Mental Health Recommender

Team 6

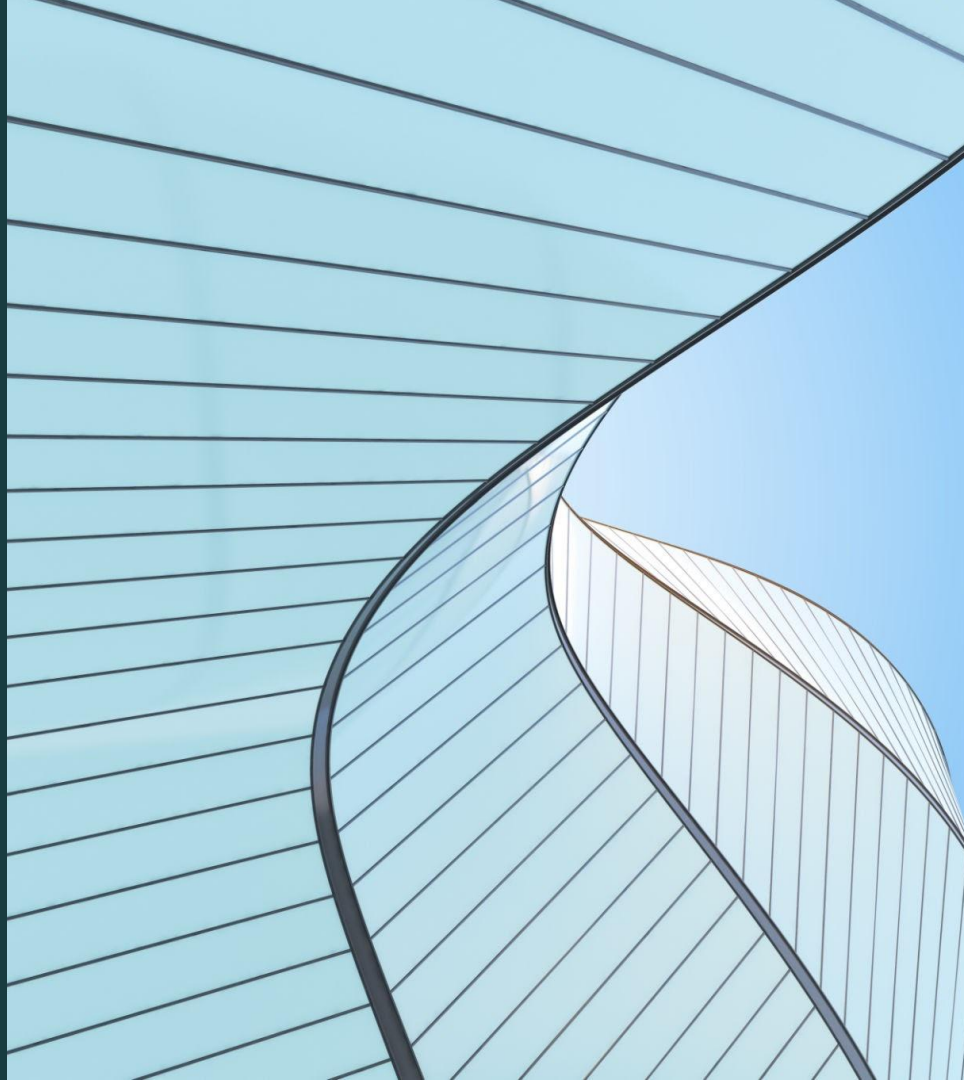
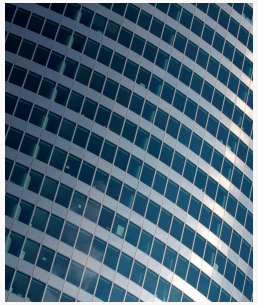


Table of Contents:

Problem

Is social media the proper outlet to destress or does it create more issues?



