



**Spotify Insights**

How can data  
influence  
creativity?

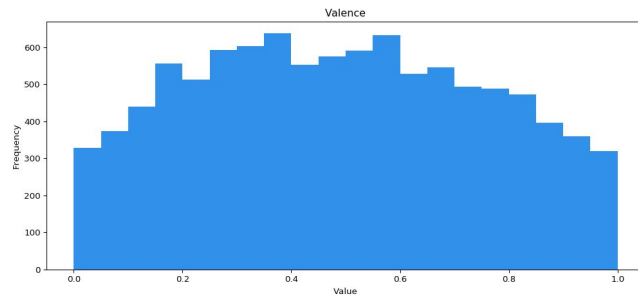
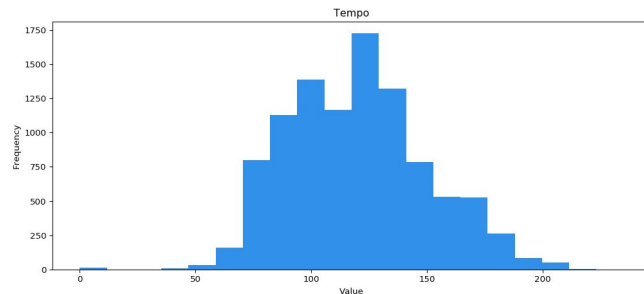
# Hypothesis

- Are there subsets of music that have measurably different attributes?
- Are there trends present in the way users create their playlists?
- If so, how different are they from the general population?
- How can musicians use the differences to influence creative decisions?

# Data in Music

- Objective
  - Tempo
  - Amplitude (volume)
  - Instrumentalness
- Subjective
  - Energy
  - Valence (mood)

[Images from spotify api](#)



# Targets

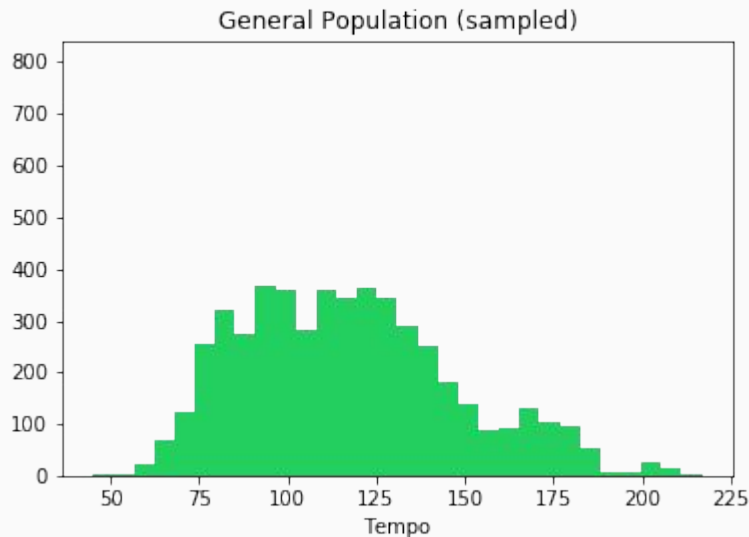
- Sample of the general population
- Songs taken from user-created playlists with “running” in the title
- Songs taken from user-created playlists with “study” in the title
- $N \approx 5,000$  for each set
- Playlist songs were gathered by me using the API and a very useful library, [Spotipy](#)
- Population data sampled from a [Kaggle](#) user
- Metrics generated by Spotify for every song

# Target Playlists: Running

Tempo

“...the speed or pace of a given piece.”

