprehensive understanding of the factors shaping student life.

1.3.2 Personal Information

At the core is the Personal Information rubric, strategically designed to gather essential demographic details. Respecting anonymity, it establishes a foundational understanding of diverse backgrounds within our respondent pool. This data serves as a crucial foundation for a comprehensive analysis, exploring intersections with well-being dimensions

1.3.3 Mental Health Assessment

Delving into emotional well-being, this rubric explores self-assessments and factors contributing to mental health. Subjective ratings, stress frequency, and proactive measures for mental health support offer insights into participants' experiences, guiding strategies for targeted support

1.3.4 Physical Health Assessment

Unraveling physical well-being, this rubric explores overall health ratings, lifestyle choices, and potential connections between physical and emotional states. Insights into physical activities, medical conditions, and lifestyle habits inform a holistic assessment, shaping strategies for support.

1.3.5 Social Relationships Assessment

This segment delves into the dynamics of social connections, assessing relationship quality, support systems, and broader social landscapes. Insights into familial influences, community belongingness, and social activities provide a snapshot of participants' social well-being.

1.3.6 Emotional Resilience and Academic Performance Assessment

Recognizing the interconnected nature of emotional resilience and academic performance, this rubric explores coping mechanisms, awareness of mental health resources, and the correlation between mental well-being and academic outcomes. Valuable insights inform strategies to support emotional resilience and academic achievement.

1.3.7 Recommendations and Comments Rubric

The Recommendations and Comments section serves as a valuable platform for participants to share their insights, offering a qualitative dimension to our understanding of student well-being. By posing open-ended questions, we aim to capture participants' experiences, suggestions, and additional thoughts that can **guide us to pinpoint initiatives to enhance students' academic success and overall development**.

1.4 Survey Participation

The form was disseminated among IEEE ENIT Student Branch members. Beyond our local community, the form was shared extensively within the National Engineering School of Tunis, as well as among students in other engineering schools. Additionally, our outreach extended to friends and colleagues in diverse fields of study, including medicine and finance. This collaborative effort aimed to capture a comprehensive array of perspectives, reflecting the diverse experiences of students

across various disciplines.

Data Collection Period : The survey was conducted during 18th of November to 25th of November, spanning a period of **1 week** to capture a diverse range of responses.

Survey Participants : A total of **130 students** actively participated in the survey, providing valuable insights into their well-being experiences. The participants were drawn from various fields of study and different academic levels, contributing to the richness and diversity of the collected data.

Overview of Collected Data : To streamline the data collection process, **Google Sheets** was employed as the primary platform for survey responses. The collected data encompasses a comprehensive exploration of students' social relationships, physical and mental health, emotional resilience, and academic experiences. Subsequent sections of this report will delve into the detailed analysis and findings derived from the gathered information.

Figure 1.2: Overview of Collected Data

Chapter 2

Data Analysis

2.1 Introduction

The journey of data analysis began with the conversion of the database to **CSV format**, facilitating ease of manipulation and exploration. Leveraging the capabilities of **Anaconda and Jupyter Notebook**, we orchestrated a meticulous examination of various facets of students' lives and academic performance, including social relationships, mental and physical health, and emotional resilience.

2.2 Global Overview of the Dataset

Before delving into the specific assessments, let's provide a comprehensive overview of the entire dataset.

1. **Dataset Size:** The dataset is organized into 130 rows and 38 columns. Each row corresponds to an individual student's response, while each column represents a specific question from the survey.
2. **Demographic Distribution:** We explored the demographic composition of the participants, including age groups, genders, and regrouped them by general fields of study.
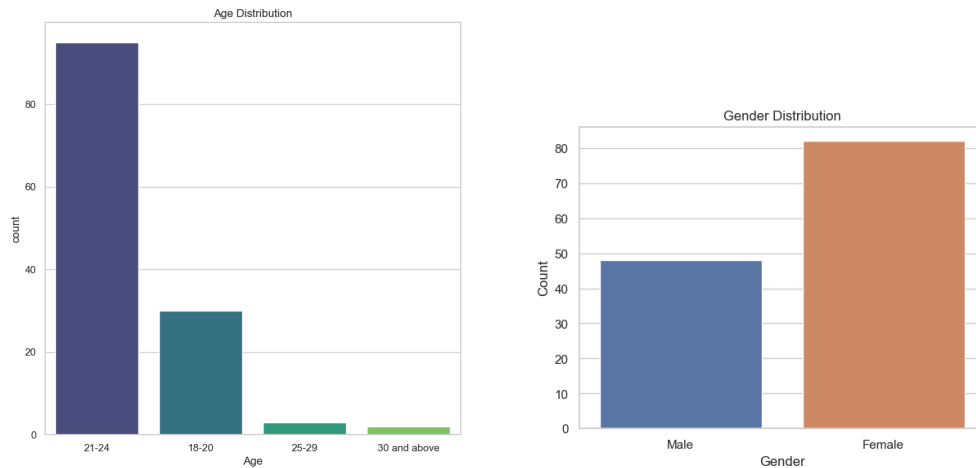
Figure 2.1: Gender and Age Distributions
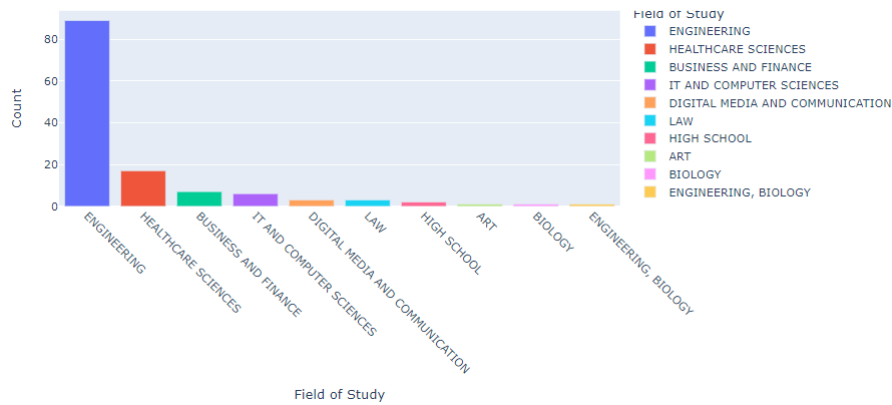
Figure 2.2: Distribution of fields of Study