Our goal is to address is to provide recommendations to help individuals improve their mental health from social media

Data Set:

Utilized 4 data sets

1. Data set is from a global mental health survey that received responses from 10,000 individuals

2. Data includes:
    a. Users screen time, sleep quality, stress levels, exercise frequency, and happiness index
    b. Social support, emotional health, sleep duration, exercise frequency, work hours, and screen time
    c. Social media platform usage and happiness of individual

Dataset Example

RAW DATA: Stress Detection Dataset

Age	Gender	Screen time	Sleep time	Mood
16 - 21	Male	More than 6 hours	4 - 6 hours	Unstable
16 - 21	Male	More than 6 hours	Less than 4 hours	Unstable
22 - 30	Female	4 - 6 hours	Less than 4 hours	Unstable

RAW DATA: Social Media Balance Dataset

Age	Gender	Screen Time	Sleep	Stress
44	Male	3.1	7.0	6.0
30	Other	5.1	7.0	8.0
23	Other	7.4	6.0	7.0

STANDARDIZATION PROCESS

UNIFIED FORMAT: Combined Dataset (12,616 samples)

age	gender	screen_time_hours	sleep_hours	exercise_freq	stress_level	happiness_index
26	male	5.2	7.0	3	6.5	7.2
34	female	3.5	6.5	4	5.8	8.0
19	male	8.0	5.5	1	8.2	4.5
42	female	4.0	7.5	5	4.2	8.8

Methodology

Process to Creating Mental Health Recommender

Retrieve Data + Data Clean up

Retrieved data from 4 different data sets and combine like-columns to create one data frame

Exploratory Data Analysis

Compare data against different groups, such as stress vs. age and screen time vs. stress

Prediction Model

We used [age, gender, screen time on screen per day, sleep hour each day, exercise frequency] as features to inform the model

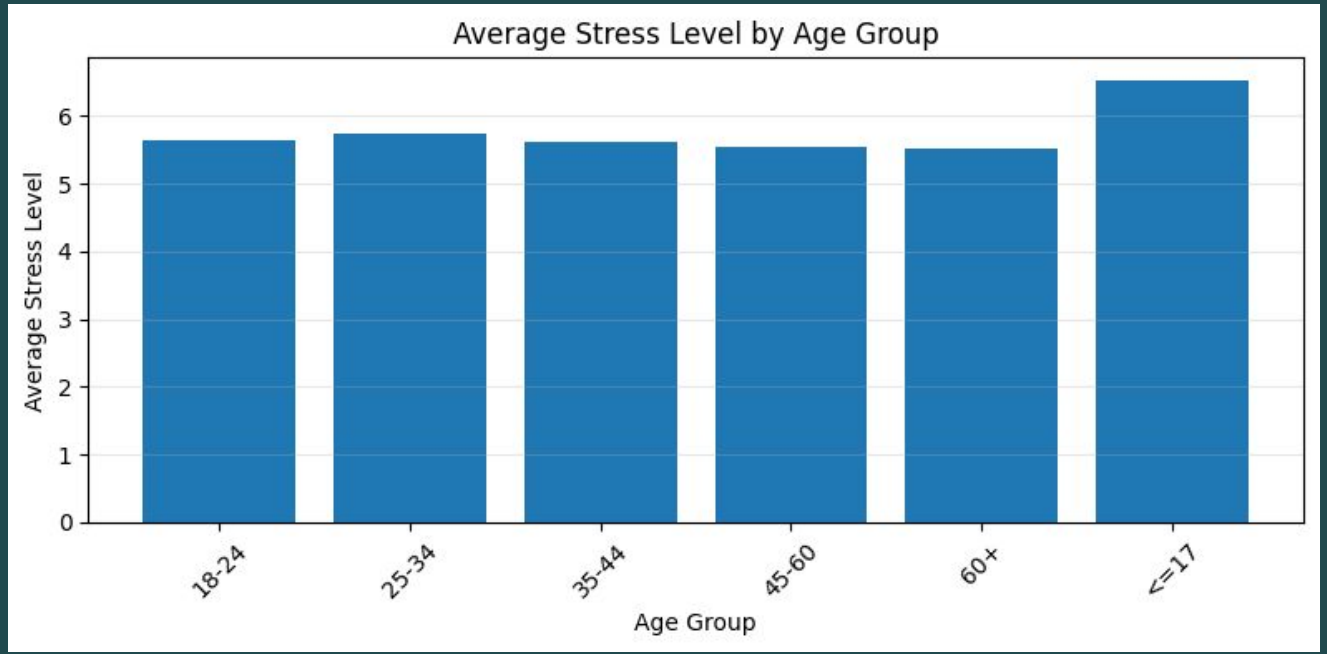
Evaluation + Recommender

User inputs and based on that information, the user will be given suggestions with how they should, for example, use social media and how to balance their days