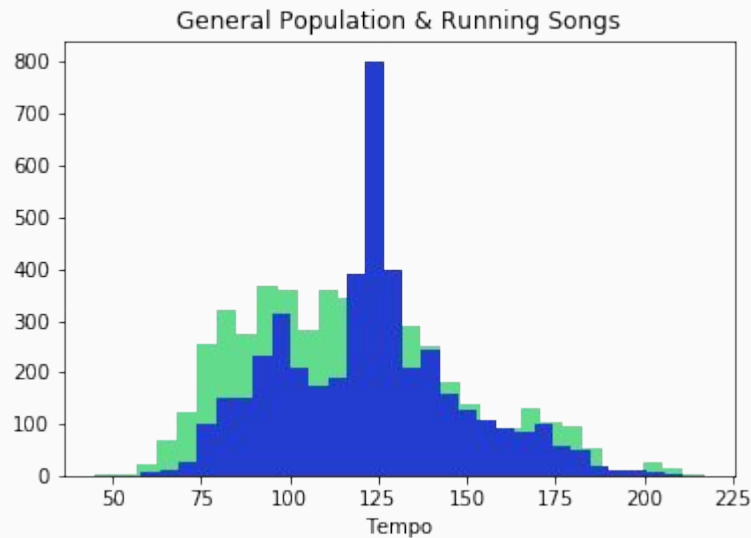
Measured in beats per minute (BPM)



