

December 2019

Physiological Responses to Music

Shauna Cox
Cleveland State University

Follow this and additional works at: <https://engagedscholarship.csuohio.edu/tdr>



Part of the [Arts and Humanities Commons](#), and the [Medicine and Health Sciences Commons](#)

How does access to this work benefit you? Let us know!

Recommended Citation

Cox, Shauna. "Physiological Responses to Music." *The Downtown Review*. Vol. 6. Iss. 1 (2019) .
Available at: <https://engagedscholarship.csuohio.edu/tdr/vol6/iss1/2>

This Article is brought to you for free and open access by the Student Scholarship at EngagedScholarship@CSU. It has been accepted for inclusion in The Downtown Review by an authorized editor of EngagedScholarship@CSU. For more information, please contact library.es@csuohio.edu.

An interesting and emerging area of research is people's physiological responses to music, and if these responses can provide an effective role for music therapy in the medical field. There are numerous ways that people react physically to music, whether it be consciously (like dancing, swaying, etc.) or unconsciously. These unconscious, automatic responses in the body could be as basic as heart rate or respiration, or as complex as biochemical reactions involving hormones and neurotransmitters. The measurement of these responses can indicate levels of emotion such as excitement or anxiety, or even levels of physical sensation, and therefore support the argument for music therapy in more than one way.

Contrasting Conclusions

Many studies conducted in the past century had the intention to prove or disprove that music has effects on these bodily responses. While some of these results were significant, others were not. Assuming that researchers find significant results in their various studies on physiological responses, they will generally come to one of two common conclusions to explain why they found what they did.

Automatic Responses

One possible conclusion is that when people's bodies respond to music (whether in terms of heart rate, respiration rate, blood pressure, skin conductance, a biochemical reaction, or something else), it is because some factor of the music directly influences the areas of the brain that control those responses. This theory is more concerning the intricacies of how the brain works and the logic surrounding it. It supports the idea that people have physiological responses to music, even when they are not consciously affected by it.

In a study published in *The American Journal of Psychology* by Ellis and Brighthouse in 1952, they measured the respiration rate and heart rate of a group of college students upon exposure to music. The students listened to three classical pieces that were chosen by the researchers and had no known emotional ties to any of the students. While heart rate recordings provided insignificant data, respiration rate increased significantly, both during and after the music was playing. The researchers note that even though the changes were significant, they were not consistent among participants, meaning it would be difficult to predict how any particular person would respond to the same music.

In a similarly conducted but more recent study by Landreth and Landreth in 1974, significant increases and decreases were found, but this time in heart rate rather than respiration rate. These researchers concluded that the differences in heart rate were actually related to "the presence or absence of learning," meaning that they believe the physiological changes did not occur from listening to music

alone, but from how actively people's brains were working in order to understand what they were hearing.

While these two studies may have gotten different results, they support the same conclusion that the recorded physiological changes were influenced by the brain's response to the composition of the music itself rather than any emotions that may have been associated with it.

Emotional Responses

The other common conclusion is that people's bodily responses fluctuate and are affected by music as a result of an emotional response that they are having to the selected music or the situation surrounding it. It supports the idea that bodily responses to music differ so much among different people because no two people can have the exact same emotional response to a selection of music, and it explains why some people have much stronger reactions to music than others.

In a study by Peretti and Swenson in 1974 on the effects of music on anxiety, level of anxiety was measured by galvanic skin response. Based on the collected data, the researchers concluded that "Music may have acted to coordinate the persons' emotional and rational states and decrease conflicts between the two, [and] was a vehicle for emotional release and acted as an anxiety-reducing agent". The galvanic skin responses also varied significantly between participants of different musical backgrounds and genders. They accredited this difference to the emotional responses that would differ based on comfort with the musical experience/process and femininity.

Then in 1978, a study was done by Coppock that measured galvanic skin response and respiration rate. He found significant results and related these results to how the participants felt about the music. This was partially whether they enjoyed the piece or not, but also based on anxiety levels, which he suggested were measured by the amount of galvanic skin response. He proposed that if the music played or performed was above a person's preferred complexity level (and therefore comfort and enjoyment levels as well), the person would respond less significantly, both consciously and autonomically, no matter how emotionally moving the piece may be to others.

Coinciding Factors

Regardless of which theory is being considered, one place where they overlap is the idea that people's bodily responses will differ depending on what genre of music is used, and that the elements of music are likely the catalysts for many reactions. Both sides of the argument agree that this is not solely because of an emotional response, but could also be due to other personal factors that are not strictly emotional.

All of these studies have another thing in common as well—significant results. While this may seem obvious, it is important to note because it means that each of these studies supports the fact that music therapy can be useful in multiple aspects of the medical field. Whether it be the slowing or quickening of heart- or respiration rates or the increase or decrease of galvanic skin response, music therapy could be used to assist doctors and nurses with preparation of surgeries and procedures, patients with cardiovascular problems, or general anxiety reduction, to only name a few.

