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The Rhythm of Mental Wellness: Exploring the Relationship Between Music Preferences and Mental Health

Abstract:

This project will examine the relationship between music preferences and mental health, utilizing data from the "MxMH Survey Results" dataset. Music Therapy (MT) leverages music to improve stress, mood, and overall mental well-being by stimulating "happy" hormones like oxytocin. Although MT includes diverse genres tailored to individual needs, questions remain about the specific impact of genre preferences on mental health. Collected through a public survey, the dataset captures demographics, music habits, genre preferences, and mental health ratings, providing a foundation for exploring music's role in mental health. By analyzing trends in how music genres influence mental health indicators, the project aims to uncover patterns that reveal music's potential as a therapeutic tool. Through analyzing this dataset, we hope to explore how MT can be applied and gain deeper insights into how music affects people's mental health. This could lead to a better understanding of the psychological impact of music and pave the way for innovative, drug-free treatments, offering individuals with ADHD or depression alternative therapies that harness the power of sound.

Introduction:

Music has long been celebrated for its ability to evoke emotions. Music therapy (MT) has been used as a tool to enhance well-being, reduce stress, and improve mental health outcomes in various studies. However, most people still don't quite understand the power of music to our mental health. This project seeks to bridge this gap by leveraging data from the "MxMH Survey Results" dataset. Through this analysis, we aim to uncover meaningful patterns and insights about how music genres, listening habits, and other preferences influence mental wellness. Our findings will provide actionable insights that can inform future applications of music therapy and enhance understanding of music's therapeutic potential. Through exploratory and explanatory visualizations, we will identify meaningful patterns, such as whether certain genres are associated with specific mental health indicators, followed by explanatory visualizations to communicate findings and insights effectively.

Background (with Related Work):

Music therapy (MT) involves the use of music to address various psychological, emotional, and physical challenges. MT isn't a one-size-fits-all approach; it incorporates a wide range of genres tailored to the unique needs of individuals and organizations. This personalized approach acknowledges that what works for one person may differ for another.

Several studies have explored the psychological and physiological impact of music. For example, Granot examined the relationship between music, pleasure, and social affiliation, emphasizing the role of hormones and neurotransmitters in these processes (Granot, 2017). Additionally, Eerola et al. demonstrated that listening to unfamiliar sad music can induce

reward-related hormonal changes, particularly in empathic listeners, shedding light on music's potential as a therapeutic tool (Eerola et al., 2021).

Further research suggests that music can stimulate the release of hormones like oxytocin and dopamine, which play a crucial role in mood regulation, stress relief, and emotional well-being. Music's ability to influence heart rate, breathing, and neurological pathways has made it a valuable tool for therapeutic applications across a range of mental health conditions. Its impact is particularly significant for mental health conditions such as anxiety, depression, OCD, and insomnia.

The "MxMH Survey Results" dataset provides a unique opportunity to examine these dynamics by analyzing self-reported mental health scores alongside music habits and preferences This project aims to create accessible, insightful visualizations to broaden awareness and understanding of MT's effects. By integrating exploratory and explanatory data visualizations, this project contributes to the growing field of personalized therapeutic interventions using music.