# Target Playlists: Running

## Tempo

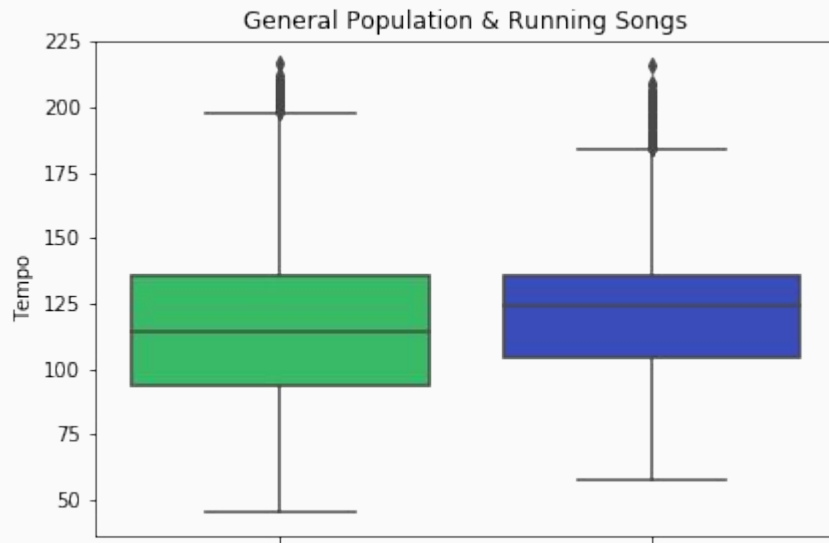
- 4 - 7 BPM higher



# Target Playlists: Running

## Tempo

- 4 - 7 BPM higher
- Narrower range

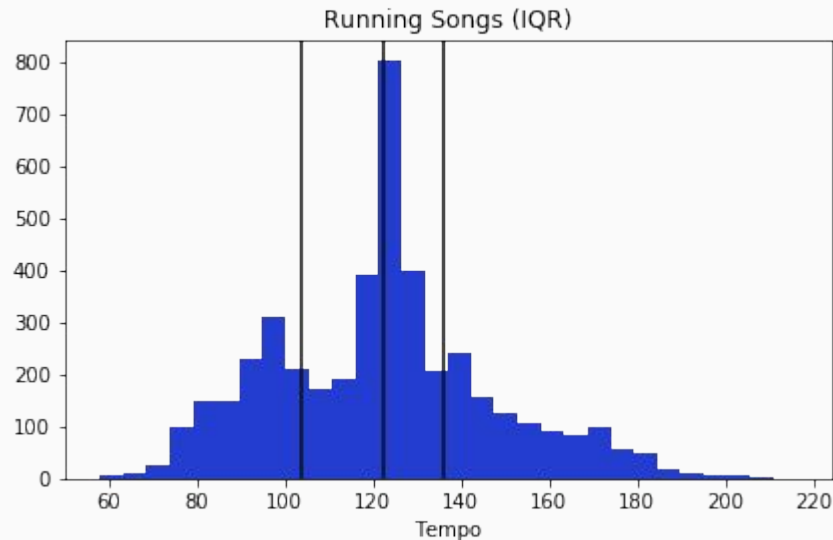




# Target Playlists: Running

## Tempo

- 4 - 7 BPM higher
- Narrower range
- Emphasis around 122 BPM



# Musical Guidelines

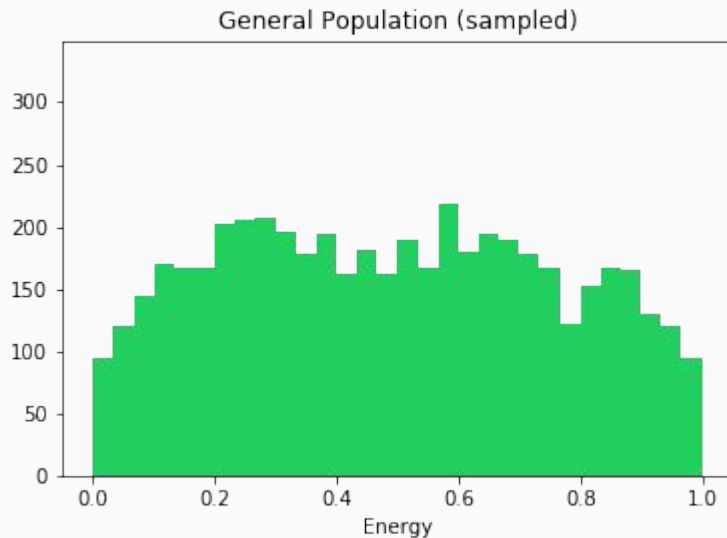
## Running Playlists

- Tempo around 122 BPM

# Target Playlists: Running

## Energy

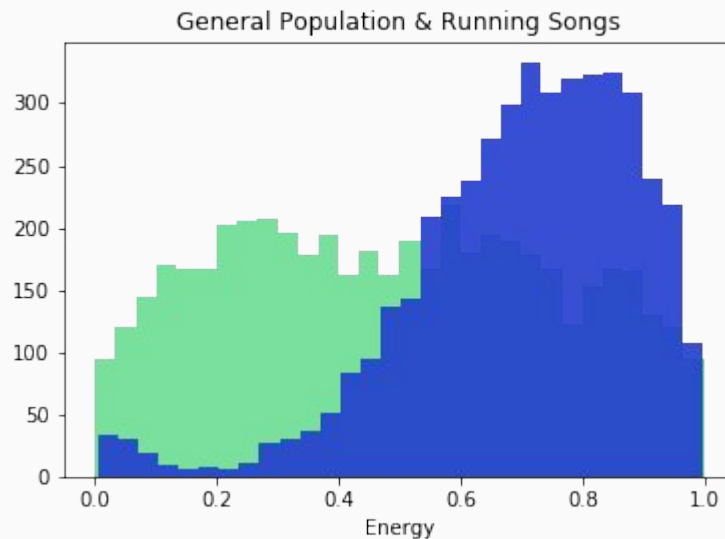
“...perceptual measure of intensity and activity.”



# Target Playlists: Running

## Energy

- Louder
- Busier
- More 'energetic'



# Musical Guidelines

## Running Playlists

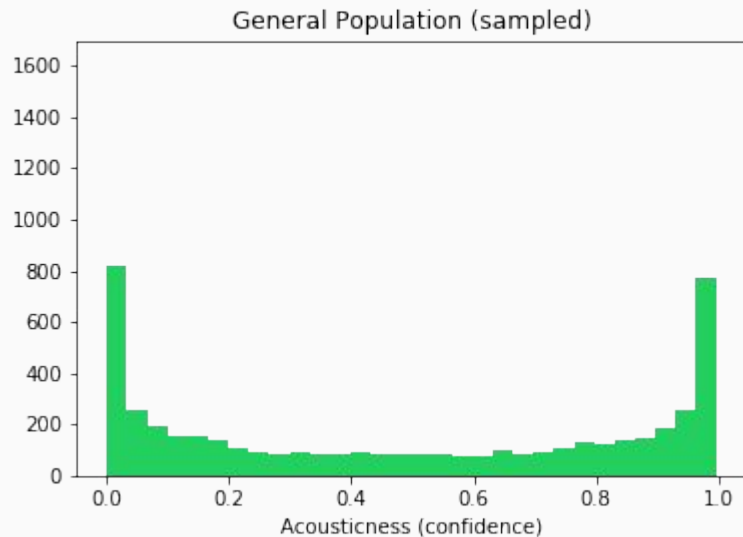
- Tempo around 122 BPM
- **Higher energy level (louder / more dynamic)**

# Target Playlists: Running

## Acousticness

“A confidence measure from 0.0 to 1.0 of whether the track is acoustic.”

