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Music Deserts: How Social Inequality Affects Accessibility to Music Resources Important to Actively Participating in Music

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Abstract: Recent findings in the cognitive neuroscience of music suggest that active participation in music has benefits such as increasing reading comprehension, soothing babies, and helping increase synapses which are beneficial in differentiating music and speech from noise. However, these benefits are not accessible to all communities. Department of Education (2012) research reveals that elementary and secondary schools with a higher percentage of poverty have fewer music teachers, music courses, dedicated rooms for music, and proper music equipment. In this research I examine how social inequality in the US correlated with a lack of music instrument stores (MIS). These areas can be thought of as Music Deserts. To examine if social inequality affects access to MIS, I identified Music Deserts by counting the number of MIS registered with US Census data within zip codes of New York City and Chicago. I also utilized US Census data to identify characteristics of each zip code (e.g. population size and median household income). After importing data into Statistic Package for Social Scientists (SPSS), I analyzed correlations between music stores per square mile and factors such as education, income, and race. I also ran a linear regression that showed Music Deserts exist and can be associated with percentage of the population with a bachelor's degree or higher. Music Deserts are important to recognize because they identify areas where a lack of resources deprive lower income communities from benefits associated with active music participation.

Keywords: *music education, music deserts, social stratification*

In seventh grade I attended a low-income school. During my second semester I signed up for a music class. Within the school it was known that if you took music, you could make an easy A. This was because the school had no musical instruments besides a few snare drums and timpani. Additionally, there was no music teacher. The position was occupied by multiple substitute teachers who had the students just sit in class during the period. After about a month of being in music, my father moved our family and I started attending a middle class school. It was then that I saw musical instruments like the saxophone, trumpet, clarinet, tuba and flute for the first time. Not only did the school have instruments for the students, but it also had a very dedicated music teacher. His name was Richard Matta and I still talk to him this day. That's how important music became to me.

After moving to a better school, I got heavily involved in music. Music became my life and is still apart of who I am today. Transitioning

from a low-income school that did not have the resources to a school that did taught me two things about the world 1) how important music can be and 2) that not everybody has the same accessibility to resources. As a result, the research I have conduct on Music Deserts is to bring awareness to how social inequality has made the accessibility to actively participate in music unequal. Through this research I strive to be an advocate and a voice for the people in low-income areas that are experiencing how social stratification affects them in their day-to-day lives in regards to active music participation.

What Music Deserts Are Not

The term Music Deserts does not mean that people within low-income areas do not participate in music. What my data suggest is that within Chicago and New York City, low-income areas have less access to musical resources. I acknowledge that low-income areas have and play music. My research was most interested in asking if these low-income areas have the

same accessibility to musical resources as people from a higher socioeconomic position. This emphasis in resources is similar to the USDA research done on Food Deserts. Food Deserts do not mean that people in low-income areas do not eat or that there is no food in these areas. The important implication of Food Desert research is that people in low-income areas have a lack of accessibility to fresh food and produce. In a similar way, people in Music Deserts also experience a lack of resources to actively participate in music and just like food; music can have benefits important for human development.

Music Deserts are significant and important to identify because they not only exclude lower income people from musical resources, but as a result they could also deprive them of associated benefits related to active music participation. This paper develops the concept of Music Deserts as well as outlines how they are significant on a cognitive level suggesting that a lack of resources has unintended cognitive consequences such as reduce reading comprehension.

LITERATURE REVIEW

The Benefits of Music

The neuroscience field is exploding with research exploring the neurological benefits of music. Within the year 2015, one scholarly journal, *Annals of The New York Academy of Science*, published their fifth edition of "The Neurosciences of Music." This addition had 34 new articles written by researchers from around the world, focusing on how the brain processes and is affected by music. As a result, this scholarly journal acts as catalogue of the scientific achievements and is "a comprehensive guide to understanding how music uniquely contributes to programs of cognitive stimulation and rehabilitation," (*The Neurosciences and Music V: Cognitive Stimulation and Rehabilitation*, 2015: viii) and highlights how "the field has come a long way from basic research to the addition of clinical research and applied studies," (*The Neurosciences and Music V: Cognitive Stimulation and Rehabilitation*, 2015, vol. viii). This emphasizes how the significant amount of

research done in the past is impacting the new research being done in the field today.

This abundance of recent scholarship has established many benefits associated with playing and listening to music. Among these, researchers have shown how active music participation can help children decipher words and language in noisy environments (Moreno & Besson, 2006; Strait & Kraus, 2011). This is because "[t]he auditory system has 'feedforward' neurons that transmit information about sound to the brain" as well as an abundant amount of "'feedback' neurons that carry information backwards from the brain to the ears," (Williamson, 2014, pg. 49). As a result, this 'feedforward', and 'feedback' highway "refines our everyday perception of sound – it tunes our ears." (Williamson, 2014, pg. 49). This research is significant because it highlights how flexible the brain can be once playing music is introduced to children, and shows how music can positively influence the way people perceive their surroundings providing clarity to noisy environments.