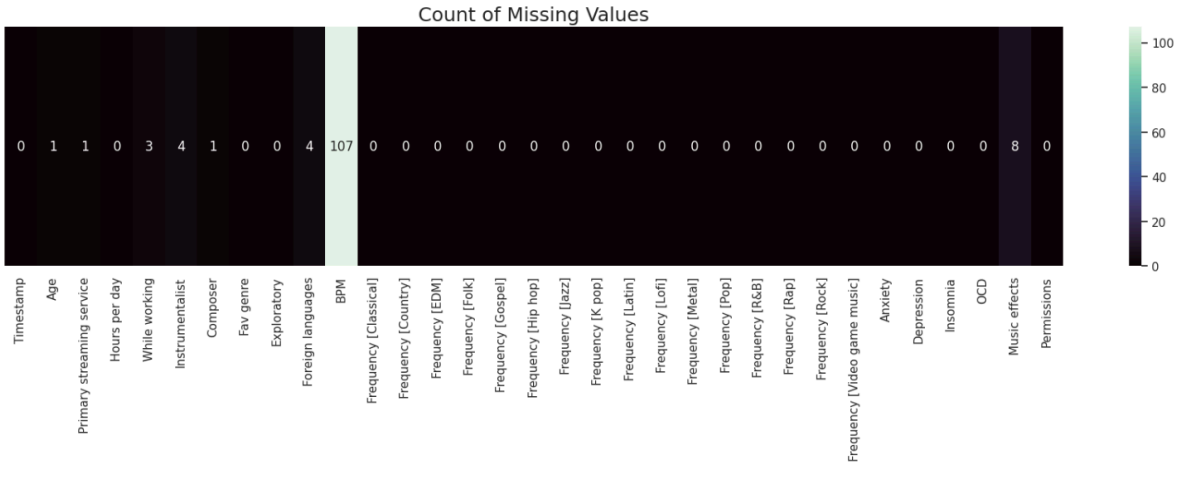
Data Preprocessing:

The dataset used for this project, titled "MxMH Survey Results," captures a wide range of information about respondents' musical preferences, listening habits, and mental health conditions. Data collection was managed via a Google Form. The form was posted in various Reddit forums, Discord servers, and social media platforms. Posters and "business cards" were also used to advertise the form in libraries, parks, and other public locations. The form was relatively brief so that respondents would be more likely to finish the survey. "Harder" questions (such as BPM) were left optional for the same reason.

The dataset is structured into three primary blocks: Block 0 focuses on general background information, such as respondents' listening habits and musical activities; Block 1 collects frequency rankings for 16 music genres, ranging from "Never" to "Very frequently"; and Block 2 measures mental health indicators, including Anxiety, Depression, Insomnia, and OCD, on a scale of 0 (not experienced) to 10 (regularly or extremely experienced). Additional columns provide demographic and contextual insights, enhancing the dataset's richness and enabling deeper analysis of the interplay between music preferences and mental health. Moreover, there are 33 columns & 736 rows in this dataset.

1. Handling Missing Values

Missing data can bias results or lead to inaccuracies in the analysis. Key columns like *'Primary streaming service'* and *'Music effects'* are crucial for analysis, so rows with missing values in these columns were dropped. For columns with a significant amount of missing data, like *'BPM'*, missing values were replaced with the median value.



2. Duplicate Row Removal

Duplicate entries can skew results by over-representing certain data points. The dataset was checked for duplicates, and any redundant rows were removed. We used df.duplicated() to identify duplicates. There are no duplicate rows in our dataset.

3. Statistical Summarization

Descriptive statistics were generated to understand data distribution, identify outliers, and assess variability. This provides a foundation for scaling or transforming data if required.

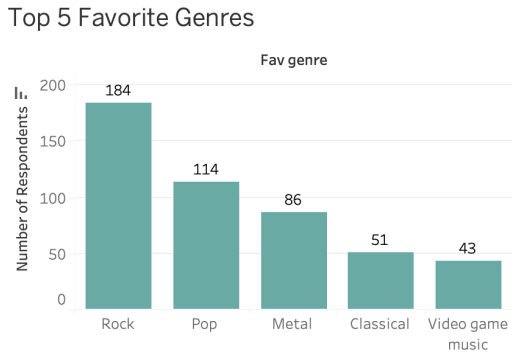
4. Unique Value Analysis

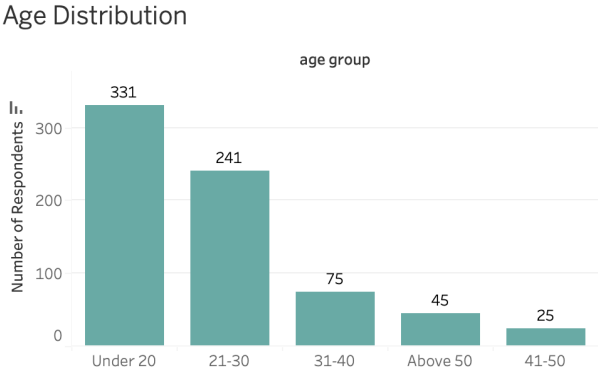
To understand the diversity of responses in categorical columns, unique value counts and values were identified. This helps in deciding whether encoding is needed for categorical data. For this, we calculated unique values using df.unique() and df.nunique().