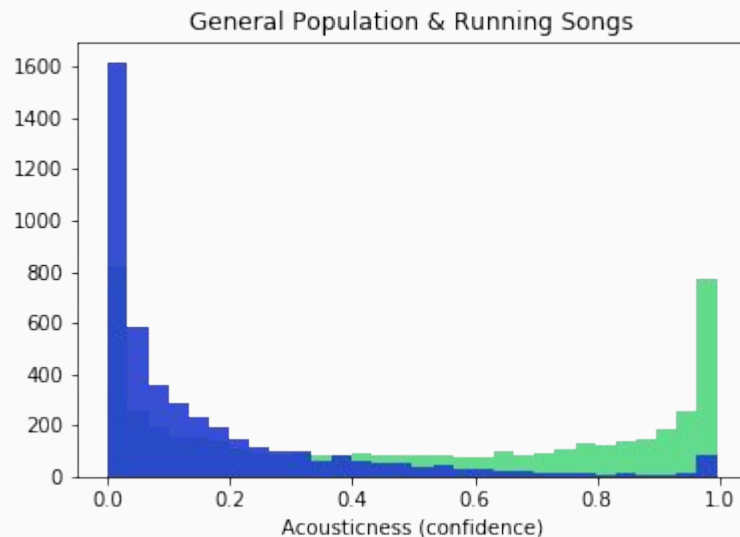
\*note, distribution differs significantly from what is listed in the documentation



# Target Playlists: Running

## Acousticness

- Hardly any acoustic songs in running playlists



# Musical Guidelines

## Running Playlists

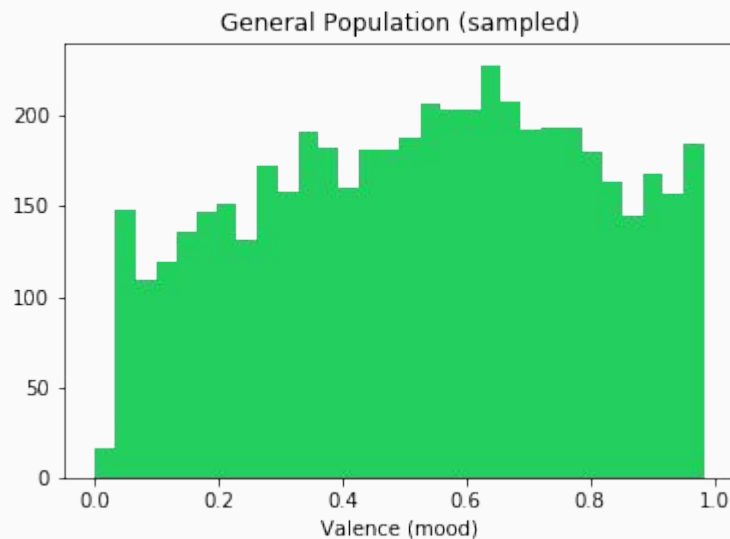
- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- **Not acoustic**



# Target Playlists: Running

## Valence

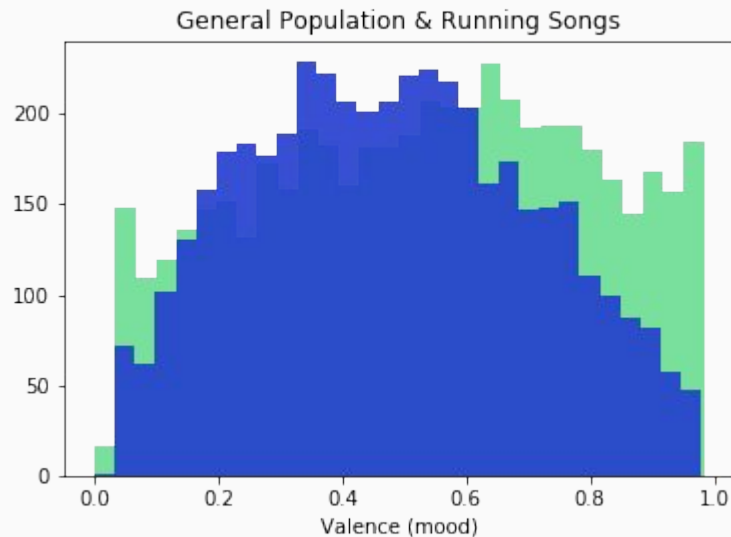
“...the musical positiveness conveyed by a track”