Music lessons have also been proven to increase reading proficiency in children (Anvari, Trainor, Woodside, & Levy, 2002) and just listening to music has been shown to reduce pain in children after major surgeries (Suresh, De Oliveira, & Suresh, 2015). Most importantly, active music participation has been shown to have *more* cognitive benefits in six month old infants regardless of socioeconomic status resulting in "less distress to limitations, less distress when confronted with novel stimuli, more smiling and laughter, and easier soothability compared to those in the passive classes," (Trainor et al., 2012, pg. 135). These are significant benefits that are provided to those who can afford the time and money to partake in active music participation. Research suggests that less privileged people do not participate in music at the same levels (Elpus & Abril, 2011).

Music Education and Social Inequality

Research done by the U.S Department of Education has discovered that elementary schools that were composed of the highest concentration

of poverty had fewer “dedicated rooms with special equipment,” (U.S. Department of Education, 2012, pg. 15) than schools with less poverty. One also sees this trend in secondary education with lower income schools having less music teachers, music courses, rooms dedicated to music, and special music equipment (U.S. Department of Education 2012, pg. 22). This means that students who attend a low-income school will have less resources and time to actively participate in music.

Attending a low-income school is not the only factor that affects active participation in music. A two year longitudinal study of high school students involved in music ($n = 621, 895$) showed that "Hispanic students were significantly underrepresented among music students," (Elpus & Abril, 2011, pg. 135) as well as males, and students of lower socioeconomic status (Elpus & Abril, 2011, pgs. 134-135). In addition, "Students scoring in the highest quartile on math or reading standardized tests were significantly overrepresented among music students, while those students scoring in the lowest quartile in math scores and the two lowest quartiles in reading scores were significantly underrepresented," (Elpus & Abril, 2011, pgs. 134-137). By synthesizing this information, we can start to see how active music participation tends to be carried out by the very privileged within US society. As a result, the benefits that can be extracted by actively participating in music also tend to be experienced by people who hold more privilege. Consequently, the primary research question that manifests itself is not if people of low-socioeconomic standing participate in music but rather, is their lack of participation a result of geographical positioning, due to living in a Music Deserts. The secondary question then is if we can identify Music Deserts by variables associated with social inequality such as income, race, and education.

METHODS

I analyzed zip code data from the US Census for the cities of Chicago and New York City to identify the number of music instrument stores

(MIS) registered with the North American Industrial Classification System (NAICS) for each zip code. I focused on musical instrument stores because I wanted to identify an institution that facilitated musical resources that allowed and maintained active participation in music. I choose New York City and Chicago because recent research in social stratification has shown that since the 1970's, it is within the major US cities that social inequality has increased to the highest level (Bischoff & Reardon, 2015). US census data was utilized because it provided insight into each zip code specifying population size, percentage of the population with a bachelor's degree or higher, median household income, square miles of zip codes, and race.

To identify NAICS within zip codes, I utilized the online mapping program SimplyMaps. MIS was identified and recorded in SPSS along with the zip codes they were a part of. To standardize the differences in zip code square mileage, MIS per one square mile was calculated (zip code square mile divided by music store in that zip code). A correlation test was run in SPSS with the following variables: MIS per square miles, income, population, percentage of the population with a bachelor's degree or higher, and percentage of the population that is white alone, percentage of the population with a high school degree or higher, percentage of the population that is Latino (any race), percentage of the population that is Black or African American alone, and percentage of the population that is Asian alone. Income was divided into five quintals using the national median household income. The median household income of the two cities (\$41,749) is within the range of national median house hold income (\$41,187- \$68,212). The frequency of these quintals are available in Table 1.

Linear regressions were run with the following variables: MIS per square miles (dependent variable) and population, percentage of the population with a bachelor's degree or higher, percentage of the population that is white alone, percentage of the population that is Latino, percentage of the population that is Black or African American alone, and percentage of the

population that is Asian alone. This is because correlation tests showed these variables to have some sort of significant correlation.

Table 1.

Median house hold income in quintals			
		Frequency	Percent
1st	\$0- \$21,432	2	.8
2nd	\$21,433- \$41,186	60	25.1
3rd	\$41,187- 68,212	89	37.6
4th	\$68,213- \$122,262	77	3.8
5th	\$112, 263- \$245,556	9	

I input a total of 242 zip codes into SPSS between New York City and Chicago. Three of those zip codes had zero population and were then taken out of data analysis making the zip code count 239. Out of these 239 zip codes two of them had \$0 total for average household income. These two data points were kept because they did have data in regards to variables such as: percentage of the population with a bachelor’s degree or higher, and percentage of the population that is white alone, percentage of the population with a high school degree or higher, percentage of the population that is Latino, percentage of the population that is Black or African American alone, percentage of the population that is Asian alone, and population.

Out of the data set, there was 181 zip codes for New York City (75.7 %) and 58 for Chicago (24.3 %). Median for the percent of the population with a bachelor’s degree or higher was 32.1.

RESULTS

Data suggest correlation between MIS per square miles and income, and the percentage of the population with a bachelor’s degree or higher. Correlation tests showed that there was a high significance between MIS per square miles and income, population, percent of population with a BA or higher, percentage of the population that is White alone, percentage of the population that is Latino, percentage of the population that is Black or African American alone, and percentage of the population that is Asian alone (Table 2).