Criticisms

A 1977 review of literature by Dainow calls for more contact with foreign researchers, even though some of his reviewed studies did have significant results. He brings up the fact that American research is fairly removed from research done in other countries, and vice versa. He says this is because people often believe (incorrectly) that music is a universal language, and therefore think that music research is a field that does not need to be shared between different cultures, but it is more likely the opposite case. Due to the varying roles that music plays in different cultures, the same types of music may hold differing significance to people from diverse parts of the world. The responses evoked would therefore contrast due to these differences. More contact with foreign researchers available could make it possible to find more significant results or a more substantial answer as to which of the previous two conclusions is correct.

A criticism that is consistent through many of these studies is size of both time and number of subjects measured. Sample sizes tend to be small, some being as low as only twenty-two subjects. This can actually make it more difficult to get significant results. The time periods in which the physiological responses are measured were typically short as well. In some studies, the responses were measured before, during, and after music-listening; but, in others, the researchers got a baseline measurement, and then only recorded responses that occurred during music-listening, not considering any responses that may have happened after the event took place.

Researchers conducting more reliable studies, whether with increased sample sizes or longer study durations, would provide opportunities for accurate data to be found and be used to create a much more solid argument for the use of music therapy in a variety of populations.

Conclusion

While physiological responses to music are rarely consistent, they are significant in most studies at the very least, and seem to be more significant the more recent the studies are (likely due to growing access to reliable measuring methods and technologies). In hospital and medical settings, sometimes it is

important for patients to have low heart rates, respiration rates, or blood pressure (like in pre-surgical settings, for example), not to mention that lower anxiety levels let the body heal faster, which gets patients home sooner, cuts down on expenses, and opens more patient beds. The fact that there are significant results for so many physiological responses supports the idea that music therapy could be largely beneficial in this field.

While the results were not consistent, that's not necessarily a bad thing. It helps support the idea that a live, credentialed music therapist would be preferred over someone who is not a professional, or prerecorded music or other technology. Music therapists are people who have completed a degree from a school approved by the American Music Therapy Association, in which they have taken courses on music, psychology, biology and anatomy, and more. Since people have such varying responses to different types of music, it would be unfavorable to have an inexperienced or uneducated individual attempting to create the same results as a qualified professional who has received much higher and more relevant levels of training.

Even though current data is not yet precise enough to provide an exact formula or method as to how to create certain responses, someone who has been educated in the field would obviously still have more understanding and capability to create the desired outcomes than someone who is untrained. With more research, it will hopefully soon be possible to collect more accurate data that will give credentialed music therapists an even more apparent advantage in the medical field.

More recent and reliable research should still be done in this subject area, with more diverse groups of people and larger samples sizes and recording durations. But even the limited research we have access to now shows that if music is used in the right way by knowledgeable people, it can create positive and necessary physiological responses.

References

- Ballora, M., Pennycook, B., Ivanov, P., Glass, L., & Goldberger, A. (2004). Heart rate sonification: a new approach to medical diagnosis. *Leonardo*, 37(1), 41-46. <http://proxy.ulib.csuohio.edu:2087/stable/1577570>
- Coppock, H. (1978). Repetition effects depend on duration and are enhanced by continuation of interrupted music. *Journal of Research in Music Education*, 26(4), 436-444. <http://proxy.ulib.csuohio.edu:2087/stable/3690714>
- Dainow, E. (1977). Physical effects and motor responses to music. *Journal of Research in Music Education*, 25(3), 211-221. <http://proxy.ulib.csuohio.edu:2087/stable/3345305>
- Ellis, D., & Brighouse, G. (1952). Effects of music on respiration- and heart-rate. *The American Journal of Psychology*, 65(1), 39-47. doi:10.2307/1418826
- Flohr, J., Miller, D., & DeBeus, R. (2000). EEG studies with young children. *Music Educators Journal*, 87(2), 28-54. <http://proxy.ulib.csuohio.edu:2087/stable/3399645>
- Foster, E., & Gamble, E. A. McC. (1906). The effect of music on thoracic breathing. *The American Journal of Psychology*, 17(3), 406-414. doi:10.2307/1412253
- Hodges, D. A., & Sebald, D. C. (2011). *Music in the human experience: An introduction to music psychology*. New York, NY: Routledge.
- Landreth, J., & Landreth, H. (1974). Effects of music on physiological response. *Journal of Research in Music Education*, 22(1), 4-12. <http://proxy.ulib.csuohio.edu:2087/stable/3344613>
- Peretti, P., & Swenson, K. (1974). Effects of music on anxiety as determined by physiological skin responses. *Journal of Research in Music Education*, 22(4), 278-283. <http://proxy.ulib.csuohio.edu:2087/stable/3344765>
- Zimny, G., & Weidenfeller, E. (1963). Effects of music upon GSR and heart-rate. *The American Journal of Psychology*, 76(2), 311-314. doi:10.2307/1419170