Data Visualization:

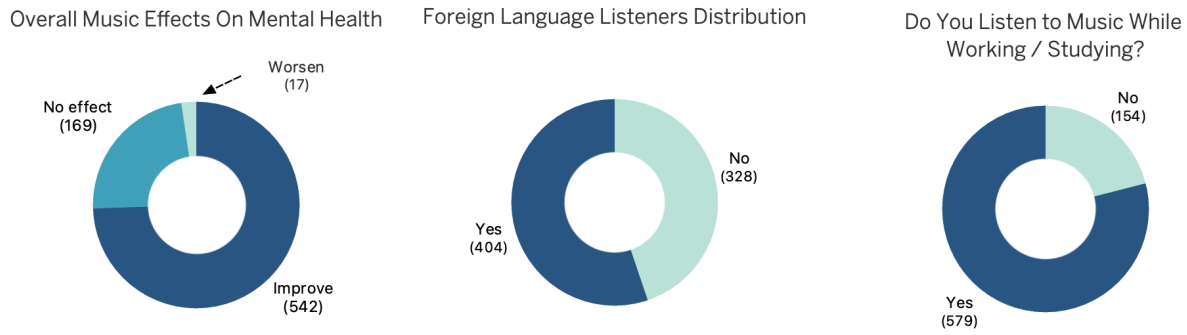
This project explores the relationship between music preferences and mental health, aiming to uncover how music therapy can be leveraged for mental wellness. Given the complexity of the dataset, with multiple metrics such as anxiety, depression, insomnia, and OCD scores and diverse categorical data like music genres and listening habits, advanced Tableau and Python features are utilized to extract meaningful insights. We implemented both exploratory and explanatory methods for our project.

Exploratory work:

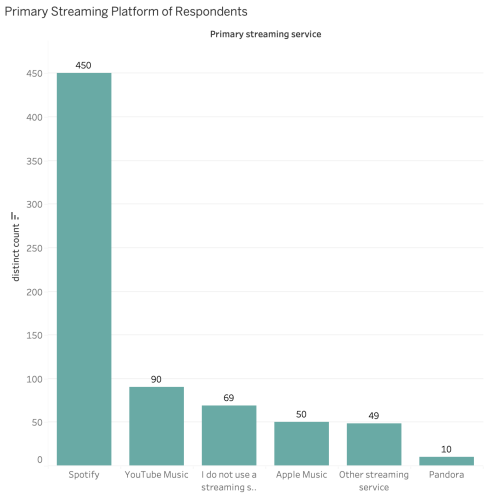




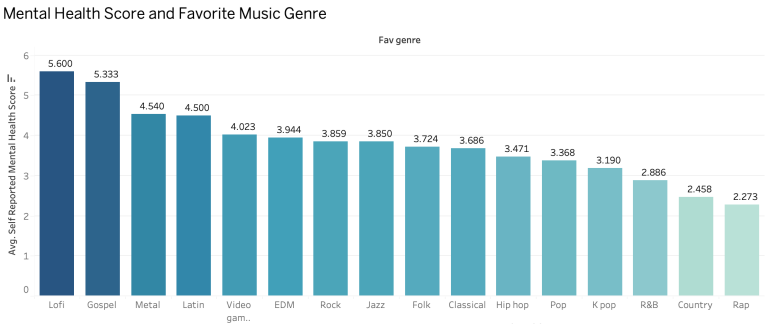
→ **Top 5 Favorite Genres & Age Distribution:** From the exploratory analysis of the dataset, we see that the most popular music genres among respondents include Rock, Pop, Metal, Classical, and Video Game Music, with Rock being the most favored genre. The majority of respondents are under 20 years old, followed by those in the 21-30 age range. Other age groups (31-40, 41-50, Above 50) have progressively fewer respondents, indicating a younger demographic.



