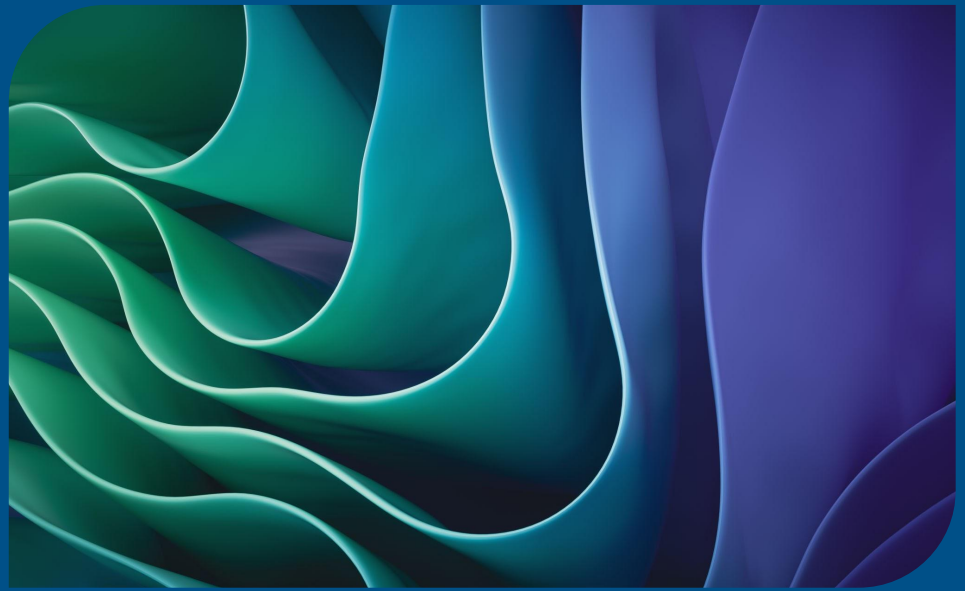
12.04.24

Melodies of Change

Analyzing Factors Influencing Improvement in Music Therapy

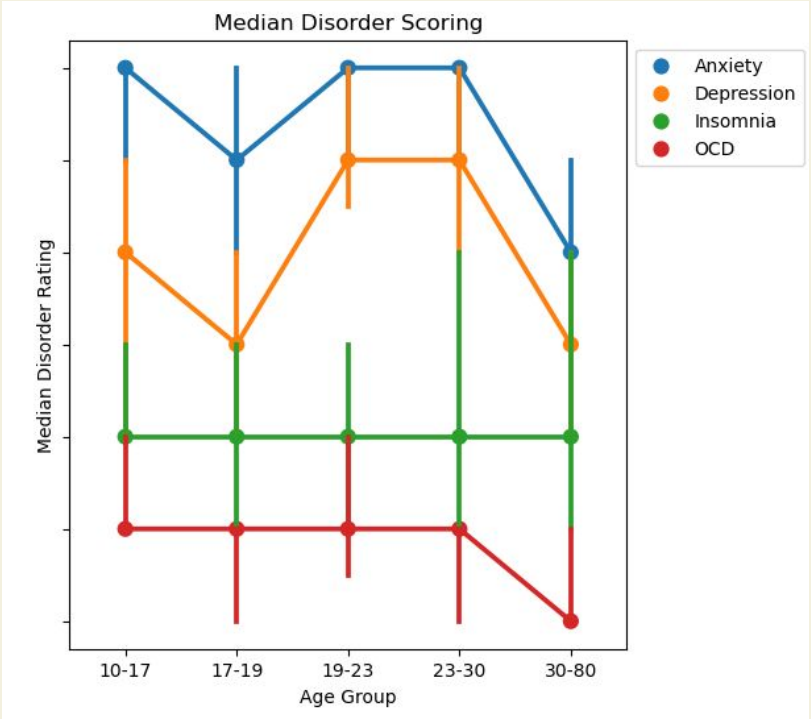


Arsen Jamkotchian

Which patient characteristics, listening behaviors, and music features most effectively predict positive outcomes from music therapy?