# Target Playlists: Running

## Valence

- Technically lower by statistical significance
- Small difference and effect size



# Musical Guidelines

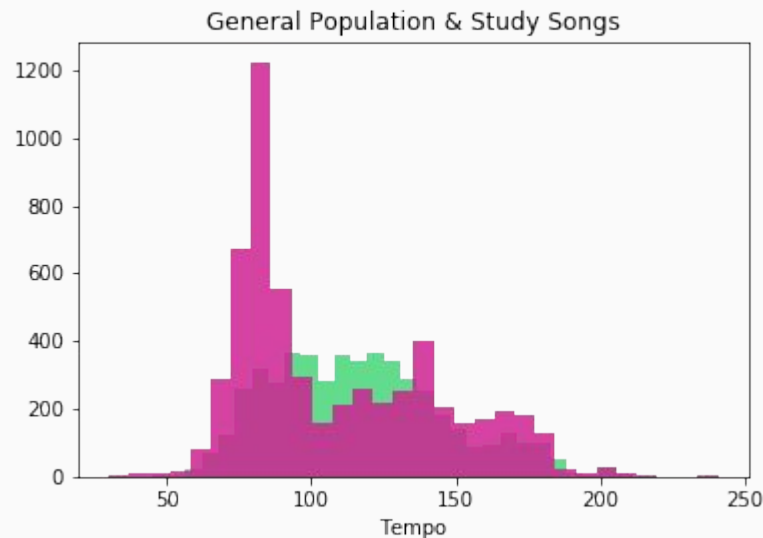
## Running Playlists

- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- **Less positive mood**

# Target Playlists: Studying

## Tempo

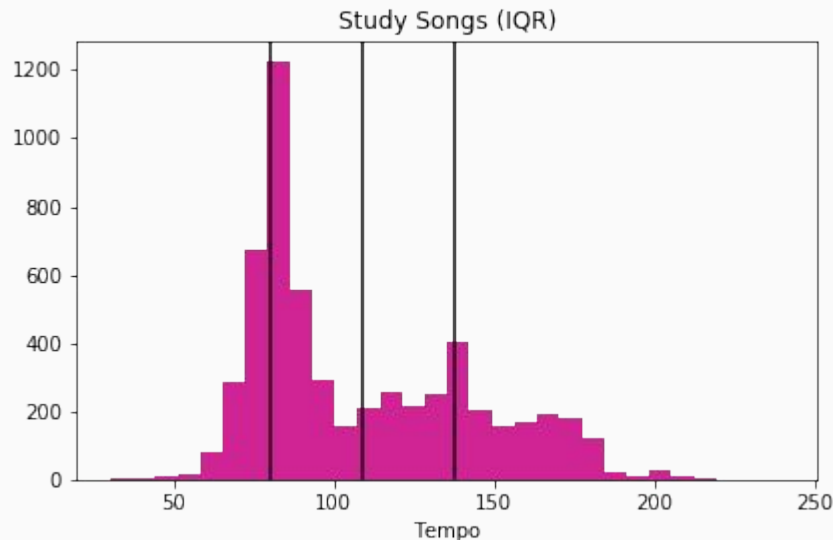
- 7 - 9 BPM lower



# Target Playlists: Studying

## Tempo

- 7 - 9 BPM lower
- Bottom of IQR better choice than the average
- Lines up with the mode
- 80 BPM



