

Severe Mental Illnesses

Predict likelihood of severe mental illness from music listening patterns.



Business Problem

Your physical health can be affected by your mental health if neglected for too long.

Some listed **benefits** of listening to music are:

- » Lower heart rate and blood pressure
- » Relax muscle tension
- » Release endorphins
- » Relive stress and encourage feelings of calm

This project will determine if music patterns can be used to predict users who experience severe symptoms from Anxiety, Depression, and/or OCD as base-line mental illnesses.



Dataset

Summary

- The music and mental health survey results dataset was collected from Kaggle (Rasgaitis, 2023).
- All responses were collected from September – November 2022.

Collection Methods

- Posted to several different social media sites for participant responses.

Question Types

- In the question set, mental illnesses were scaled from 0-10 according to the participant's view.
- It also collected information about frequency of music genre listened to such as hip hop, rock, lofi, etc. and other music listening habits.

The Global Assessment of Functioning (GAF)

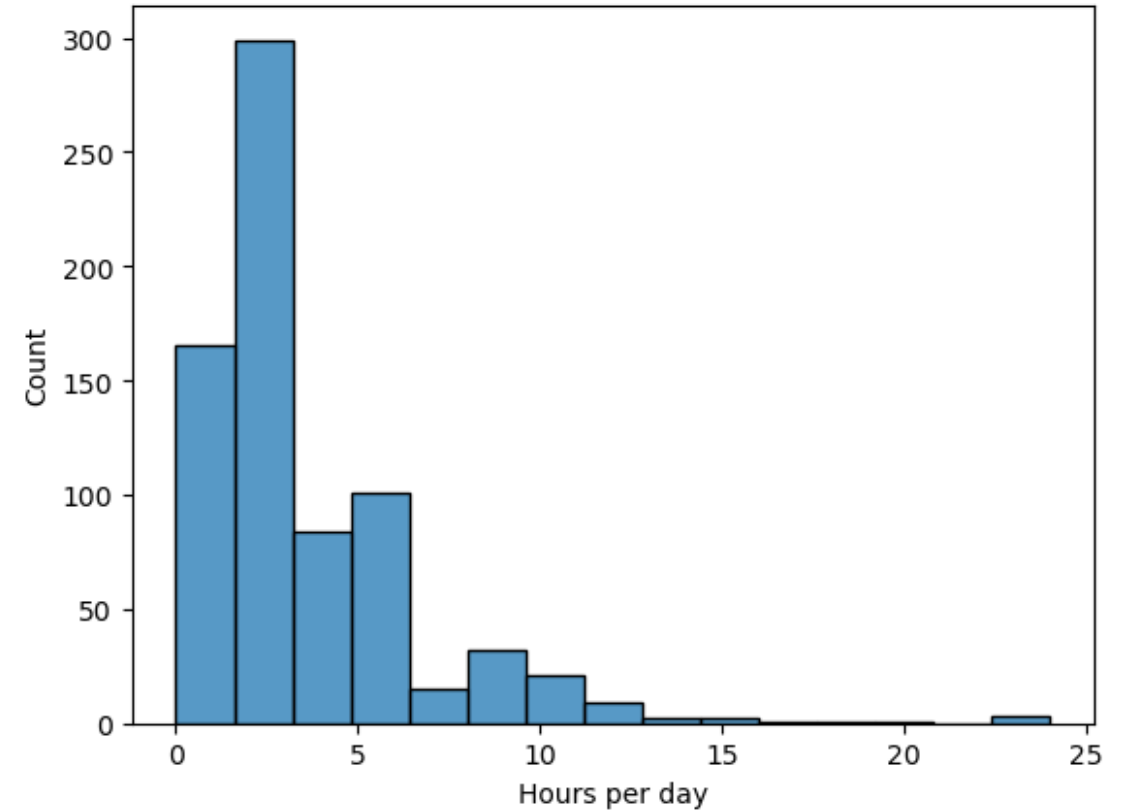
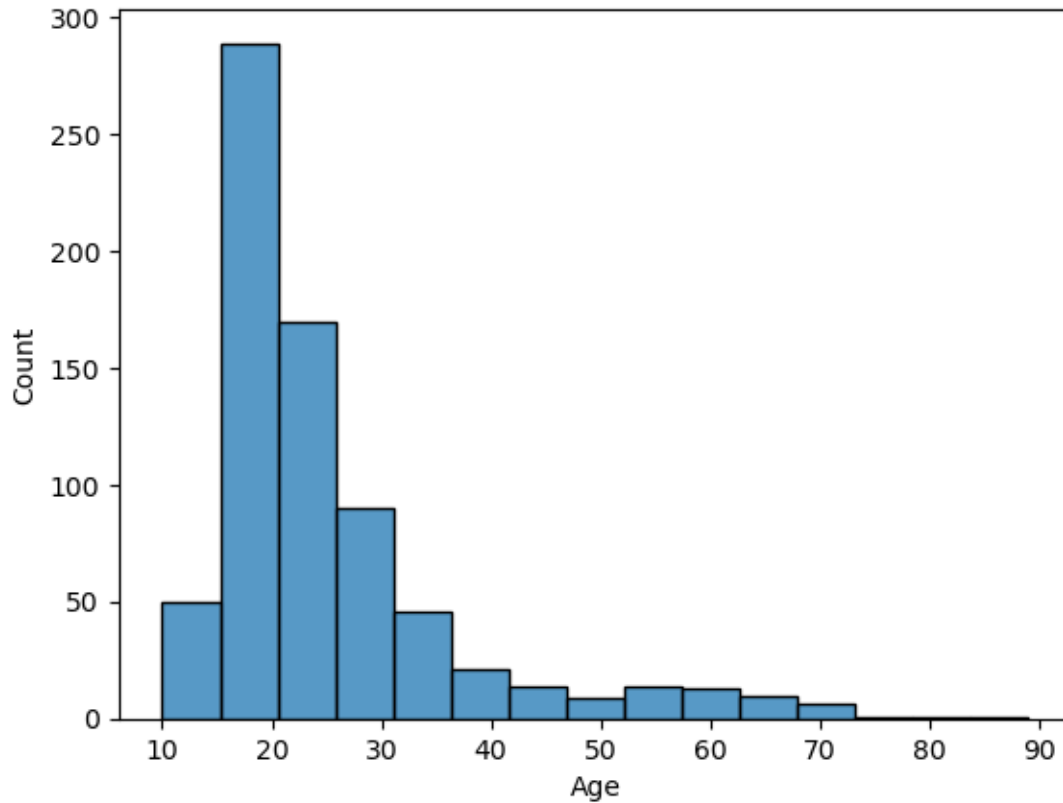
Source: *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition

- **100-91:** Superior functioning in a wide range of activities, life's problems never seem to get out of hand, is sought out by others because of his or her many positive qualities. No symptoms.
- **90-81:** Absent minimal symptoms (e.g. mild anxiety before an exam), good functioning in all areas, interested and involved in a wide range of activities, socially effective, generally satisfied with life, no more than everyday problems or concerns (e.g., an occasional argument with family members).
- **80-71:** If symptoms are present, they are transient and expectable reactions to psychosocial stressors (e.g., difficulty concentrating after family argument); no more than slight impairment in social, occupational, or school functioning (e.g., temporarily falling behind in school work).
- **70-61:** Some mild symptoms (e.g., depressed mood and mild insomnia) OR some difficulty in social, occupational, or school functioning (e.g., occasional truancy, or theft within the household), but generally functioning pretty well, has some meaningful interpersonal relationships.
- **60-51:** Moderate symptoms (e.g., flat and circumstantial speech, occasional panic attacks) OR moderate difficulty in social occupational, or social functioning (e.g., few friends, conflicts with co-workers).
- **50-41:** Serious symptoms (e.g., suicidal ideation, severe obsessional rituals, frequent shoplifting) OR any serious impairment in social, occupational, or school functioning (e.g., no friends, unable to keep a job).
- **40-31:** Some impairment in reality testing or communication (e.g., speech is at times illogical, obscure, or irrelevant) OR major impairment in several areas, such as work or school, family relations, judgment, thinking, or mood (e.g., depressed man avoids friends, neglects family, and is unable to work, child frequently beats up younger children, is defiant at home, and is failing at school).
- **30-21:** Behavior is considerably influenced by delusions or hallucinations OR serious impairment in communication or judgment (e.g., sometimes incoherent, acts grossly inappropriately, suicidal preoccupation) OR inability to function in almost all areas (e.g., stays in bed all day, no job, home, or friends).
- **20-11:** Some danger of hurting self or others (e.g., suicide attempts without clear expectation of death, frequently violent, manic excitement) OR occasionally fails to maintain minimal personal hygiene (e.g., smears feces) OR gross impairment in communication (e.g., largely incoherent or mute).
- **10-1:** Persistent danger of severely hurting self or others (e.g., recurrent violence) OR persistent inability to maintain minimal personal hygiene OR serious suicidal act with clear expectation of death.
- **0:** Inadequate Information.