Effects on Insomnia, Anxiety, OCD, and Depression

- Those suffering from OCD or Insomnia may worsen following treatment.
- Those suffering from Anxiety showed improvement.
    - Despite higher median Anxiety values
- Requires rigorous and controlled research.



Enhance Data Collection Methods

Sampling Bias

Physical flyers geographically limited to University of Washington vicinity.

Web postings limited to sites more frequently visited by younger people.

People who have access to Google Forms.

Survivorship Bias

No indication of therapy completion status.

Self-Reported

Mental disorders not ranked by professional.

BPM impossible to self-report.

No validation of past or present therapy.

Encourage music listening while working

68%

Importance of the *While working* feature in predicting improvement.

Data Overview

Collection

Cleaning

Exploratory Data Analysis

Music & Mental Health Survey

Collection Locations

Public locations at University of Washington and online on Reddit, Discord, and social media platforms.

Format

Self-reported Google form with 33 questions.

Content

Demographics, mental health conditions, music listening habits, and music characteristics.

Participants

735 participants ranging in age from 10 to 89 years old.

Data Cleaning

Impute missing values

Use Spotify data to impute missing BPM

Mode to impute missing categorical data

Mean to impute continuous normally distributed values

Median to impute continuous skewed values

Encoding and Scaling

Ordinal values one-hot encoded

Binary variables converted into dummy variables.

Continuous values standardized using StandardScaler

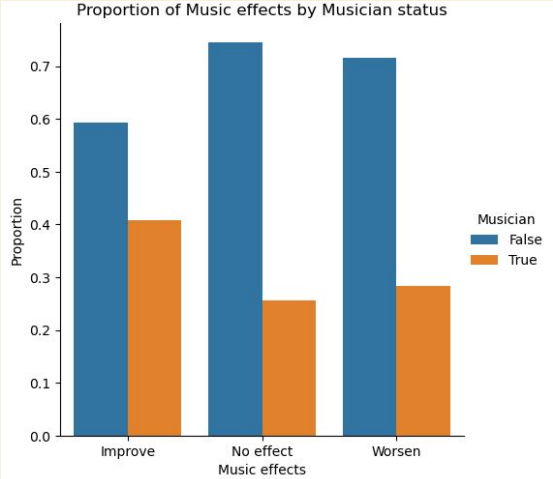
Binarized *Music effects* into *Improve*

Data Type Conversion

Converted features to appropriate data types

Dropped out-of-range entries

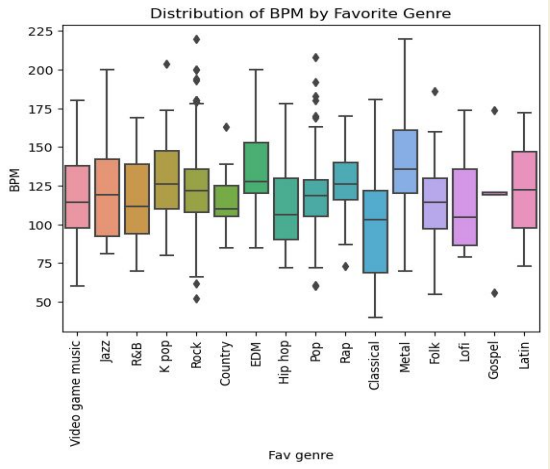
EDA Findings



Musician vs. Therapy Outcomes

Nonmusicians reported higher rates of improvement.

Higher proportion of nonmusicians reported worsening compared to musicians.



Differences b/w Mean BPMs of Genres

Significant differences in mean BPMs between genres.

Since genre-specific, may influence listener experiences and mental states.