# Musical Guidelines

## Running Playlists

- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- Less positive mood

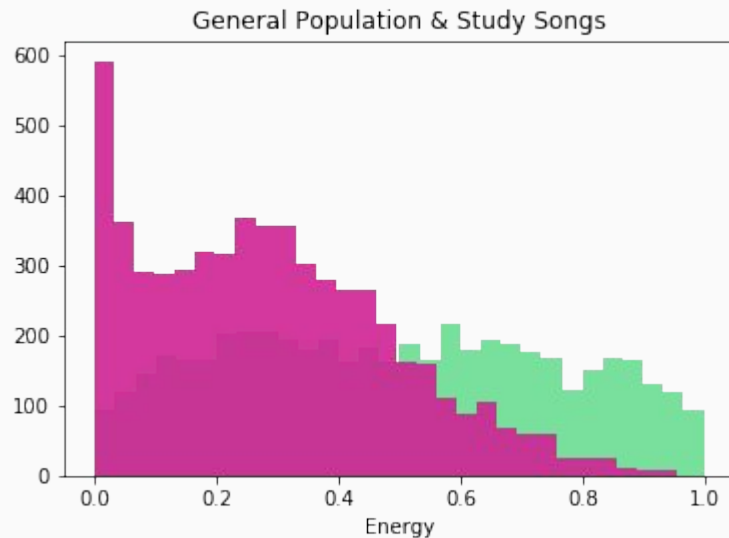
## Study

- Tempo around 80 BPM

# Target Playlists: Studying

## Energy

- Much lower energy
- Softer, simpler songs to avoid distracting the listener



# Musical Guidelines

## Running Playlists

- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- Less positive mood

## Study

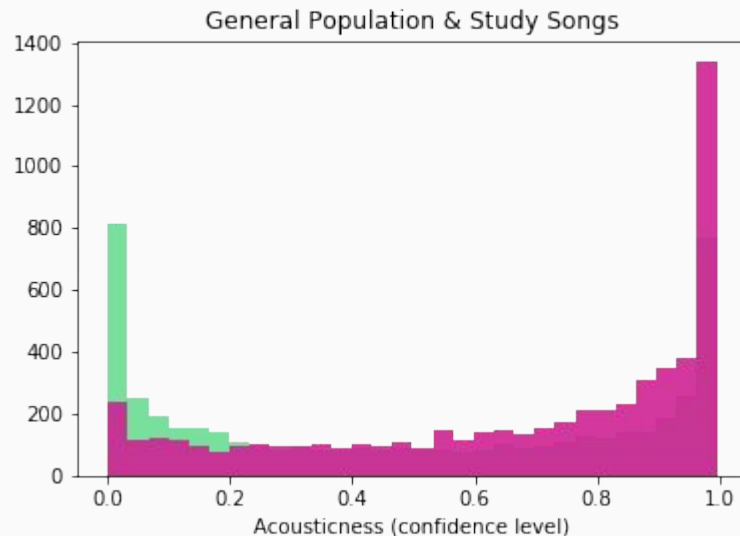
- Tempo around 80 BPM
- Low energy level (simple / less dynamic)



# Target Playlists: Studying

## Acousticness

- One playlist was very large and contained only solo piano songs
- Maybe better. Would require further analysis



# Musical Guidelines

## Running Playlists

- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- Less positive mood

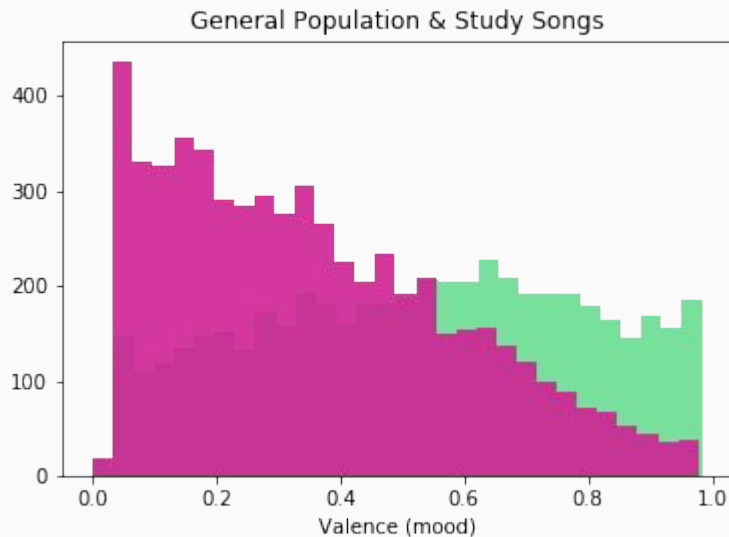
## Study

- Tempo around 80 BPM
- Low energy level (simple / less dynamic)
- **Maybe acoustic**