Exploratory Data Analysis

Exploratory Data Analysis

Age and Screen Time

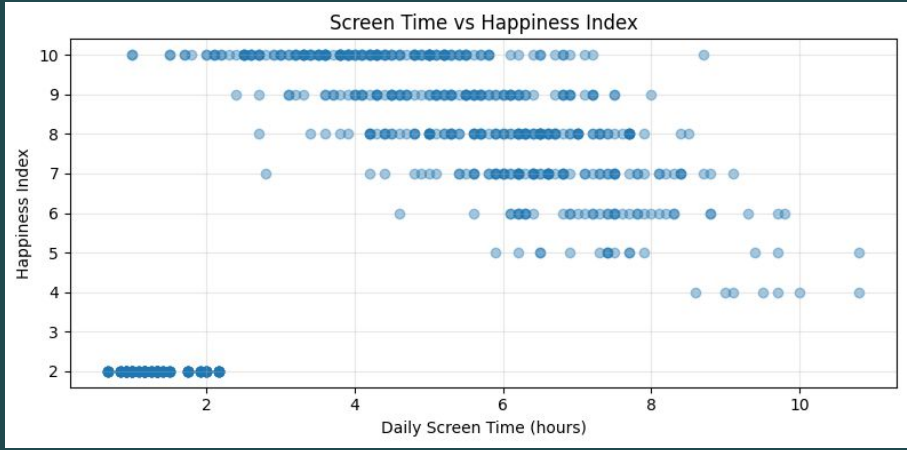


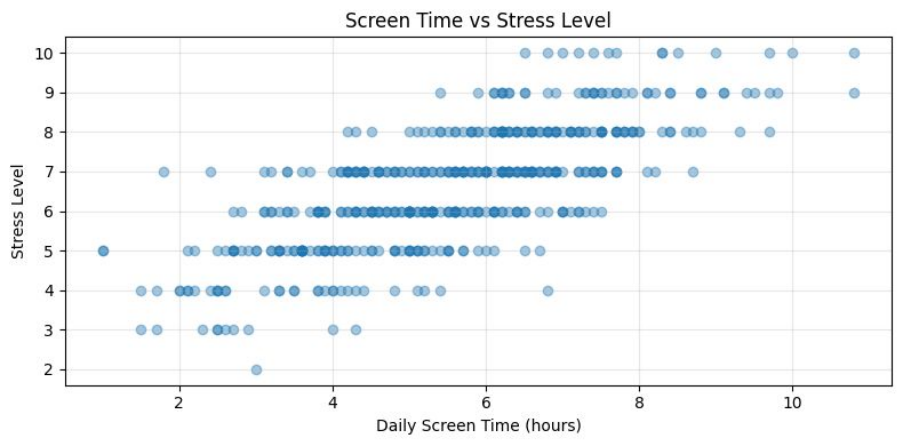
On average, individuals over 18 yrs have a lower level of stress compared to those 17 yrs and under

Exploratory Data Analysis

Screen Time Against Happiness and Stress

- Negative correlation between screen time and happiness
- Positive correlation between screen time and stress