Data Preparation

Format	fill null with 0
	alter dtypes to int
	code yes/no responses as 0/1
Mental Illness Scale	classify mental illnesses that scored 6 or higher as severe (1/)
New Feature	count the number of genres that a participant rarely listened to at a minimum.





Analysis

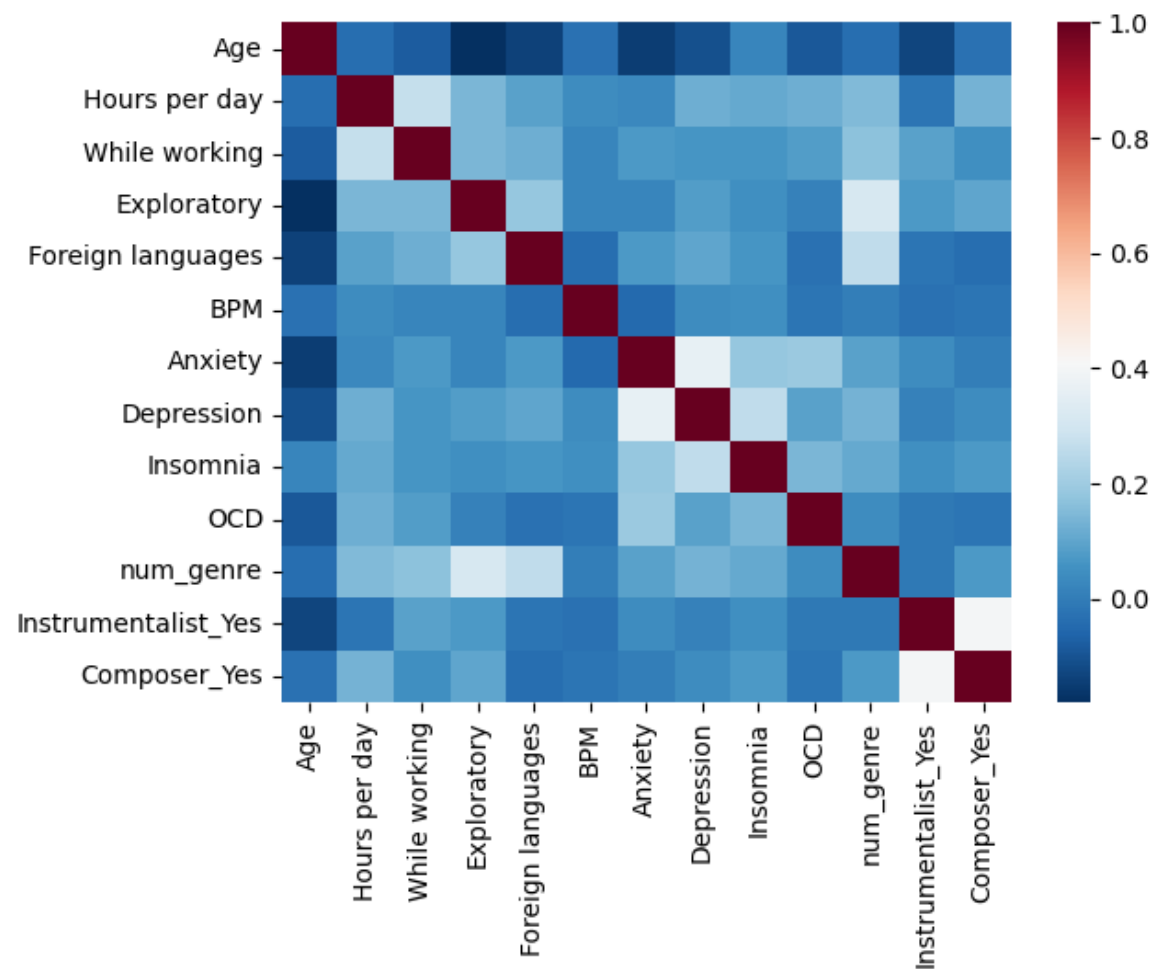
- » Respondents' age typically fell into 10-40 years old with most participants being 15-20 years old.
- » Most respondents stated that they listened to music less than 6 hours per day.