3. **Response Completeness:** It is essential to acknowledge that not all participants responded to every question in the survey. Out of the 130 students surveyed, the following non-required questions received incomplete responses: What factors, if any, contribute to stress or anxiety in your life as a student?, Have you encountered relational difficulties recently? Please briefly describe, If yes, could you briefly describe this correlation? (correlation between mental health and academic performance), Based on your experiences, what recommendations do you have for improving student well-being at our institution?, Is there anything else you would like to share about your overall well-being as a student?.

It's important to note that these questions were not mandatory, and participants had the option to skip them. As these missing responses are

complementary rather than indicative of oversight, we have opted not to take any corrective actions, such as **dropping rows or cleaning the data**. This approach ensures that the data remains authentic and reflective of the participants' individual choices in engagement with the survey.

Additionally, as part of our data integrity measures, we conducted a thorough **check for duplicates**, and no instances of duplicate responses were found in the collected data.

2.3   Mental Health Analysis

In our exploration of student well-being, the mental health dimension plays a pivotal role. This section delves into the analysis of mental health data obtained from the survey responses. The objective is to gain insights into the subjective well-being of students and understand the factors that may influence their mental health.

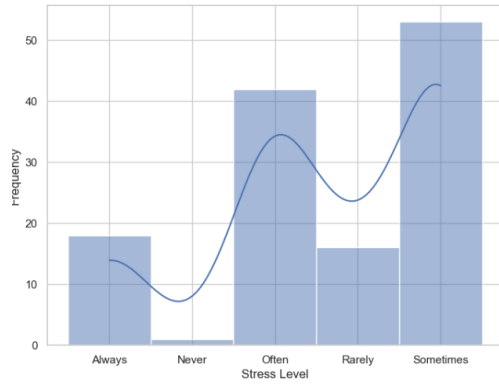**Average Mental Health Rating = 6.238462**

(a) Distribution of Stress Levels
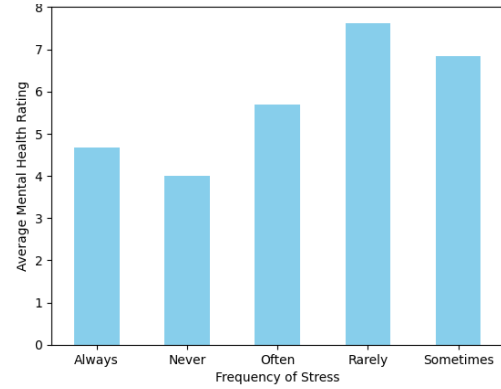
(b) Average Mental Health Ratings for Different Stress Levels

2.3.1   Seeking Mental Health Support

Understanding students' proactive measures in seeking mental health support is another crucial dimension. We analyze responses to the question "Have you ever sought mental health support or counseling services during your time as a student?" to gauge the prevalence of help-seeking behaviors among participants. The box plot allows us to compare the distribution of mental health ratings between those who sought support and those who didn't. If the medians or spreads differ, it suggests that seeking mental health support might have an impact on mental health ratings.
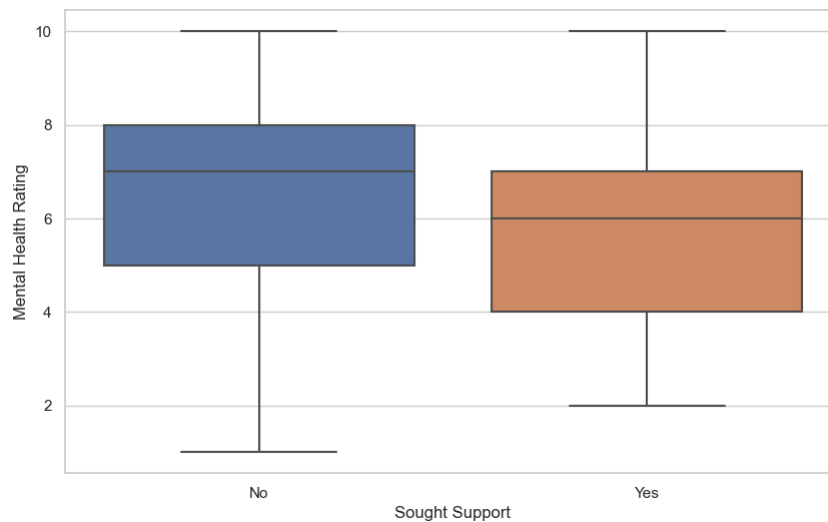
Figure 2.4: Comparison of Mental Health Ratings for those who Sought Support vs. those Who Didn't