# Target Playlists: Studying

## Valence (mood)

- Decidedly less positive
- Music as a tool, not an escape



# Musical Guidelines

## Running Playlists

- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- Less positive mood

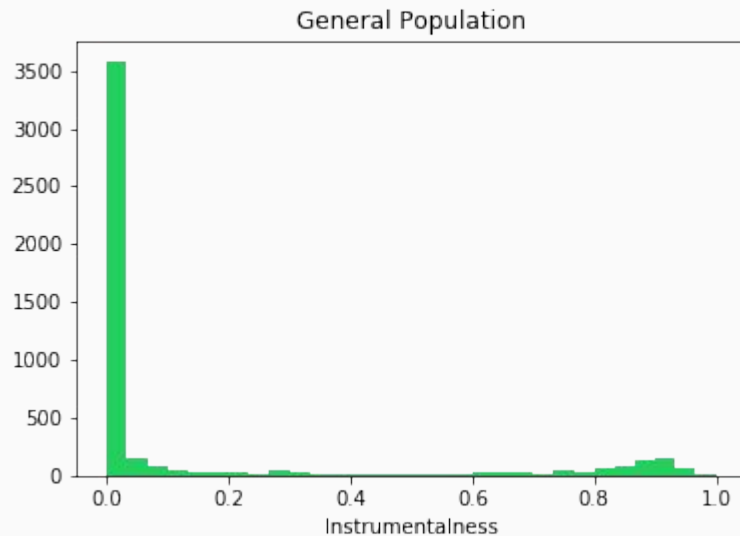
## Study

- Tempo around 80 BPM
- Low energy level (simple / less dynamic)
- Maybe acoustic
- **Emphasis on less happy**

# Target Playlists: Studying

## Instrumentalness

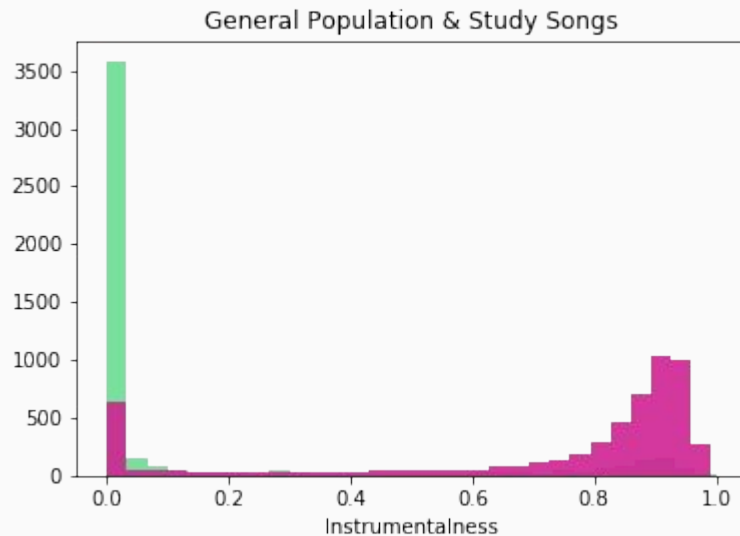
“The closer the instrumentalness value is to 1.0, the greater likelihood the track contains no vocal content.”