→ **Overall Music Effects, Foreign Listeners, & Listeners While Working/Studying:** The 542 respondents believe music improves their mental health, while only 17 have reported music worsens their mental health, and 169 have noticed no effect. This suggests that music generally has a positive impact on mental well-being. The second chart shows the number of respondents who listen to foreign language songs and those who do not. The third donut chart highlights that 579 respondents listen to music while working or studying, compared to 154 who do not. This suggests that music is commonly used as a background during productive activities, possibly to aid focus or reduce stress.

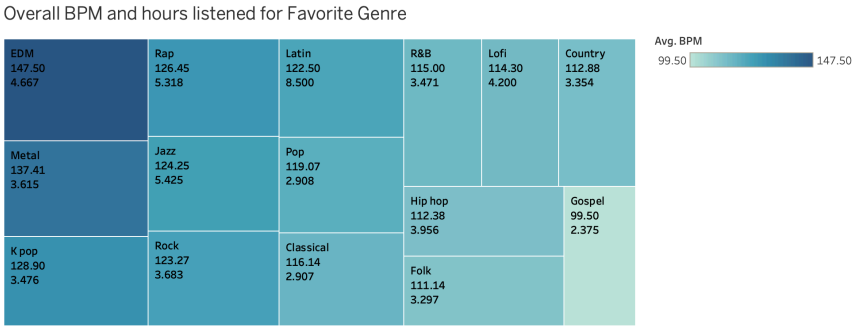


→ **Respondents Primary Streaming Platform:** The bar chart shows the primary streaming platforms preferred by respondents, with **Spotify** leading by a significant margin, as it is the primary service for over 450 users. Following it, **YouTube Music** is the second most popular, with around 90 respondents. A notable portion of the survey population (69 people) reported not using any streaming service. **Apple Music** and **Other streaming services** each attract a moderate number of users, with approximately 50 and 49 respondents, respectively. Lastly, **Pandora** has the smallest share, with only 10 respondents considering it their primary streaming service.



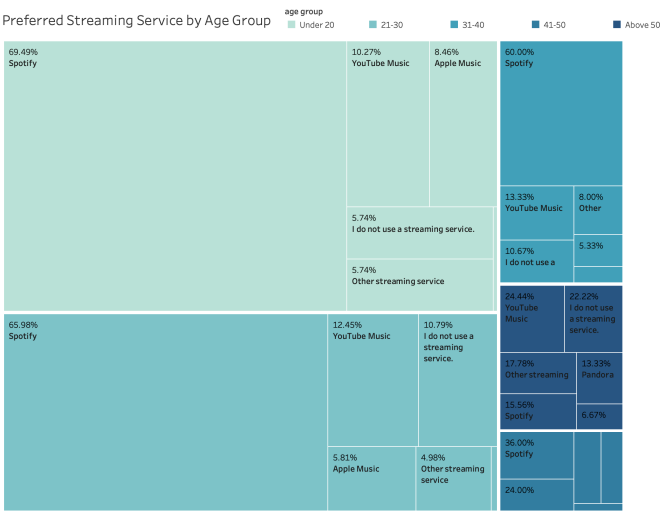
→ **Mental Health Score by Favorite Genre:** The bar chart shows the average self-reported mental health scores across different music genres. **Lofi** music is associated with the highest mental health score (5.6), followed closely by **Gospel** (5.3). Other

genres like **Metal**, **Latin**, and **Video game music** also show relatively high scores, around 4.5. In contrast, genres like **Rap** and **Country** are linked to lower mental health scores, with **Rap** having the lowest score (2.3). This suggests that genres like Lofi and Gospel may have a more positive impact on mental health compared to others.