2.3.2 Factors Contributing to Stress or Anxiety

In our analysis of factors contributing to stress or anxiety among students, we employed the **Rapid Automatic Keyword Extraction (RAKE) algorithm**. RAKE is an unsupervised keyword extraction algorithm designed to identify key phrases or keywords within a text. Unlike other methods, RAKE does not rely on pre-existing linguistic resources or training data. After extracting these keywords, we employed a Word Cloud visualization to highlight the most prevalent terms in a visually engaging manner.
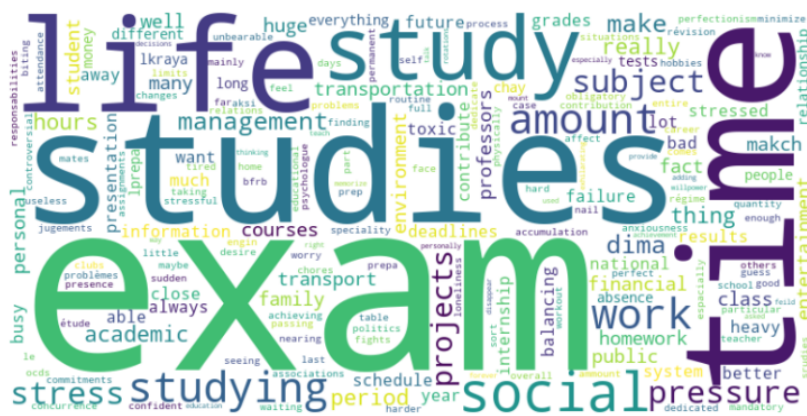
Figure 2.5: Factors contributing to stress or anxiety

2.3.3 Cluster analysis using k-means

Cluster analysis involves grouping participants into clusters based on similarities in their responses. In our case, we used the responses to the questions 'How often do you feel stressed?', 'How often do you feel anxious or worried?', 'How often do you feel down, depressed, or hopeless?' to identify patterns of mental health.
Elbow Method: To determine the optimal number of clusters (k) for k-means clustering. In our case the algorithm indicated **3 clusters**. A pairplot is created with each pair of variables represented in scatter plots. Diagonal plots show the distribution of each variable and kernel density estimates.
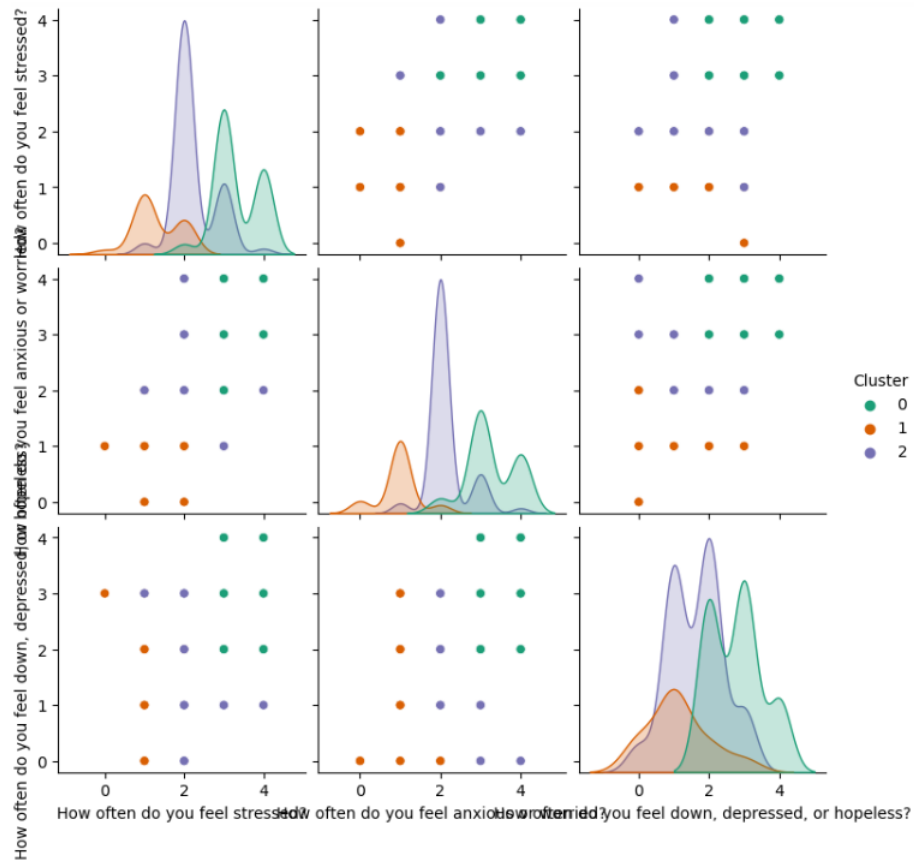
Figure 2.6: Pair Plot of Clusters