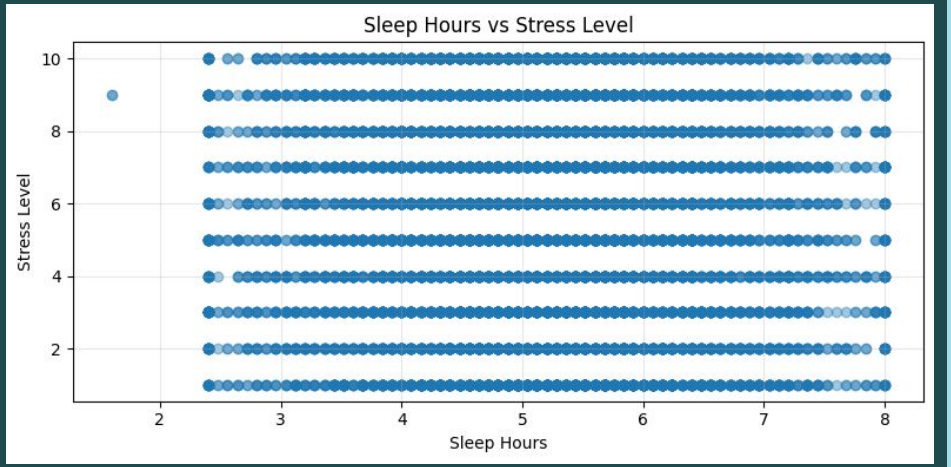


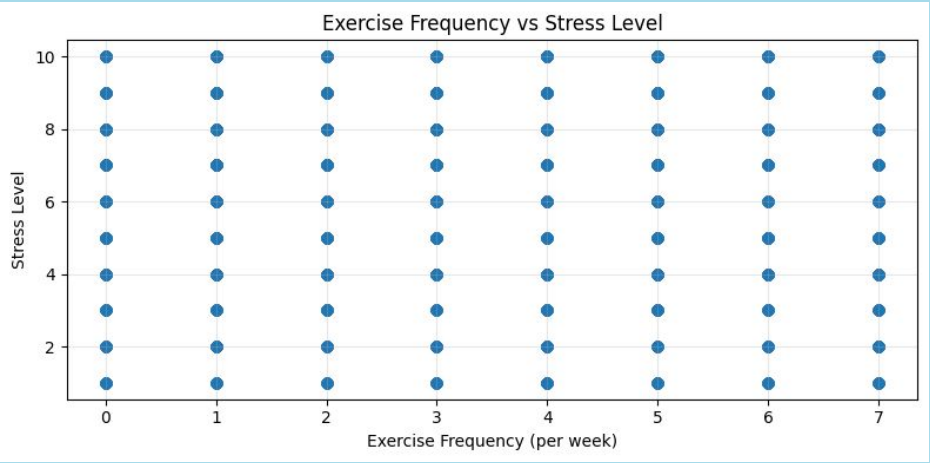


Exploratory Data Analysis

No Correlation

- Data uniform across sleep and exercise, which means zero correlation

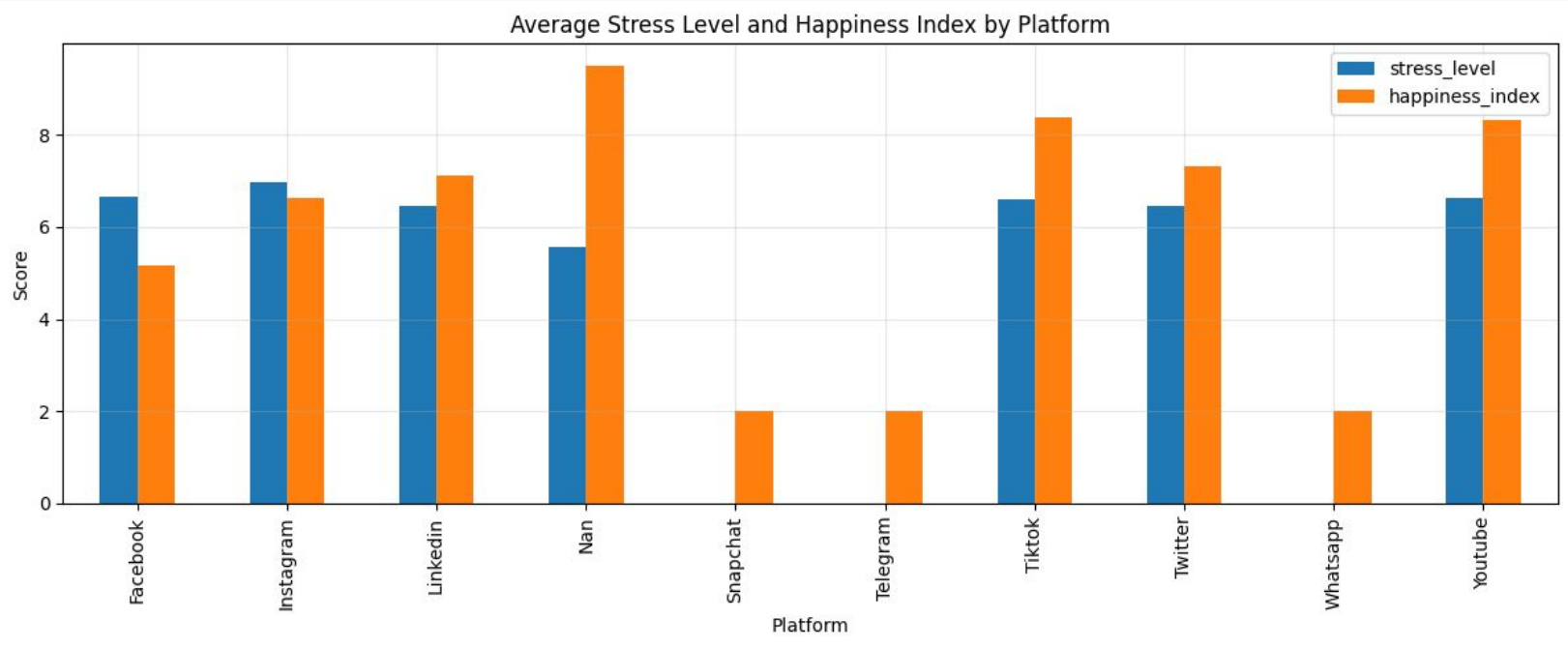




Exploratory Data Analysis

Stress, Happiness by Platform

Different platforms bring more stress than happiness



Mental Health Prediction Model

Mental Health Prediction Model

We used [age, gender, screen time on screen per day, sleep hour each day, exercise frequency] as features to inform the model. This model will predict [stress level, happiness index].

As these features are already numerical, we can directly apply several well-known machine learning models where we chose [LinearRegression, RandomForest, Gradient Boosting Regressor(Decision Trees) and XGBRegressor(Decision Trees)].