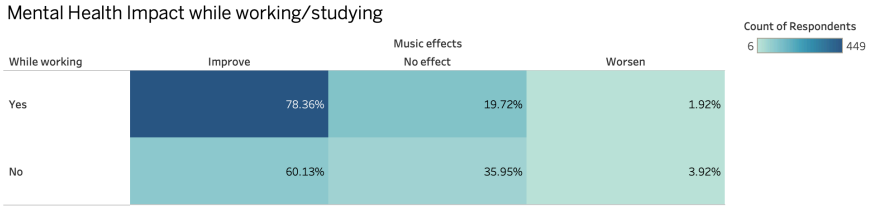


→ BPM and Hours Listened by Favorite Genre: Electronic Dance Music (EDM) has the highest average BPM at 147.5 and an average of 4.67 hours listened weekly, followed by Metal (137.41 BPM, 3.62 hours) and K-pop (128.9 BPM, 3.48 hours). Gospel, with the lowest average BPM at 99.5, has the least weekly listening time at 2.38 hours. Interestingly, Latin music, with a BPM of 122.5, stands out for having one of the highest average weekly listening times at 8.5 hours, suggesting a strong engagement with this genre. These patterns underscore the diversity in tempo preferences and listening habits, aligning with varying energy levels, cultural influences, and mood states.

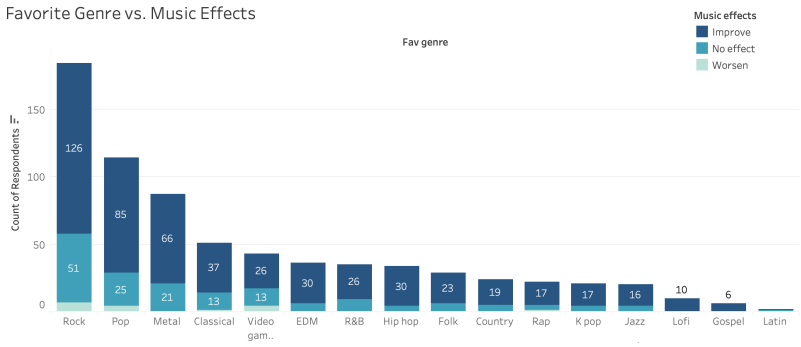
Explanatory work:



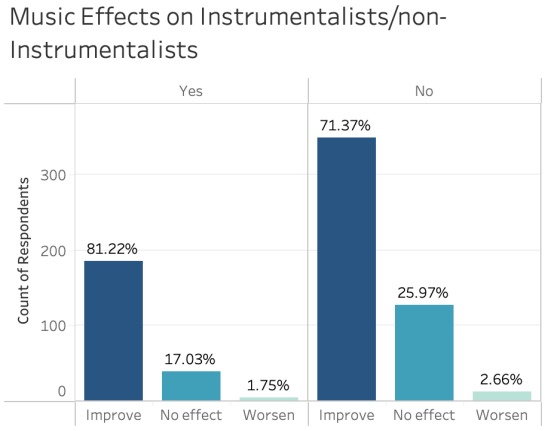
→ Preferred Streaming Service by Age Group: These results underscore Spotify's dominance while suggesting opportunities to engage non-streaming users and niche markets. The treemap visualization shows the preferred streaming services categorized by age groups. Spotify is the dominant choice across most age groups, especially among individuals under 20, where it accounts for 69.49% of preferences. Preferences diversify in the "Above 50" category, with noticeable representation for YouTube Music, Pandora, and non-streaming options.



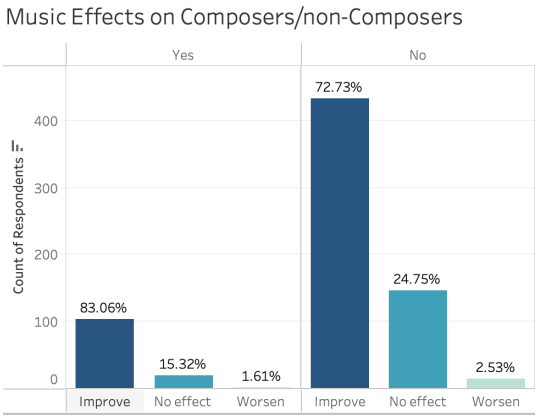
→ **Music Effects While Working/Not Working:** Music improves respondents' mental health conditions while working for 445 (78.36%) respondents, highlighting its strong positive impact in work settings. A smaller group of 111 (19.73%) reported no effect, while only 11 (1.92%) found it worsened their conditions. When not working, 90 (60.13%) respondents still found music beneficial, with 55 (35.95%) reporting no effect and just 6 (3.92%) noting a negative impact. Overall, these results confirm music's widespread role as a productivity enhancer and its positive influence on respondents' mental health conditions, with minimal negative perceptions in both contexts.



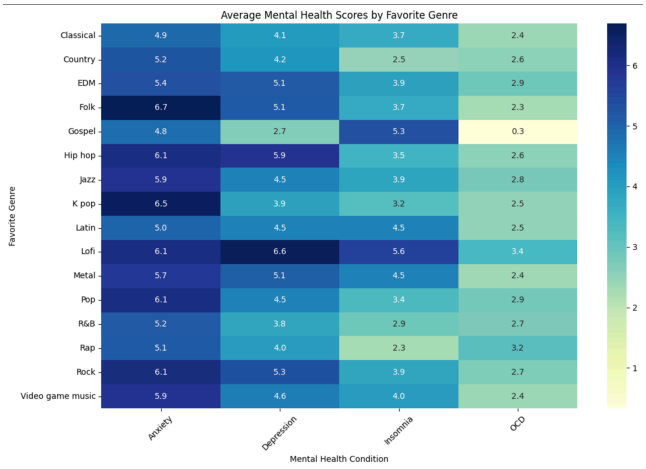
→ **Favorite Genre vs. Music Effects:** Rock is the most favored genre, with most respondents finding it improves respondents' mental health conditions, followed by Pop and Metal, which show similar trends. Genres like EDM, Hip Hop, and R&B also show positive effects but cater to smaller audiences. Niche genres such as Jazz, Gospel, and Latin demonstrate predominantly positive effects despite lower respondent counts. Overall, music generally improves respondents' mental health conditions across people's favorite genres, with minimal negative perceptions.



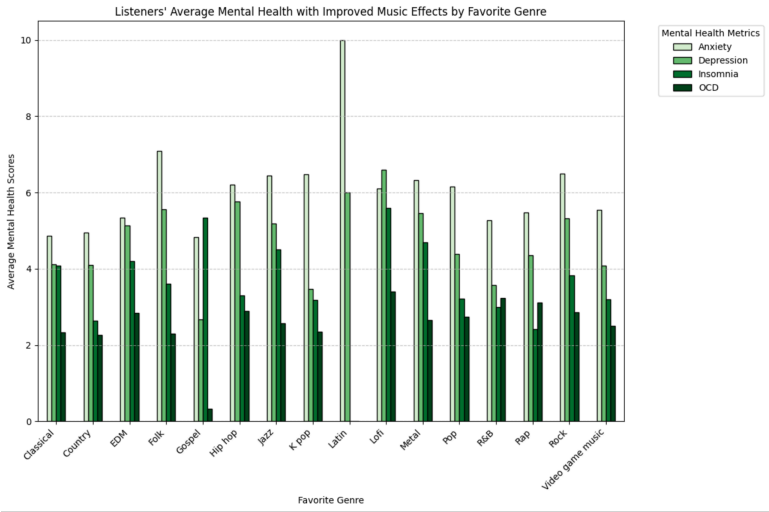
→ **Instrumentalist Music Effects:** Non-instrumentalists predominantly reported that music improves respondents' mental health conditions (349 respondents), with fewer stating no effect (127) or negative effects (13). Instrumentalists showed similar trends, with 186 noting improvement, 39 experiencing no effect, and only 4 reporting negative impacts. Music appears to benefit both groups, though non-instrumentalists had a higher proportion reporting positive effects. Overall, music is largely seen to positively impact respondents' mental health conditions, regardless of instrumentalist status.



→ **Composer Music Effects:** Among composers, 83.06% reported improvement, with only 15.32% seeing no effect and 1.61% experiencing worsening. Non-composers also showed a majority (72.73%) reporting improvement, but a higher percentage (24.75%) experienced no effect, and 2.53% reported worsening. This indicates that music has a more consistently positive impact on composers compared to non-composers.

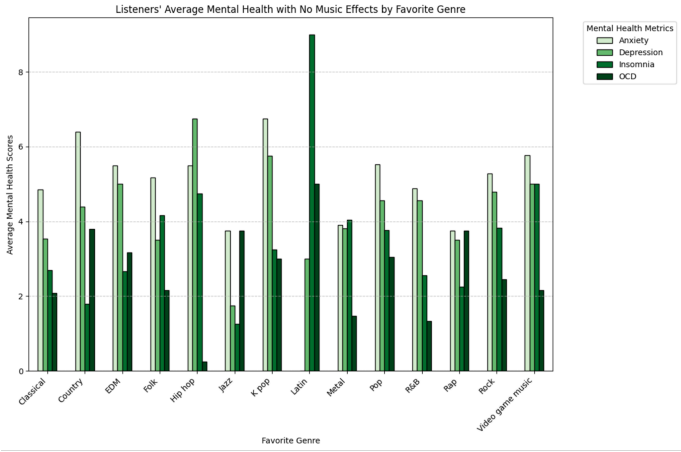


→ **Genre Preference and Mental Health Correlation:**
Lofi music is selected as the favorite genre of listeners with the highest average scores for anxiety, depression, and insomnia. This might indicate a potential link to reducing stress and sleep difficulties among its listeners. Energetic genres listeners like EDM and Metal show moderately high scores for anxiety and depression, while Gospel and Classical music listeners are linked to lower scores across mental health conditions. Overall, the data highlights how favorite music genres align with mental health conditions, potentially reflecting their role in emotional regulation and personal coping mechanisms.

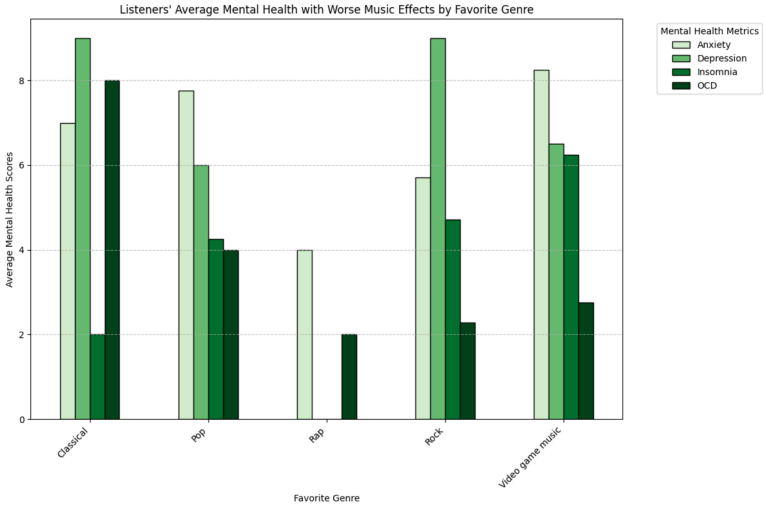


→ **Listeners' Average Mental Health with Improved Music Effects by Favorite Genre:** The bar chart highlights the average mental health scores (Anxiety, Depression, Insomnia, and OCD) among listeners who reported improved effects from music, grouped by their favorite genre. Latin music listeners show the highest average scores for anxiety and depression, but their reported improvement in mental health suggests that its listeners may face significant mental health challenges but find solace in the genre. Similarly, Lofi music listeners