Cluster 0 demonstrates a higher average frequency of stress (3.31), anxiety (3.25), and feelings of depression (2.77), indicating a group with more prevalent emotional challenges. Cluster 1, conversely, reports lower levels across all three aspects (1.30, 0.96, 1.13), suggesting a relatively lower frequency of negative emotional experiences. Cluster 2 falls in between, with moderate frequencies of stress (2.22), anxiety (2.14),

and depression (1.63). These nuanced insights into the emotional landscapes of each cluster lay the groundwork for tailored interventions and support strategies.

2.4 Physical Health Analysis

In the comprehensive exploration of student well-being, the physical health assessment stands as a crucial dimension. This section delves into the analysis of physical health data derived from survey responses, aiming to provide insights into various facets of students' physical well-being and lifestyle choices.

Average Physical Heath Rating = 6.707692
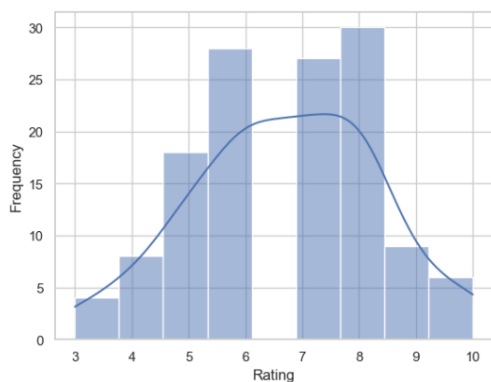
(a) Physical Health Rating Distribution   (b) Existing Medical conditions count
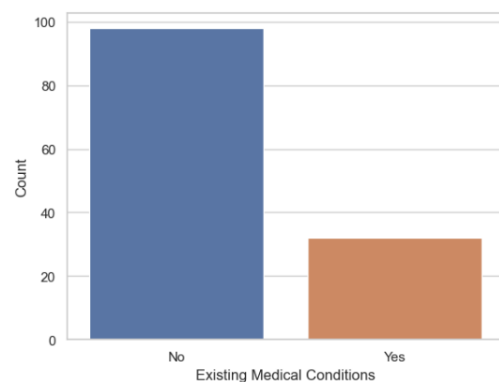
2.4.1 Physical Activity and Physical Health

As we shift our focus to the realm of social relationships, our analysis aims to unravel the intricacies of students' interpersonal connections and the impact on their well-being. The survey incorporated a set of questions designed to illuminate various facets of social relationships, providing valuable insights into the quality of connections, the existence of support systems, and the influence of family dynamics.
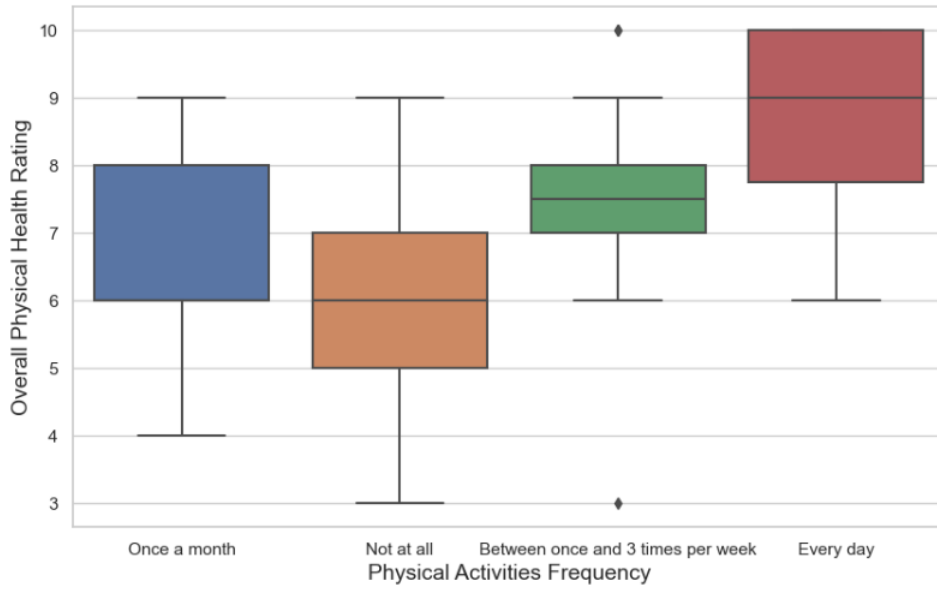
Figure 2.8: Relationship between Physical Activity and Physical Health

2.5 Social Relationships Analysis

As we continue our exploration into student well-being, the analysis shifts its focus to the intricate interplay between social relationships and mental health. This section aims to unravel insights derived from survey responses, shedding light on the subjective well-being of students and the factors influencing their mental health within the context of social relationships.