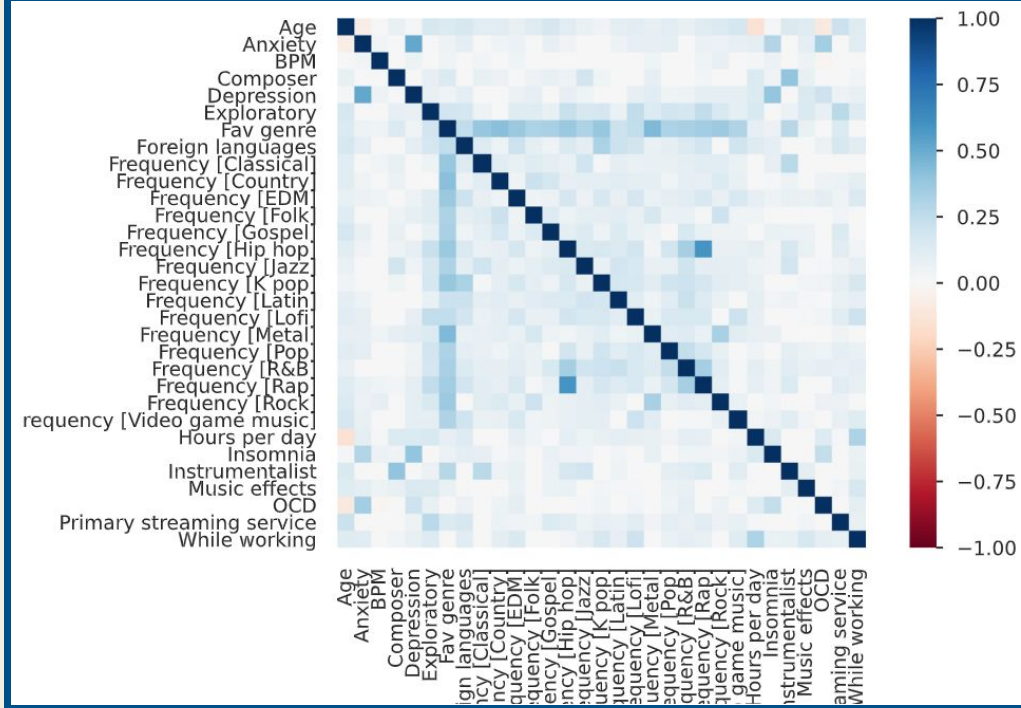
Correlation Heatmap

High correlations:

- Frequency listening to rap and hip-hop
- Depression and Anxiety

Slight correlations

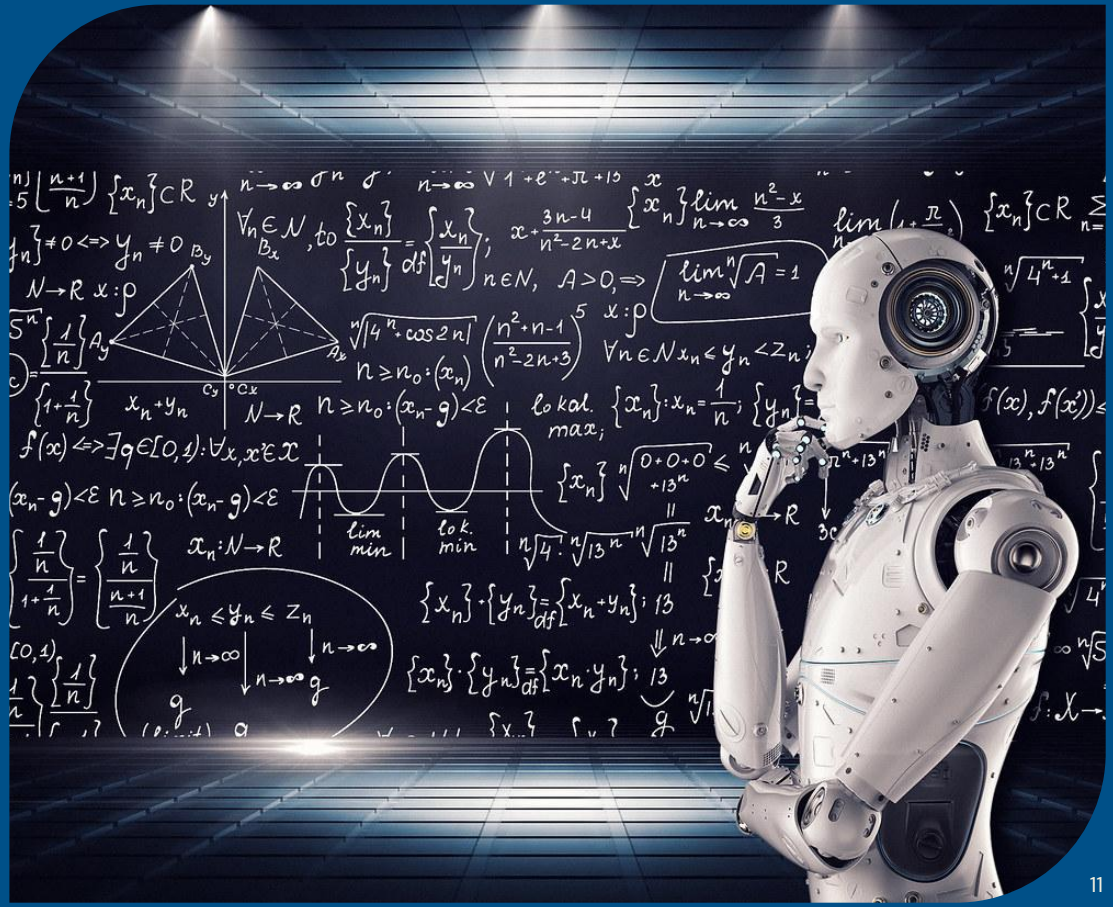
- Favorite genre and corresponding frequency
- Composer and instrumentalist