exhibit elevated scores for anxiety, depression, insomnia, and OCD. Having these listeners report improved mental health conditions aligns with its reputation as a genre used for relaxation and coping with stress or sleep difficulties. On the other hand, Gospel and Classical genres are associated with the lowest average scores, having more Insomnia listeners in comparison to other genres. This indicates that these genres are favored by individuals who may have fewer mental health challenges and may seek out these genres for calmness and serenity. Overall, the data suggests that while certain genres like Gospel and Classical correlate with a generally lower mental health burden, others like Lofi and Latin resonate deeply with individuals facing greater challenges, underscoring music's dual role as an emotional expression and a coping tool. This emphasizes the personalized nature of music's impact on mental well-being.



→ Listeners' Average Mental Health with No Music Effects by Favorite Genre: This chart shows the average mental health scores of listeners who reported no effect from music, grouped by favorite genre. Latin music listeners who present Insomnia and OCD symptoms have reported that this genre did not affect their mental health. These listeners presented the highest scores across all metrics, indicating significant mental health challenges regardless of music's impact. Genres like Jazz and Classical are presented with the lowest average mental disorder scores, suggesting their listeners generally face fewer mental health issues and reported that music had no impact on their current mental health. Overall, the lack of perceived improvement from music does not appear to significantly alter the mental health profiles of listeners, with genre preferences likely reflecting emotional resonance rather than therapeutic effects.



→ Listeners' Average Mental Health with Worse Music Effects by Favorite Genre: This chart illustrates the average mental health scores (Anxiety, Depression, Insomnia, and OCD) for listeners whose favorite music genres negatively impacted their mental health, exacerbating symptoms. Rock and Video Game Music genres are notable for showing the highest average scores across multiple mental health metrics, including anxiety and depression. Interestingly,

Classical is associated with heightened OCD scores, while Rock shows significant levels of depression among its listeners. These results suggest that even favorite music genres can sometimes negatively impact listeners' mental health, potentially reflecting deeper emotional associations or context-dependent effects. For instance, genres like Rock and Classical, often linked with introspection or strong emotions, may amplify negative feelings in individuals prone to mental health challenges. Similarly, Video Game Music might evoke stress or perfectionist tendencies tied to gaming culture, contributing to higher disorder-related scores. These findings highlight the complexity of the relationship between music preferences and mental health, emphasizing that personal context, emotional states, and how individuals interact with their favorite genres play critical roles in determining whether music soothes or worsens their well-being.

Conclusion:

This project provides compelling insights into the intricate relationship between music preferences and mental health. The findings emphasize that music, beyond its role as entertainment, holds significant therapeutic potential to influence emotional regulation, alleviate symptoms of mental health conditions, and foster well-being. By highlighting the diverse ways music interacts with mental health, this analysis underscores the importance of personalized approaches in Music Therapy, paving the way for innovative, data-driven strategies to harness music's power for mental wellness. For future work, it would be valuable to analyze additional respondent data to track improvements in mental health scores over time, providing insights into the long-term effects of Music Therapy.

Citation:

Granot, Roni. “Music, Pleasure, and Social Affiliation: 9 : Hormones and Neurotransm.” *Taylor & Francis*, Taylor & Francis, 26 June 2017, www.taylorfrancis.com/chapters/edit/10.4324/9781315194738-9/music-pleasure-social-affiliation-roni-granot.

Eerola, Tuomas, et al. “Being moved by listening to unfamiliar sad music induces reward‐related hormonal changes in empathic listeners.” Annals of the New York Academy of Sciences, vol. 1502, no. 1, 17 July 2021, pp. 121–131, https://doi.org/10.1111/nyas.14660.

Link to the dataset: https://www.kaggle.com/datasets/catherinerasgaitis/mxmh-survey-results