Average Social Relationships Quality = 6.730769
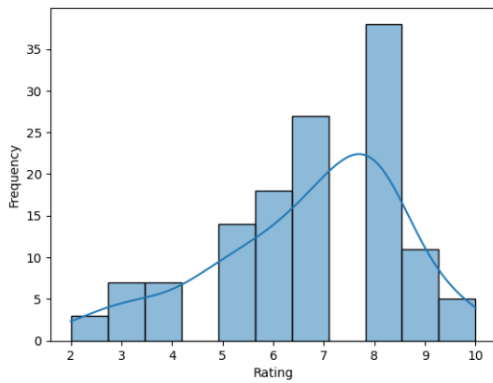
(a) Distribution of Social Relationship Ratings
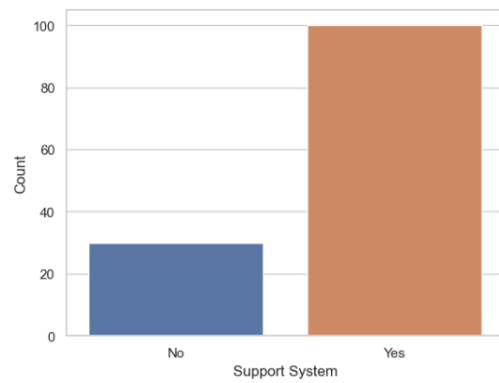
(b) Support System Count

2.5.1 Academic Community Belongingness and Social Activities

The survey probed students' sense of belonging within their academic community and their participation in social activities or clubs. This exploration sheds light on the broader social landscape that shapes participants' overall well-being and contributes to a comprehensive understanding of the interconnected factors influencing their social connections.

Figure 2.10: Types of social activities or clubs

2.6 Emotional Resilience Analysis

Within the intricate landscape of student well-being, emotional resilience holds a significant place. This section delves into the analysis of emotional resilience data derived from survey responses. Our aim is to understand how students navigate challenges, perceive their emotional resilience, and recognize the interconnectedness of emotional well-being and academic performance.

2.6.1 Coping Mechanisms and Emotional Resilience

Central to our analysis is an exploration of students' coping mechanisms and perceived emotional resilience. Questions such as "How do you typically cope with challenges or setbacks in your academic and personal life?" offer insights into the strategies students employ to navigate difficulties and build emotional resilience.
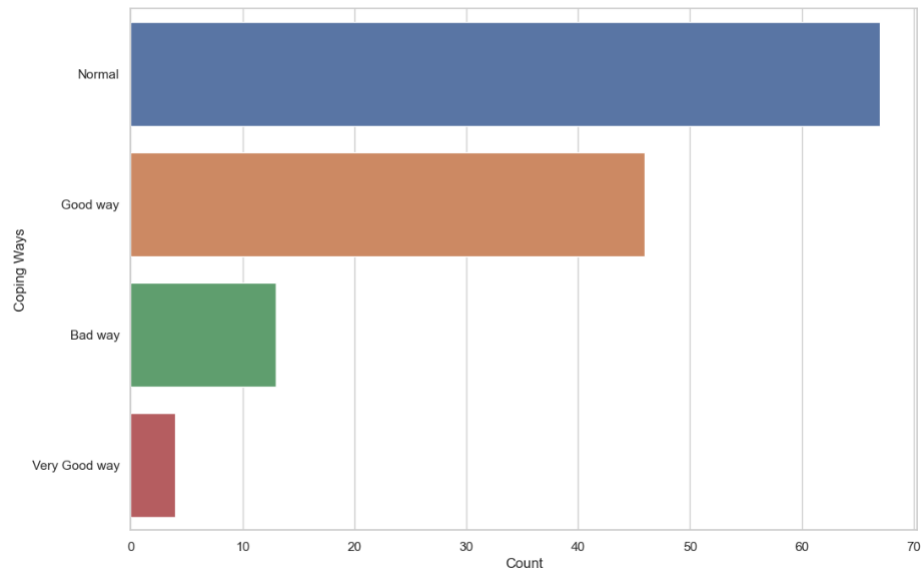
Figure 2.11: Coping with challenges and setbacks