Modelling

Predictor variable: Improve

Models: Logistic Regression, Random Forest, and Gradient Boosting Classifier



Model Metrics

Logistic Regression

Scores:

- F1: 0.83
- Recall: 0.94
- Accuracy: 0.72
- Precision: 0.74

Random Forest Classifier

Scores:

- F1: 0.84
- Recall: 0.98
- Accuracy: 0.73
- Precision: 0.74

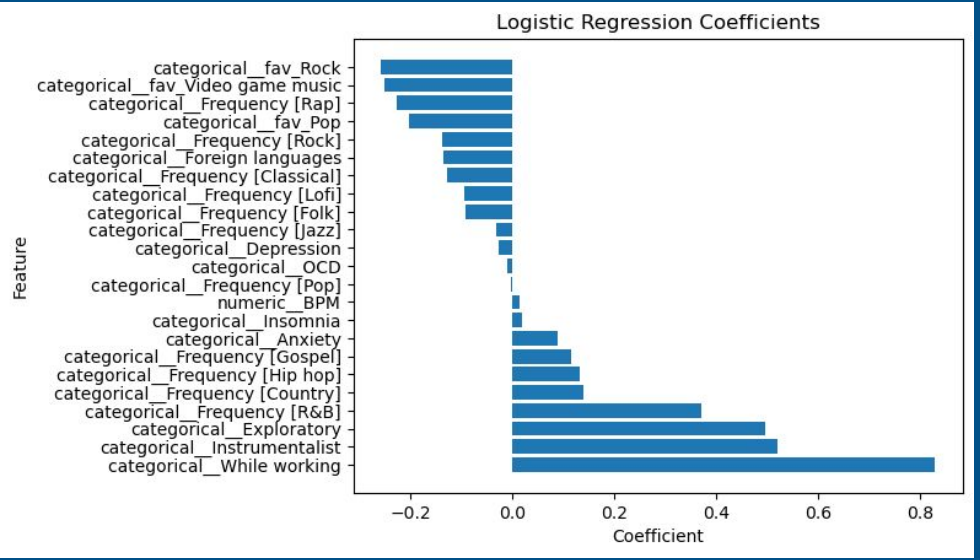
Gradient Boosting Classifier

Scores:

- F1: 0.85
- Recall: 1
- Accuracy: 0.74
- Precision: 0.74

Logistic Regression Coefficients

Inform feature relationships together with feature importances.



Conclusion

1. Research relationship between therapy and mental disorders.
2. Encourage music listening while working
3. Enhance data collection methods