# Target Playlists: Studying

## Instrumentalness

- Overwhelming amount of instrumental songs
- Statistically, this represented the largest deviation from the population



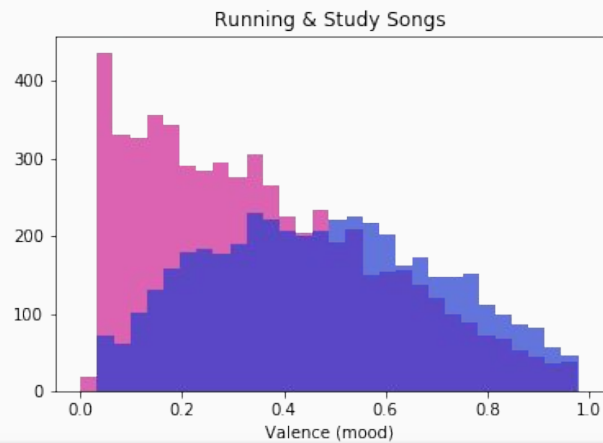
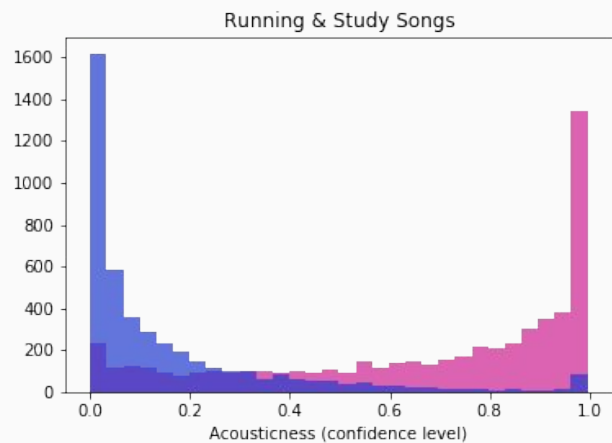
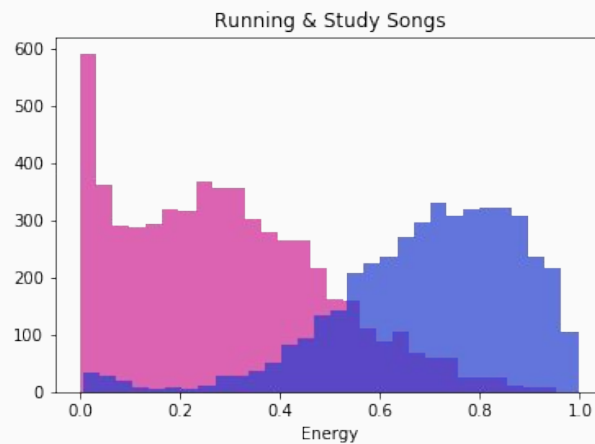
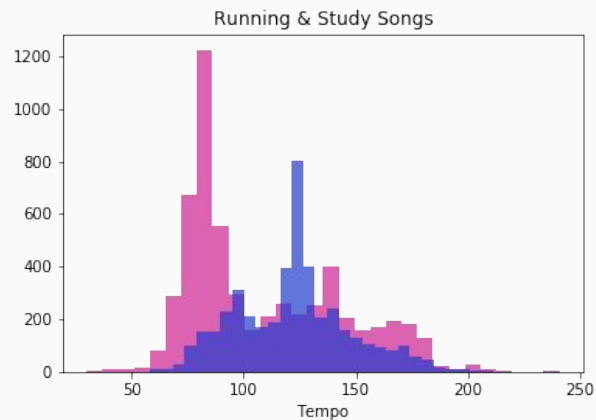
# Musical Guidelines

## Running Playlists


- Tempo around 122 BPM
- Higher energy level (louder / more dynamic)
- Not acoustic
- Less positive mood

## Study

- Tempo around 80 BPM
- Low energy level (simple / less dynamic)
- Maybe acoustic
- Emphasis on less happy
- **Minimal lyrical content**



 = Running

 = Study



# Conclusions

- We are able to establish that certain types of playlists carry attributes that are significantly different than the general population.
- With objective measures like tempo, we can set forth a clear target.
- Looking at subjective measures, we can set some loose overall goals for what the music should feel like
- All of these are established in our final set of “Musical Guidelines”

# Improvements

- Sample the population in a way that better represents it.
- Limit playlist size and draw from more playlists
- Instead of dropping duplicates, use them to weight the data

# Additional Use Cases

- Artists can look through their discography and try to market old songs in a fresh way
- Labels can make their own running or study playlists
- Guide algorithmically generated playlists

# Questions?

**Thank You**