Correlation

The correlation of features for anxiety, depression, and OCD seemed variant other than:

- » age
- » hours per day
- » relationship between the 3 mental conditions
- » number of music genres listened to

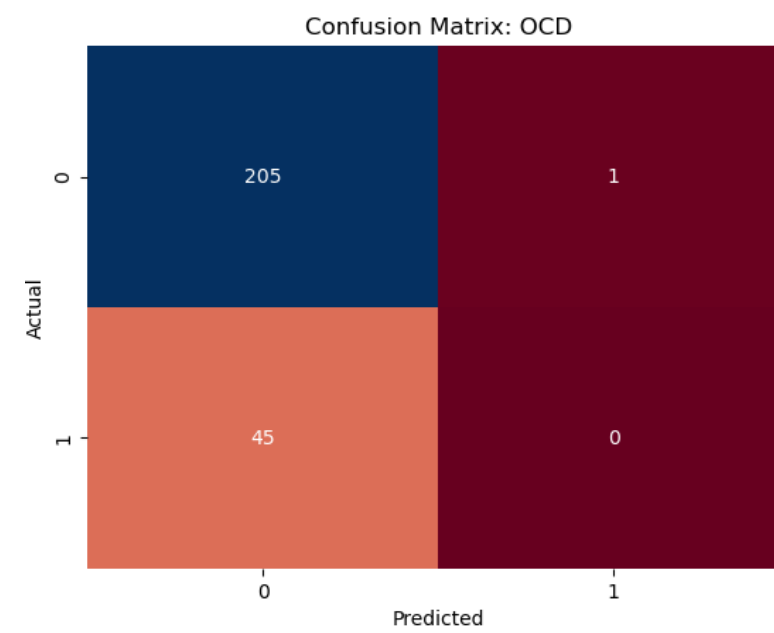
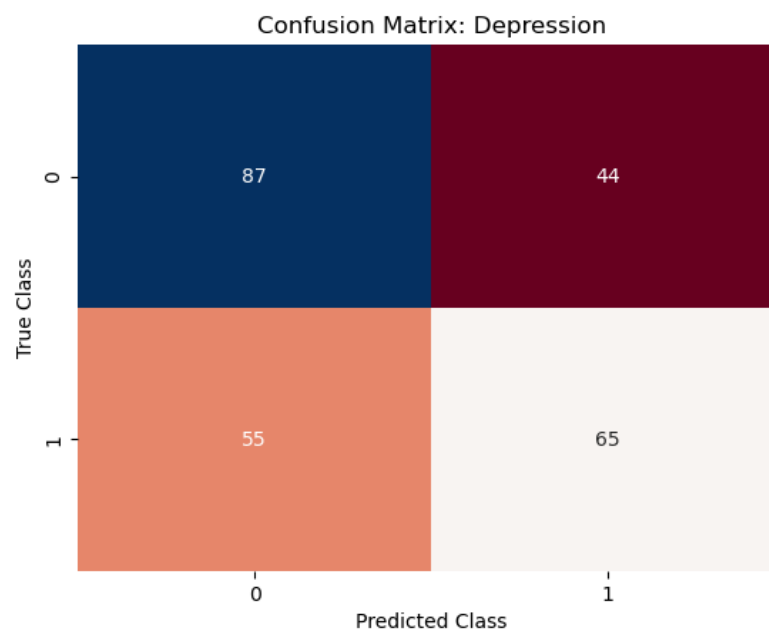
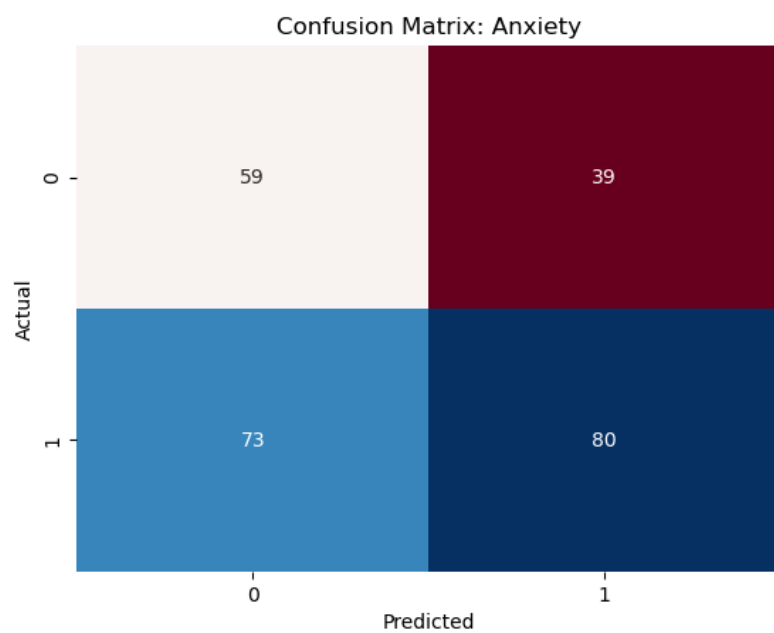
Feature Name	P-value
Age	0.0000000
Hours per day	0.0007078
Insomnia	0.0001288
Number of Genres	0.0293297



Model Evaluation

The classifier chain of logistic regression models appeared to have the highest accuracy of the model types chosen for comparison. Based on the individual mental illness confusion matrixes, it appeared that the model's success was driven down by the accuracy of predicting OCD.

Types	Accuracy
Classifier Chain (Logistic Regression)	35.86%
Random Forest Classifier	31.87%
Multi Output Classifier (Logistic Regression)	30.28%





Ethical Concerns and Limitations

- » All participants consented to have their information recorded for educational purposes but may not consent to a larger study or licensed application of the data.
- » The small sample may hinder the accuracy in a production environment. An entity that has a database of habits would be preferred.
- » Assumptions
 - Participants accurately accounted for their actual habits and not just their perceptions of how they respond.
 - Assumed that participants understand the meaning of the 0-10 scale for anxiety, depression, insomnia, and OCD and shared a common definition of what their score reflects.
- » Accuracy on a multi-label classification model was difficult as there were three closely related targets.

Future Applications

This research would have benefits to the community through the display of advertisements to a target audience for the following:

Provide awareness of struggles, resources, and offerings

Facilitate communication from those suffering from a severe form of mental illness to work with specialists





Thank You

Julie Campbell