Can Music Genre Predict Happiness of a Country?

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Abstract

Music not only serves as an important source in regulating moods but also transcends itself in impacting the happiness of individuals. However, it is not well documented that explores what specific music genre(s) are preferred in countries, whether specific preferences affect happiness, and if moderators such as Suicide, Homicide, Substance abuse and Alcohol abuse interact with genres to determine happiness. To examine this, data were collected from secondary sources from Our World in Data repository and World Happiness Report and Google trends. It was found that the preference for music genres did not contribute to the happiness of any country. However, music genres such as Rap & RnB predicted Homicide, and EDM was associated with Substance abuse. At the same time, genres did not qualify significantly for explaining the variance observed in other moderating variables such as Suicide, Alcohol abuse and Homicide. Regression analysis revealed that happiness increased with lesser Homicide rates and higher Substance abuse.

1. Introduction

Happiness as a societal metric has received growing attention in the recent decade. Numerous studies have explored happiness and its determinants using data-driven sciences (Curini Iacus, & Canova, 2015). Social networking sites such as Twitter and Facebook are potential contributors, as well as Google Trends have provided a cumulative advantage to researchers to explore these determinants effectively. These studies mostly focused on developing happiness indices and their validation, examining trends of life satisfaction, real-time expressions of happiness tweets spanning states and demography (Mitchell, Frank, Harris, Dodds, & Danforth, 2013; Yang, Srinivasan, 2016).

Within the realm of data sciences, exploring the relation between music and happiness have got less attention. Music is a ubiquitous companion to people's everyday lives (Schäfer, Sedlmeier, Städtler & Huron, 2013). Qualitative studies carried out to find this link reveals that music has the potential to provide a route to wellbeing (Lamont, 2011; Schäfer, Smukalla, & Oelker, 2014). The results in these studies found that in addition to pleasure, both absorption and transcendence were commonly reported experiences in response to music listening.

In 2012, Caitlin Dempsey used the data available on Encyclopedia Metallum and CIA World Factbook to find the number of metal bands per capita. The results showed a clear interest of the Scandinavian countries in the genre. Interestingly, the United Nations has also been releasing the happiness indices of various countries annually, and Scandinavian nations have always dominated those rankings. This led us to ask the question whether there exists a relationship between genre-based listening habits of countries and their happiness indices.

In this study, we collect data on music genre and artist preference from Google Trends, happiness data from The World Happiness Report for the year 2016, and data of moderator variables from Our World in Data. Two of the moderator variables, Substance abuse was strongly linked with a preference for EDM (Electronic dance music), and preference for Rap and RnB was associated with Homicide. Consequently, happiness increased with lesser Homicide rates and increased Substance abuse.

2. Music and Happiness

It is a very well-known fact that music is one of the most cultural and popular leisure activities that individuals engage for affect regulation (Schäfer, Sedlmeier, Städtler & Huron, 2013). Juslin et al. (2008) using the experience sampling method estimated that the prevalence of music episodes (music-listening experiences in different environments) accounted for 37% among others, and in 64% of the music episodes respondents were significantly affected by the music. A recent study by Wang and Wong (2014) reported that music was one of the thirteen predictors strongly linked with happiness. Hence, there is undoubtedly a strong link between music and happiness.

The motivation to listen to music is to derive pleasure and emotions that in turn, shapes our emotional states (Juslin & Zentner, 2001; Thompson, 2011). Other uses of music cover a whole range of personal ways of dealing with emotional problems, relieving boredom, getting through difficult times, being trendy, relieving tension, creating an image, expressing feelings and emotions, pleasing friends, and reducing loneliness (North, Hargreaves, & O'Neill, 2000). Schäfer, Sedlmeier, Städtler and Huron (2013) suggest the 'Big Three' of music listening — self-awareness, social relatedness, and arousal and mood regulation. From a public health perspective, it can be said that music may already be providing health benefits to a significant

proportion of the population. It is comparatively of low cost to other countermeasures for stress, and one of the frequently used measures. It is also a very effective way to increase public health (Västfjäll, Juslin, & Hartig, 2012).

3. The Negative Side of Music

Literature suggests that despite fruitful engagements, frequent exposure to certain genres of music were also related to perpetuation of Homicide, Suicide, Alcohol and Substance abuse (Chen, Miller, Grube, & Waiters, 2006; Diamond, Bermudez, & Schensul, 2006; Wass, Raup, Cerullo, Martel, Mingione, & Sperring, 1989). Music genres portray world views or themes, and individuals identify themselves mostly with the lyrics of the songs. For instance, in heavy metal music, these themes pertain to depression, social isolation, loneliness, hopelessness, and failed personal relationships (Stack, 1998). It is believed that the propagation and trivialization of such themes depict that their utilization holds positive consequences (Roberts, Henriksen, & Christenson, 1999). A quantitative review by Stack, Lester, and Rosenberg (2012) indicated that fanship of lyrics of songs were significant determinants of suicidal behavior among youths. Similarly, preference for sad music was related to higher psychoticism indicating a higher risk for suicide. Individuals who preferred opera and classical music or RnB and pop had lower scores on psychoticism (Till, Tran, Voracek & Niederkrotenthaler, 2016).