Table 2.

Correlation: MIS per square miles		
	Pearsons	Sig. (2 tailed)
Income	.227**	.000
Percentage of the population with High School or higher	.234**	.000
Percentage of the population with Bachelor's degree or higher	.403**	.000
Percentage of the population White Alone	.238**	.000
Percentage of the population Latino (any race)	-.121	.061
Percentage of the population Black or African alone	-.200**	.002
Percentage of the population Asian alone	.111	.087
Population	-.044	.494

Note: **= sig. at.001

A linear regression was run to better understand the relationship between significant variables such as income, percentage of the population with high school degree or higher, percentage of the population with Bachelor's degree or higher, percentage of the population that is White alone, and percentage of the population that is Black or African American alone on the dependent variable of MIS per square mile. Linear regression showed that when controlling for education and race, education maintains ($p=.000$) significance while income and race become insignificant (Table 3).

Table 3.

Linear Regression: MIS					
	B	Std. Error	Beta	t	Sig.
Income	-.311	.354	-.095	-.878	.381
Percentage of the population with high school or higher	-.046	.041	-.175	-1.127	.261
Percentage of the population with a Bachelor's degree or higher	.083	.014	.659	5.751	.000
Percentage of the population White alone	-.007	.014	-.070	-.493	.622
Percentage of the population Black or African	-.003	.012	-.026	-.234	.815

DISCUSSION

One major limitation of this research is that it does not allow us to establish causality because we cannot satisfy the conditions in time order. While we know that Music Deserts are predicted by higher education, we do not know which one caused the other. This has huge implications because it means that either 1) The lack of musical resources can decrease the percentage of the population with a bachelor's degree or higher, or 2) that by implementing more musical resource and music programs, that we can increase higher education in a low-income area. Programs like the Harmony Project have been able to increase higher education obtainment among low-income students. The Harmony Project strives to "provide students from low SES backgrounds with music opportunities that enrich the students and their communities"(Kraus et al., 2014, pg. 2). In a two-year study by Nina Kraus, it was found that students within the program "reinforce literacy skills, enhance the perception of speech in background noise, and strengthen the neural encoding of speech sounds in children from low SES backgrounds"(Kraus et al., 2014, pg. 2).

Most importantly, "Between 2010 and 2014, 93% of Harmony Project alumni enrolled in post-secondary education, versus 67.6% of students graduating from public schools within Los Angeles County," (Kraus et al., 2014, pg. 2)

The Harmony Project is not the only organization that has had success in introducing music to low-income areas. The President's Committee on the Arts and Humanities has also implemented a two-year program (called Turnaround art schools) studying the effects of strong arts programs on specific schools. The evaluation found that the Turnaround art schools saw an increase in both math and reading scores (Presidents Committee on the Arts and Humanities, 2015). Though this program did not only focus on music, the underlining theme is that arts education can increase student achievement.

However, the correlation between higher education and Music Deserts could mean that the absence of music resources results in a decrease

of the population with a bachelor's degree of higher. Since the cognitive neuroscience of music is showing how active music participation has many benefits, it is not absurd to then start asking how Music Deserts are affected by budget cuts to arts programs in low-income areas. Essentially, Music Deserts could be a result of the defunding of music programs, which has in turn decreased higher education obtainment. It is hard to say which scenario is correct due to the limitations of linear regression but the important part of this research is that we know that they are correlated.

Ideally, further research would look at informal music resources and musicians, such as the bucket players in Chicago. This is important because the ways in which music is socially constructed represents power structures and those who are not considered traditional musicians reflect how the negated norms of music and power are sustained (Martin, 1995). Since Music Deserts correlate with social inequality, it would be important to understand how the social construct of music manifests itself within Music Deserts. Additionally, looking at other variables such as access to transportation would provide a concise outline of Music Deserts. Further research would also benefit from analyzing additional cities and rural areas with GIS mapping.

Conclusion

In describing Pierre Bourdieu, Tia DeNora (a researcher in the sociology of music) once wrote, "culture represents a struggle over the definition of social reality and therefore the issue of the meaning of objects is also an issue of who defines or appropriates them, where, when, how and for what purpose," (DeNora, 1986, pg. 93). Music Desert research is important because it identifies an inequality that low-income people experience. When I was child there was no word to identify the inequality I encountered. Though Music Desert research has a long way to go, there is at least a word that people can use to identify the inequality they experience in regards to music accessibility.

It appears at this point that my research is the first to show that Music Deserts do exist and that

higher education is the primary predictor of where we are likely to find them. Music Desert research is important because it shows there is a correlation to the accessibility to music resources used to actively participate in music and higher education. This has huge implications for social scientists and policy makers. By showing the relationship between higher education and Music Deserts, it is time to rethink the importance of music programs within our education system. Perhaps policy makers should focus on implementing STEAM (Science, Technology, Engineering, Art, Mathematics) instead of cutting arts programs. Where Music Desert research goes next will be up to future researchers and music educators who strive to counter such inequalities.

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