Using stress level and happiness index as targets, we trained out model with hyperparameters shown in Table. 1.

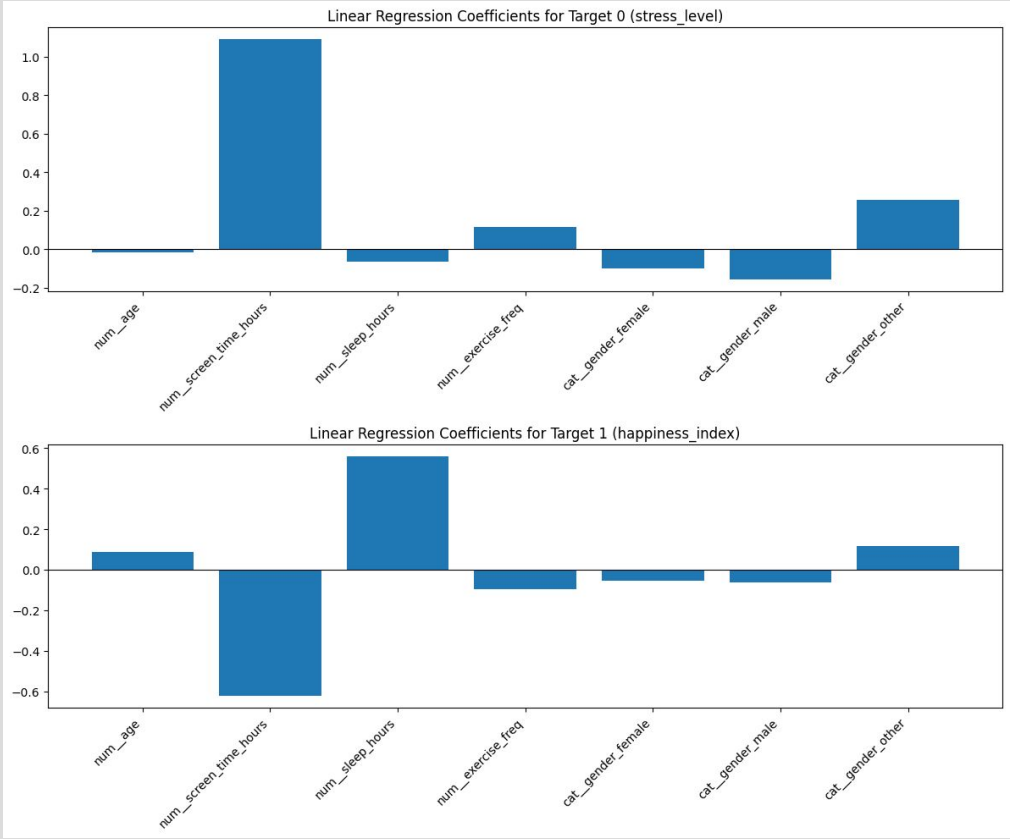
After training all these models, we pick the best(lowest RMSE) model to do later evaluation and application

Table 1. Model Hyperparameters

LinearRegression						
RandomForest	N_estimators = 200					
GradientBoostingRegressor						
XGBRegressor	N_estimators = 300	Learning_rate = 0.05	Max_depth = 6	Subsample = 0.9	Colsample_bytree = 0.9	Objective = MSE

Mental Health Prediction Model

Coefficients of each feature.
The larger the absolute number is, the more important it is.