In light of the above review, we observed that the extant literature on music and happiness shows how both are inextricably linked. In addition to that, specific choices of music genres also play a very vital role in the development of behavioral tendencies of an individual, positive or negative. However, the focus of these studies was narrowly concentrated on a micro-level. At a macro-level, therefore, this study intends to examine the link between happiness and listening habits of countries with special reference to music genres. Moderator variables such as Homicide, Suicide, Substance abuse, and Alcohol abuse were also considered to understand the relation between happiness and preference for specific music genres. The data were gathered from secondary sources available in the public domain.

4. Data Sources

The music genre preference and artist was collected from Google Trends. Happiness data were taken from The World Happiness Report, which comprised of the happiness index of 156 countries. The happiness indices of 156 countries were taken from the 2016 report, which, according to the report, was calculated by averaging the values between the years 2013-2015. Our world in data also acted as a rich repository for the data collected for the moderator variables in our study.

5. Data and Methodology

According to statistics revealed by top Apple Music (and former Universal Music Group) executive Jimmy Iovine during an interview at Vanity Fair's New Establishment Summit in San Francisco, YouTube accounts for 40% of the overall music listening. Apart from that, Spotify and other streaming services are unavailable in most parts of the world. The number of searches for a particular artist on YouTube from a particular country is a fair approximation in terms of the popularity of the artist in the country.

Data were collected from trends.google.com website isolating the YouTube searches for popular artists from 8 main genres— pop, classical, country, EDM, jazz, metal, rap & RnB and rock (see Table 1). They were selected by studying the overall sales, billboard rankings, and public opinion across eighteen countries ("The World's Favorite Music Genres," 2018). The search data from Google was stored in the trends repository, and it was adjusted to a relative scale. According to the website, the search results were proportionate to the time and location of a query by the following process:

- a) Each data point was divided by the total searches of the geography and time range it represents to compare relative popularity. Otherwise, places with the most search volume would always be ranked highest.
- b) The resulting numbers were then scaled on a range of 0 to 100 based on a topic's proportion to all searches on all topics.

- c) Different regions that showed the same search interest for a term don't always have the same total search volumes.

For the same reason, a metric had to be developed to make the results indicative of the absolute searches of that particular artist. A reference search ‘music’ was taken for every country individually for the time frame of 1st January 2013 to 31st December 2015 and the indicative score for each artist was adjusted with respect to the search term ‘music’ as the general trend was that ‘music’ was searched more than any other artist. The results were normalized using the following equation:

$$Score = \frac{artist - music}{music}$$

Where ‘artist’ is the average search result for that particular artist and ‘music’ is the average search result for the word music. The score was expected to be observed in between -1 to 0 for every artist. If any artist scored more than 0, it implied that the artist was searched more than the word ‘music’. For our simplicity, we corrected the score to 0. Apart from that, many artists scored a -1 which implied that the artist was searched very little with respect to the reference search term. Artists that had a score of -1 in more than 20 countries were also removed from our study. Similarly, countries with a score of -1 for more than 20 artists were also removed and were left out of our studies. After manually correcting for all the exceptions we normalized the score for it to lie between 0 and 1. The results obtained gave us an approximate idea of the music listening habits of the country as the artists were then classified on their genres and the average value of the score for each genre was calculated. The results were plotted on a map using Tableau (Public 2018.1) as can be seen in Fig 1.

The data regarding the moderator variables, (Suicide, Homicide, Alcohol abuse, Substance abuse) from each country were classified into five groups (very high, high, moderate, low, and very low) based on the extent to which the moderator variables were prevalent within the country. After the grouping was done, stepwise discriminant analysis Wilks’ lambda test was used to identify the impact of each variable in terms of the final result. A value of zero for the statistic means that there isn’t any variance not explained by the independent variable. In other words, the closer to zero the statistic is, the more the variable in question contributes to the model. A code in python was written to compute the value of Wilks’ lambda statistic.

Furthermore, to estimate whether moderating variables predicted happiness, a linear regression model was used in IBM SPSS Statistics 20. Firstly, however, the outliers were manually detected and removed from the model to improve the overall coefficient of determination.

6. Results

Table 1. Region wise music consumption.

Countries/Regions	%							
	Cl	Co	ED	Ja	Me	Po	R& R	Ro
Africa	6.12	4.67	7.75	4.56	6.11	9.25	7.53	8.96
Asia (ex. Near east)	8.86	7.22	18.25	6.37	10.86	18	18.9	13.08
Eastern Europe	11.31	9.14	15.44	8.8	9.51	17.49	14.01	14.36
Eurasian	4.88	3.86	8.85	3.16	3.32	9.83	7.3	6.87
Latin Am & Car	46.27	57.7	14.21	59.47	45.34	7.38	20.72	25.29
Middle east	6.37	4.32	10.95	4.02	7.11	11.6	9.68	10.69
Northern America	1.42	0.39	2.33	0.95	1.44	2.43	1.48	1.96
Oceania	1.43	0.83	2.29	0.91	1.45	2.34	1.64	2.1
Western Europe	13.34	11.87	19.93	11.76	14.87	21.68	18.73	16.7

*Notes:** Latin American & Caribbean, Cl = Classical, Co = Country, ED = EDM, Ja = Jazz, Me= Metal, Po = Pop, R&R = Rap & RnB, Ro = Rock.

Fig 1 Classical

Fig 2 Country

Fig 3 EDM

Fig 4 Jazz

Fig 5 Metal

Fig 6 Pop

Fig 7 Rap & RnB

Fig 8 Rock

The results suggest that Latin American and Caribbean countries account for the highest consumption for all the genres of music. It was widely observed that Classical music, Country music, Jazz and Metal were predominant with a cumulative percentage of 46.27, 57.7, 59.47, and 45.34 respectively. Other music genres that had a fair share were Rap and RnB (20.47), and Rock (25.49). Furthermore, Western Europe (19.93) and Asia (ex, near east) (18.25) were relatively found as avid consumers of Electronic dance music. Pop music, however, was popular in Western Europe (21.68).

6.1 Moderators and their Relation with Music Genres

A stepwise discriminant analysis was used to estimate the impact of each genre on the moderator variable. In the Stepwise feature we generated the Wilks' lambda value which gives us an insight into how well a genre predicts the moderator variable. Wilks' lambda values vary from 0 to 1 and the lower the Wilks' lambda value, the better the genre is at prediction. In every step, we add a genre to decrease the Wilks' lambda value from the previous step and using this we can rank the genres on the basis of their ability to predict the moderator variable. In addition to that the value of variance, for each function offers a better understanding of the impact of each function on the moderator variable. The most significant 3 genres were only taken into the study.

From the given tables (Table 2 to 5) it is observed that genre based classification can give us a good insight into Homicide and Substance abuse as these individual genres stand out in predicting the same. Table 3 shows that discriminating power of the first function (Rap & RnB),

which accounted for approximately 89% of the variance explained by the discriminant function model for Homicide. Similarly, for Substance abuse, EDM accounted for a strong 51% variance in the discriminate function model. This shows the existence of some correlation between the genres and the moderator variables.

Table 2. Stepwise discriminant analysis of music genres predicting Suicide.

	Wilks' lambda
Po	0.88366512
Po Co	0.77514351
Po Co Me	0.68370139

Table 3. Stepwise discriminant analysis of music genres predicting Homicide.

	Wilks' lambda
R& R	0.61295027
R& R Co	0.54819567
R& R Co Cl	0.52208163

Table 4. Stepwise discriminant analysis of music genres predicting Substance abuse.

	Wilks' lambda
ED	0.43990413

ED	Cl		0.33719292
ED	Cl	Co	0.29012313

Table 5. Stepwise discriminant analysis of music genres predicting Alcohol abuse.

	Wilks' lambda
R& R	0.81824133
R& R Ja	0.75299651
R& R Ja Po	0.68453568

To check the ability of the genres to predict the Homicide Rates and the Substance abuse, a Catboost Classifier model was coded using python and confusion matrix for the 5 grouping variables were separately generated. Table 6 and 7 show that genres can act as a good predictor for the same.

Table 6. Confusion Matrix for Homicide Rates

		Actual Values									
		Very Low		Low		Moderate		High		Very High	
Predicted	Values	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
		79	3	78	0	79	0	76	0	81	0
		0	17	1	20	0	20	2	21	0	18

Table 7. Confusion Matrix for Suicide Rates

		Actual Values									
		Very Low		Low		Moderate		High		Very High	
Predicted	Values	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
		79	3	78	0	79	0	76	0	81	0
		0	17	1	20	0	20	2	21	0	18

		FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
Predicted	FALSE	79	1	80	0	79	1	77	1	81	1
Values	TRUE	1	19	1	19	1	19	1	21	0	18

6.2 Moderators and happiness index

A simple linear regression was calculated to predict happiness based on Homicide rates. A significant regression equation was found ($F(1, 47) = 52.914, p < .001$), with an R^2 of .53. The model predicted that happiness was equal to $.041 + -.036$ (Homicide rates). It meant that the happiness of countries decreased -.036 for each Homicide case. The lesser Homicide rates in the countries, the higher the happiness of these countries. Furthermore, Substance abuse significantly predicted higher happiness ($F(1, 56) = 63.927, p < .001, R^2 = .533$). The higher is the substance abuse, the greater is the happiness, .15 of the countries.

7. Discussion and Conclusion

The present study aimed at exploring the role of music genres in contributing to the happiness of a country. We also took moderators such as Suicide, Homicide, Alcohol abuse, and Substance abuse to examine the relationship between music genres and the happiness index of countries. In addition to that, we also tapped genre-wise distribution in terms of their popularity in the countries.

In the region-wise distribution of each genre, a common trend was seen that the Latin American countries were heavy consumers of music in general and had a considerable share of the pie in almost every genre except Pop. Western Europe was one of the leading consumers of Pop & EDM music. The distribution for the popular genres like pop, EDM and Rap & RnB was more uniform throughout the globe while unconventional genres such as Metal, Jazz, Country and Classical, have uneven distribution and predominantly found in Latin American regions.

Furthermore, the genre-wise music distribution gave a fair estimate of the entire moderator variable except for alcohol abuse and suicide. The Wilks' lambda values for all the

genres for suicide and alcohol abuse corresponded relatively high values implying that the genre-wise distribution failed to act as a good estimator for the prediction of the same.

Rap & RnB proved to be a good estimator for the Homicide rate in a nation. Since Rap originated from the underground hip hop movement in the 1970s' and was a medium of expression for the Latin American and African American community who were written off as a marginalized group. The form of music, as seen by the community was a form of expression and a form of confession of their livelihood in their troubled neighborhood due to marginalization and other issues, the music usually discussed the murders and around them. This is a strong lyrical theme of the original "Ghetto rap" and also the infamous "Gangsta Rap".

EDM was a significant estimator for substance abuse. The results are supported by recent studies where they found that participants who listened to electronic dance music reported 2.5 % higher uses of illicit drugs than other genres. These drugs cause euphoria and mental stimulation, but at the same time, cause adverse effects (Ridpath, 2014). Ethnographic work lends evidence that drug use in the rave and EDM scenes often has a positive, stabilizing function for participants (Hitzler 2002; Moore and Miles, 2004).

Another significant finding of our study was that an increase in Substance abuse positively affects happiness. It was reported by Bergsma and Veenhoven (2011) that happiness was highest for people indulging in Substance abuse as compared to other disorders in the Netherlands. It might be that most people abusing substances like alcohol are young and this behavior is specific to a particular phase of early adulthood, where one is under the influence of alcohol as a result of a pleasant event (De Graaf et al. 2002). Meanwhile, lesser Homicide rates lead to high happiness. It was found in studies that higher satisfaction of life among adolescents was strongly linked with lower violence (MacDonald, Piquero, Valois, & Zullig, 2005; Medina & Tamayo, 2012). People lose their sense of control over their lives due to an increase in vulnerability to crime, and subsequently, their subjective happiness deteriorates (Adams & Serpe, 2000).

To summarize, as discussed in the earlier forum that music as a part and parcel of society can affect us in many ways. In one way it can lead to an increase in happiness and as well as its opposite. Music acts as a simple and cost effective route towards happiness that has the potential

to create lasting positive emotions (Lamont, 2011). Furthermore, from our findings we could draw that certain genres of music for instance, Rap & RnB and EDM lead to serious consequences. One possible explanation might be that consumers of music internalize the lyrics, and it escalates in the manifestation of violence and other gruesome activities.

This study is a step in a new direction as not much work has been done in assessing the impacts of genres in the various factors determining the happiness index. However, the work has been done on secondary data, and the hypothesis hasn't been tested thus far on a micro-scale. Moreover, we have only considered the ten most famous artists of each genre to get an approximate idea of the listening habit of the nations. The regional artists of each country have been excluded from the study and may have a significant impact on the overall genre score that is assigned to each country.

Future studies could focus on the impact of genres on the individual in accordance to their consumption. When an individual listens to music, it is not confined by a single genre. A person usually consumes a mix of genres and thus the happiness quotient depends on the extent to which it is consumed. In addition to that, genre based listening as a consequent or a determinant of happiness could also be studied. It is also still unclear about the genre preferences based on socio and economic indicators of countries as most of these studies have concentrated only on the personality and genre preferences.

8. References

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