2.6.2 Awareness of Mental Health Resources

Understanding students' awareness and utilization of mental health resources within their educational institution is another key dimension. Analysis of responses to questions like "Are you aware of the mental health resources available at your school?" and "If yes, have you ever used these resources?" provides valuable insights into the accessibility and effectiveness of support systems.
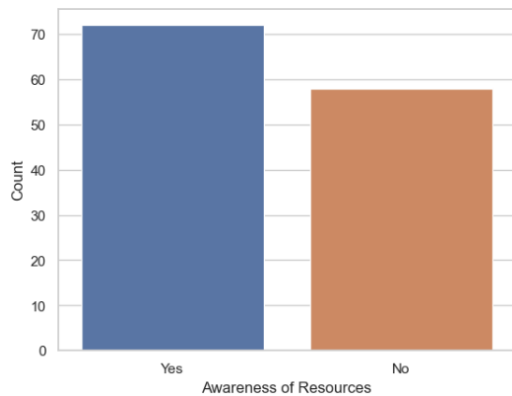
(a) Awarness of mental health resources
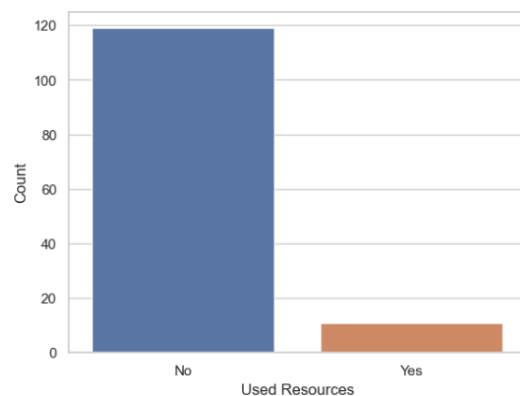
(b) Utilization of these resources

2.7 Correlation between Mental and Physical Health, Social relationships, Emotional Resilience and Academic Performance

Exploring the correlation between mental health and academic performance provides valuable insights. **Correlation** is a statistical measure that describes the extent to which two variables change together. It ranges from -1 to 1.

- When it's close to 1: Strong positive correlation. As one variable increases, the other tends to increase.
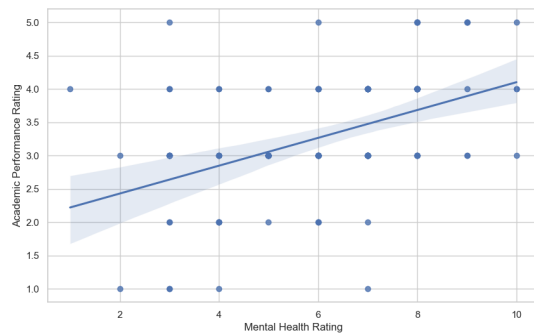- Close to -1: Strong negative correlation. As one variable increases, the other tends to decrease.
- Close to 0: Weak or no linear correlation.

(a) Correlation Between Mental Health and Academic performance (0.45)
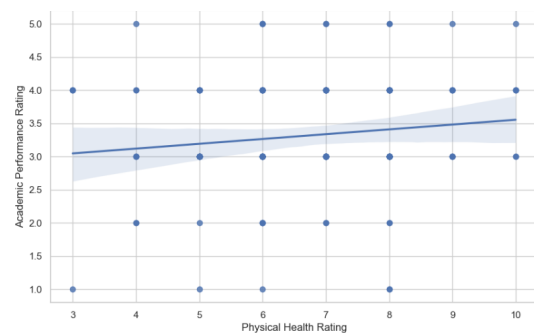
(b) Correlation Between Physical Health and Academic performance (0.13)
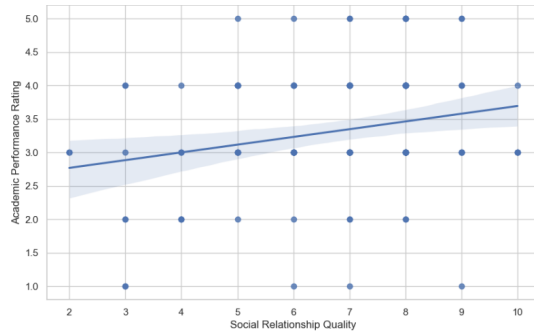
(c) Correlation Between Social Relationships and Academic performance (0.24)
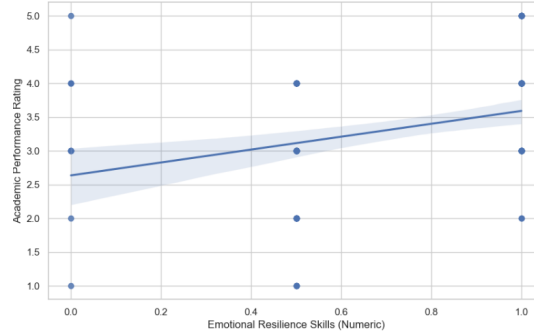
(d) Correlation Between Emotional Resilience and Academic performance (0.34)

Figure 2.13: Correlation between Health, Emotional Resilience and Academic Performance

Chapter 3

Solution

3.1 Introduction

The recommendations provided by students for improving well-being at our institution highlight several key themes. Consistency emerges as a crucial factor, with suggestions for incorporating essential social activities, reducing mandatory attendance, and offering a variety of extra-curricular activities. There is a consensus on the importance of educating students about stress management, incorporating physical activities into the curriculum, and organizing events to raise awareness about mental health. Flexibility in the curriculum, providing professional mental health support, and creating safe spaces for expressing emotions are also emphasized.

The quality of professors, understanding and qualified, is deemed significant, along with recommendations to reduce study hours, introduce a later start time for the day, and offer more free time for personal activities. Suggestions include having psychologists available, implementing stress management programs, and encouraging physical activities as part of the curriculum. Additionally, students express the need for less pressure, more group activities, and an integration week every month.

While some emphasize the role of clubs and social activities in reducing stress, others call for a focus on learning rather than exams. Virtual psychotherapy sessions, workshops on stress management, and promoting a healthy work-life balance are also suggested. Encouraging communication, providing financial education, and integrating technology for flexible learning options are additional recommendations. Overall, the responses reflect a holistic approach, encompassing various aspects of student life to foster a supportive and balanced environment.

3.2 Empowering Student Well-being: An Innovative React JS-Driven Solution

Recognizing the intricate nature of student well-being, we proudly introduce an innovative tool meticulously implemented using **React JS**. This dynamic platform is expressly designed to address the unique needs of each individual within institutions and universities. Leveraging the data gathered from our detailed student well-being survey, this comprehensive solution stands as a testament to our commitment to advancing student welfare through cutting-edge technology. The React JS integration ensures a seamless and responsive user experience, allowing institutions to delve into the nuanced details of each student's responses and provide personalized support. Through this forward-thinking approach, we aim to redefine how institutions engage with and support the well-being of their students.

3.2.1 Targeted Well-being Assessment: A Tailored Approach for Institutions

Unlike traditional survey analysis, our tool treats each response with individual attention. We ensure that every student's input is processed in isolation, providing a nuanced understanding of their well-being. This personalized approach allows institutions to delve into the specifics of students' challenges, fostering a targeted and empathetic response.
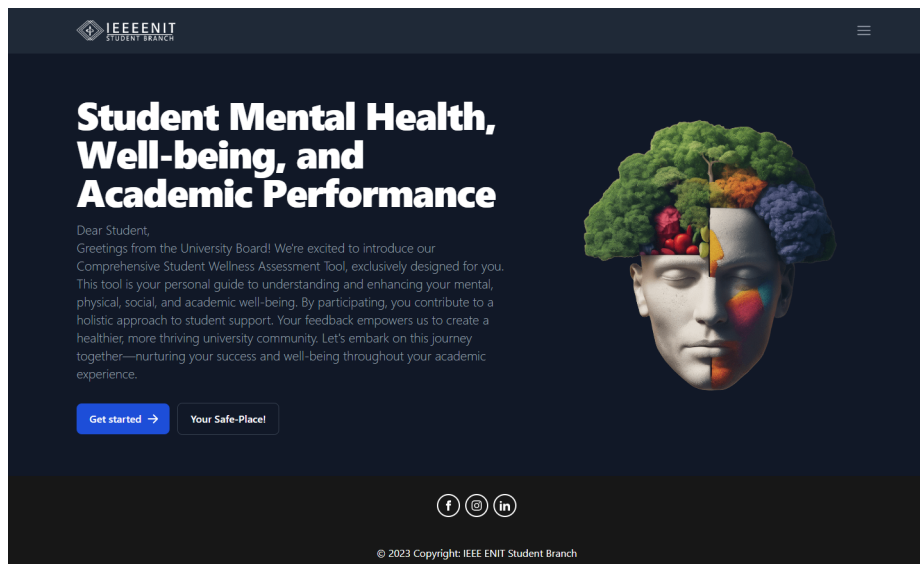

Figure 3.1: Our proposed tool

The tool serves as a crucial resource for university boards and administrators, offering a detailed overview of the mental and physical health, social connections, emotional resilience, and academic performance of each student. This granular insight empowers institutions to identify students in need of support promptly.

3.2.2 Enhanced Student Support and Confidential Communication

Adding a layer of empathy to our innovative solution, we've incorporated a dedicated section where students can communicate confidentially with the administration. This feature serves as a safe space for students to share concerns, seek guidance, or report any challenges they may be facing. The administration, can then respond promptly and effectively to address individual student needs. This confidential communication channel reinforces our commitment to creating an environment where students feel heard, supported, and empowered in their academic journey. By seamlessly integrating technology with personalized care, our solution endeavors to bridge the gap between institutional support and individual well-being.
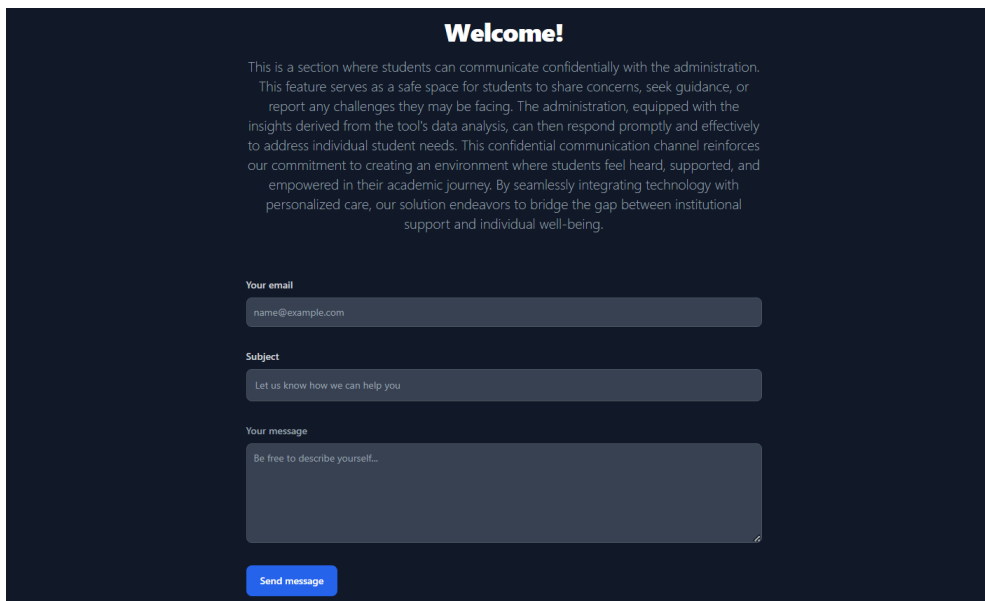

Figure 3.2: Student Support Section

3.2.3 Integrated Mental Health Chatbot for Enhanced Student Support

Our innovative solution extends beyond conventional data analysis by introducing a unique feature – a direct link to a mental health chatbot. Seamlessly integrated into the platform, this chatbot provides students with immediate access to mental health support. By facilitating instant connections and offering timely assistance, the platform promotes a proactive approach to well-being. This ensures that students can efficiently access the necessary services they require, fostering a supportive and responsive environment.

Figure 3.3: Chatbot

3.2.4 Diverse Perspectives: Enriching Student Well-being with Podcasts

Understanding the multifaceted challenges that students encounter, our tool goes beyond conventional approaches. In addition to in-depth data analysis, the platform offers an engaging and curated selection of podcasts, each addressing specific themes such as stress, anxiety, and overall mental health. These podcasts are thoughtfully named:

1. Navigating the Chaos: Simplifying Your Hectic Schedule
2. Mastering Exams: A Quick Guide to Success
3. Embracing Failure: A Quick Guide to Growth
4. Mastering Responsibilities: Your Guide to Success
5. Quick Insights: Presentations and Social Interactions
6. School Talk: Ineffective Teachers
7. Decoding Grades: Navigating the Academic Landscape
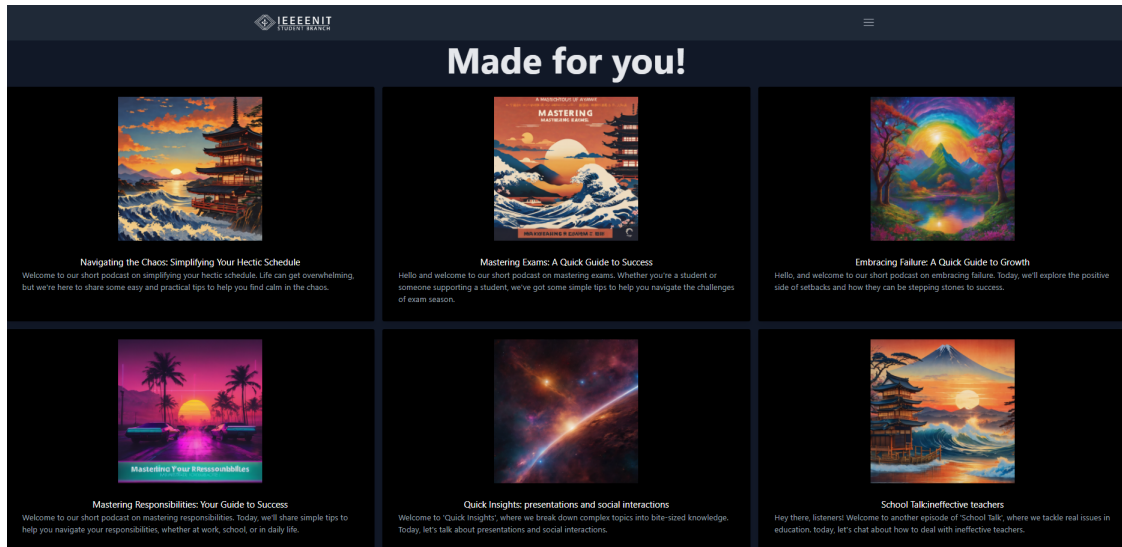8. Balancing Act: Finding Your Equilibrium

Figure 3.4: Podcasts

This resource is strategically integrated into the tool to complement traditional support systems, providing students with an additional avenue for self-help and reflection. By offering valuable insights and practical tips on various aspects of student life, these podcasts empower individuals to navigate the challenges they face and foster a positive mindset. The curated list serves as a dynamic tool to enhance well-being, providing students with accessible and relatable content tailored to their academic journey.

3.3 Conclusion

In essence, our well-being solution is a transformative tool that not only analyzes but actively contributes to the improvement of student mental health. By integrating data-driven insights, facilitating direct access to mental health chatbot, and providing supplementary resources like podcasts, we aim to create a supportive and resilient academic community.