Evaluation of the Mental Health Prediction Model

Objective Model Evaluation

Stress level

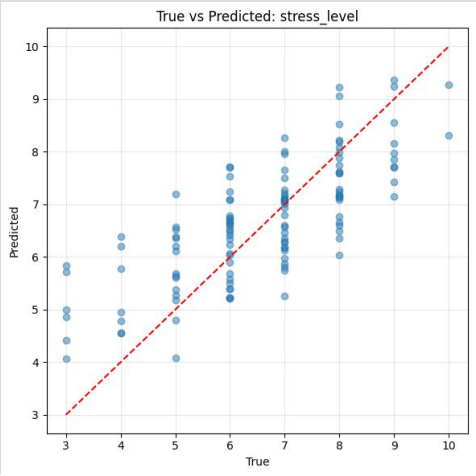
Metric	Value
R^2	0.5622
MAE	0.8459
RMSE	1.0395
MAPE	0.1510
Explained Variance score	0.5660

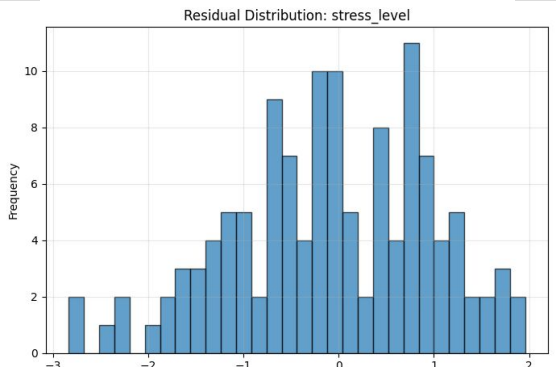
Happiness index

Metric	Value
R^2	0.5335
MAE	0.8842
RMSE	1.0707
MAPE	0.1164
Explained Variance score	0.5336

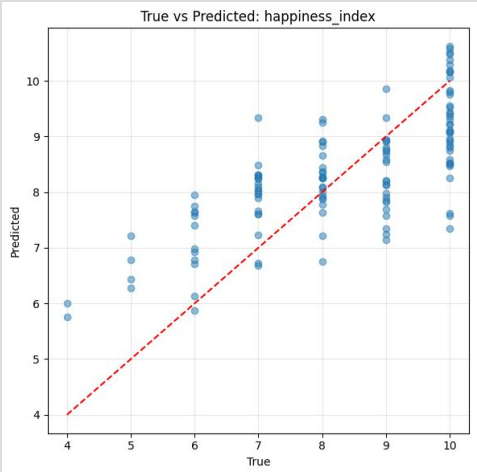
Objective Model Evaluation

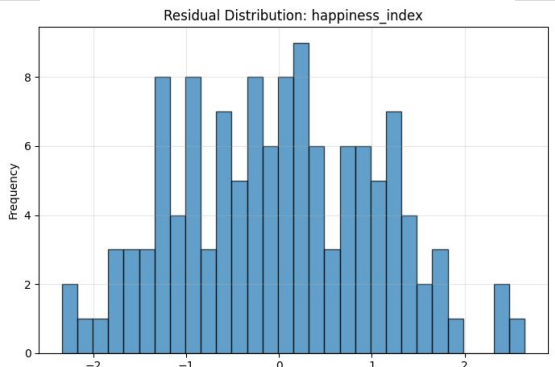
Stress level





Happiness index





Potential Applications

Usage as a mental health recommender system

User Inputs

Ask the user to input their age, average daily screen time, average sleep, and exercise frequency.

Model Predictions

This model can predict the predicted anxiety and happiness level.

Give Recommendations

If the predicted levels of stress are too high given the user inputs, then we can recommend using less social media.

Potential Application

Mental health impacts individuals of all ages. To the right are potential recommendations for the usage of this recommender and data.

For Individuals < 18 years old

Recommender could be used in schools to help improve mental health in students. One example can be an outright ban on phones during school hours to help students reduce screen time.

For working class individuals

Can be used by companies as a way to design programs to boost employee morale. This could be to provide fun activities that help in removing employees from their computer.

For government usage

For example, can compare suicide rates with stress related to mental health and social media

Demo: