AGPE THE ROYAL GONDWANA RESEARCH JOURNAL
OF HISTORY, SCIENCE, ECONOMIC, POLITICAL AND SOCIAL SCIENCE
ISSN (E): 2583:1348 | A Peer reviewed | Open Accsess & Indexed
Volume 03 | Issue 03| April 2022| *www.agpegondwanajournal.co.in* | Page No. 19-31

AN EMPIRICAL STUDY ON THE COGNITIVE IMPACTS OF MUSIC ACROSS DIFFERENT GENERATIONS OF INDIVIDUALS IN MITIGATING STRESS

Meyers K.*[1], Bhattacharjee P.[2], Khan M. A.[3], Yadav D.[4]

[1]**Mr. Kyle J. Meyers,** Asst. Professor, Dept. of Chemistry, St. Xavier's College (Autonomous), Mumbai
[2]**Ms, Propali Bhattacharjee,** Research Student, St. Xavier's College (Autonomous), Mumbai
[3]**Ms. Mahek Anmber Khan**, Research Student, St. Xavier's College (Autonomous), Mumbai
[4]**Mr. Devesh Yadav,** Research Student, St. Xavier's College (Autonomous), Mumbai

ABSTRACT:

The efficacy of music in therapeutically influencing human lifestyle can be broadly classified. Music is known to relieve stress and anxiety (Meyers et al., 2021). The influence of music in the cognitive regions of the brain and its ability to stimulate the body's reward centers is considered a powerful tool to enhance and flourish human life. What makes music different from other mediums of stress relief is that the music industry is backed by variety. Individuals have the freedom to choose from different genres and select what best suits their personality. All humans share this cross-culturally existing feature called 'music' which is customizable and universal by nature (CROSS, 2001). Data was collected from 100 healthy respondents. Results showed that 83% of the participants chose music as the main source of distraction during stressful conditions. Pop and hip-hop was found to be the most preferred music genre for people in the age group of 15-35 years whereas classical music genre was the most preferred choice for individuals above 35 years of age. Another important observation in this paper was that the majority of the respondents increase their duration of listening to music during stressful situations, thus showing the significance of music as a solitary source in overcoming stress. In this paper, we aim to gauge the role of stress and the influence of music in positively mediating anxiety and stress issues in common individuals across different generations.

Keywords: Music, genres, stress, psychoacoustics, adolescents.

Introduction:

"Music is the cheapest mind-altering drug. It boosts dopamine, lowers cortisol, and makes you feel great. Your brain is better at music." Owing to the recent empirical research connecting human behavior and music, it is no longer considered only as a form of entertainment but is also

CORRESPONDING AUTHOR:	RESEARCH ARTICLE
Mr. Kyle Meyers Assistant Professor, Departent of Chemestry St. Xavier's College(Autonomous), Mumbai, Maharashtra Email: kyle.meyers@xaviers.edu.in	

known to significantly influence human lifestyle physiologically and psychologically. Almost two decades ago musicologist Ian Cross defined music as temporally patterned human tasks, carried out at social and individual levels, that consist of generation and understanding of sound and have no instantaneous effect which is noted in his works Cross, (2001).

Individuals encode structural attributes of music such as pitch interval and pitch contour automatically, which is suggestive of the fact that the human mind has evolved to process musical signals and humans have found a companion in music for quite some time (Peretz, 2001). It became evident when 35,000 – year – old music instruments were found by Conard et al., (2009) that the human engagement with music has been an abiding one, and that music was an essential part of the human race earlier than first interpreted. The discovery of 35,000 – year – old music instruments by Conard et al., (2009) shed light on the fact that the human relation with music has been harmonious and it has been an integral part of the human lifestyle earlier than thought.

Stress often is a major issue affecting our lives. Anxiety and stress are widely known to be detrimental to human behavior. It is estimated that up to 75% of medical illnesses are directly associated with stress (Hughes et al., 1984). Thus, stress management and relief is a crucial subject of research and music proves to be a universally available and economical aide. It is therefore important to have a background knowledge about the multidimensional aspects of music with respect to the human mind and body. In this section of the paper, we shall explore the work of previous studies on how music can influence the physiological and psychological parameters of an individual and how personality traits are characterized by different music genres.

1. Effect of music on stress, anxiety, and mood

Several studies have suggested that it improves health outcomes and music therapy can lower cortisol levels in the body which is the primary stress hormone (KHALFA et al., 2003). The theory of music, mood, and movement asserts that the role of music in enhanced health outcomes is due to the psychological response of the altered mood which can also be studied in the works of Meyers et al., (2021). Music goes from the auditory cortex of the brain to the limbic system which brings out emotional and behavioral changes through association with the amygdala.

The Covid-19 situation has created problematic stressful situations and music is being sought by many as a source of relief and to bring calmness as it is an effective tool and more economical way to manage stress. Music can be an effective tool to intervene in depression levels in graduate students (Pan et al., 2021). Another important role of music suggests (Chang et al., 2015) is in reducing pregnancy-related stress in pregnant women as this provides a much more economical and cost-effective alternative with hardly any side effects. For patients undergoing surgery, a considerable amount of evidence supports the anxiolytic effects of music. Patients exposed to relaxing music experienced a lowering in physiological stress reactivity and subjective anxiety levels in various clinical fields (Knight & Rickard, 2001).

2. The physiological and cognitive aspects of music

Stress activates the hypothalamic-pituitary-adrenal axis to release cortisol which affects the sympathetic nervous system causing an increase in heart rate and blood pressure. Prolonged exposure to cortisol may cause serious health complications (Walcott, 1999). We emotionally react to music because it affects the limbic system which is the center of emotional feelings and sensations. The TLS with amygdala and hippocampus being the central structures, reacts strongly to vocal and musical expressions of emotion. Using several pathways and loops, emotional cues in voices and music might be conveyed to, exchanged with, and decoded by the TLS in the works by Frühholz et al., (2014).

The Limbic system is influenced by the psychological response of music and is affected by musical pitch and rhythm. It decreases cortisol levels and activates the reward pathways and serotonin levels and also increases the recovery rate of the autonomic nervous system when it is exposed to stressful conditions. The downregulation of the sympathetic nervous system and upregulation of the parasympathetic nervous system has been proposed as the most probable mechanism (Ebrahimi & Tan, 2018). Peaceful music reduces beta-endorphin, an opioid peptide neurotransmitter identified in the works of McKinney et al., (1997). Endorphin levels rise on listening to classical music whereas the levels go down by listening to upbeat or 'Techno-music'. Cortisol levels are higher for upbeat and stimulating music (Gerra et al., 1998) and lower for relaxing music (Yamamoto et al., 2007). This finding was aided by the explanation from Fancourt et al., (2014) that epinephrine and adrenocorticotropic hormone levels increase due to upbeat music.

Music also improves neurogenesis and increases the activity of neuronal structures like the amygdala, cortex, hypothalamus, and hippocampus(Boso et al., 2006; Fukui & Toyoshima, 2008). The ventral tegmental region and the nucleus accumbens are two key brain areas involved in autonomic response regulation. This is due to dopamine release in the nucleus accumbens on exposure to relaxing music(Menon & Levitin, 2005; Meyers et al., 2021; Sutoo & Akiyama, 2004). Medications such as opioids and benzodiazepines are commonly used as analgesics to reduce anxiety levels in patients undergoing invasive cardiac catheterization (ICC). It was then found that music can be used as an effective adjunct to these standard methods. It creates positive and pleasant feelings thus bringing relaxation to an individual. Blood clots in the circulatory system are majorly caused by excess fibrinogen. People with greater positive emotion have a lower fibrinogen response to stress than those with lesser positive emotion. Musical engagement is found to induce positive emotions and thus, has been implemented to achieve positive physiological states as noted in the Bookseller, (2011).

3. Association of music genres with personality traits

The anxiolytic role of music in reducing anxiety has been studied by many researchers over the past years. Listening to self-selected and classical music brings out positive, relaxing states and increases in parasympathetic system arousal as compared to heavy metal music (Labbé et al., 2007). Some of us tend to listen to particular music while working or studying to improve our concentration but

those who listen to hip-hop and rap while studying had poorer performance than those who preferred classical and relaxing music. Malakoutikhah et al., (2020) suggest that listening to traditional, pop, and classical music caused increased relaxation whereas rock-type music didn't have a significant impact while sedative music (slow and soft tempo) reduces tension more often than stimulative music which has a hard tempo and loud volume but it depends on musical preference by an individual. To this Jiang et al., (2013) adds that individuals are more accustomed to music preference than music type in stressful conditions.

Additionally, if a person has some past experiences associated with a particular kind of music, then it can further increase the effect of inducing positive behavior change (Davis & Thaut, 1989). The preference of any particular music genre or kind has been closely associated with the personality traits of an individual and which soothes them or can distract them from their stress the most. Results have shown more preference towards energetic or upbeat music for socialites. On the other hand suggests Saarikallio & Erkkilä, (2007) that individuals with greater candidness and forthrightness have a greater preference for complex and rebellious music and people who remain frequently stressed spend more time listening to religious, pop, or country music (van Goethem & Sloboda, 2011).

Materials and Methods:

An empirical survey-based google form was first created consisting of a total of twenty-one questions reflecting only on the quantitative outcomes of this research (Newby, 2010). Questions gauging the respondents' relation with stress, their music taste, involvement of music in stress relief, and sleep patterns were included in the survey. For some of the questions, a five-point Likert Scale was used to measure and assess the perceptions of the respondents. Prior consent was taken from all the respondents and data was collected from 100 healthy individuals belonging to a range of 15 years to above 55 years of age. The survey was conducted using a convenience sampling technique. The responses were collected over a span of two weeks.

Discussion and Results:

The survey indicated that individuals from both generations felt equally stressed but there was a section of respondents(n=14) who 'always' felt stressed and all of them belonged to the age group 15-35. These individuals were more inclined towards hard-tempo stimulative music. Several studies in the past have concluded that fast tempo music stimulates the systolic and diastolic blood pressure level and heart rate thus causing anxiety.

The primitive stress-causing factors among individuals (>45 years) were found to be health-related problems and exhaustive office work. Since most of the respondents in the age group (15-25 years) were either school or college students, exams and assignments (n=63) were an obvious reason for their stress level. Relations with peers and loved ones were observed to be the second most stress-causing factor overall (n=49).

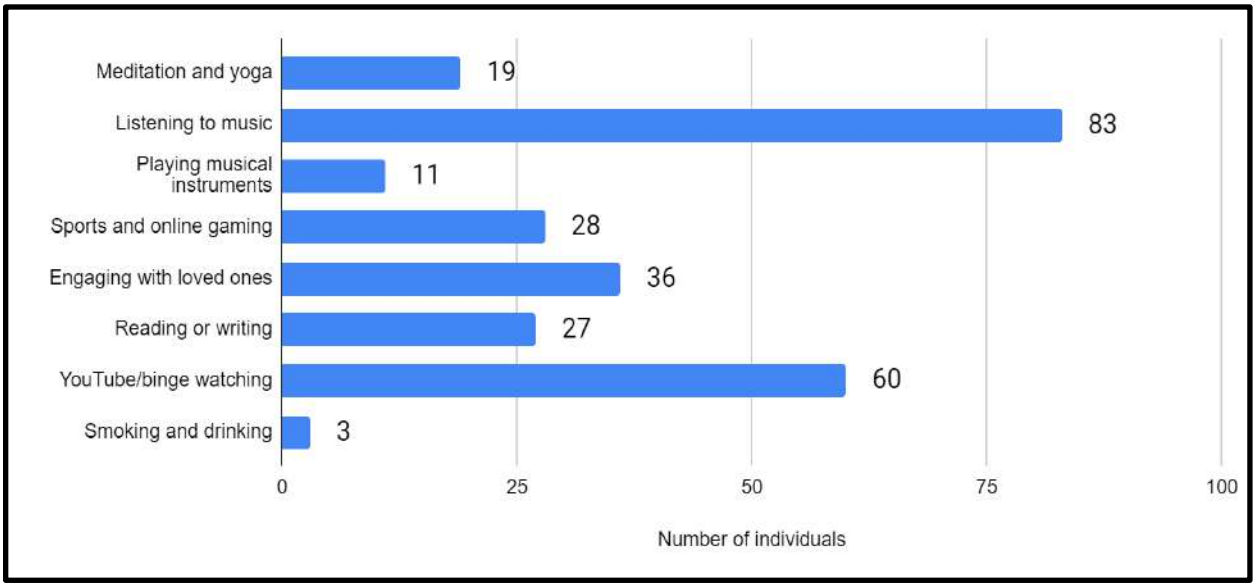

Fig 1: The frequency of the different alternatives used for distraction under stressful situations

Listening to music (n=83) and YouTube/binge-watching (n=60) are most commonly used for distraction purposes during stress conditions. The possible reason for this is their easy accessibility and availability. Several studies involving psychological criteria of music therapy and psychoacoustics have asserted that people largely find music as an effective tool to bring calmness and peace. It acts as a mediating stimulus because of its structural organization and helps in modulating perception, attention, etc. among individuals (Meyers et al., 2021).

The survey questionnaire was drafted on the basis of a five-point Likert scale as 'Likert Scale items have the inherent advantage of not expecting a simple yes / no answer from the respondent, but rather allow for degrees of opinion, and even no opinion at all (Burns & Burns, 2005; Marazban S. Kotwal et al., 2020; Meyers et al., 2021; Meyers K., 2021). The format used for the questionnaire had 5 Likert items, and was scaled from 1 to 5 to assess the therapeutic effect of music (Layder, 2014a). On a five-point Likert scale, 50% of individuals chose 5 and 34% chose 4 while considering the therapeutic effects of music which signifies the effectiveness of music in relieving stress in a given population.

Some of the respondents (n=79) agreed that music helps them to have a better sleep when they are stressed whereas the remaining did not (n=21). It was further observed that few of them (n=13) do not usually have a habit of listening to music before going to sleep. However, they use music as a source to relieve stress and improve the quality of their sleep. The usage of music to overcome stressful situations has been most predominantly seen in individuals belonging to the age group 15 to 25 years. A possible explanation for this can be given based on the primary stress-causing factors chosen by each of the respondents belonging to different age groups. Stress due to exams, and job-related tasks, which could be considered as a continuous source of stress in day-to-

day life, was observed to be the most prevalent factor for the 15 to 35 age group people. Whereas for individuals above 45 years of age, stress due to health issues and relations with peers and loved ones were most predominant. These could be considered as intermittent stress-causing factors.

People who often remain stressed have a higher tendency to develop chronic stress which in turn leads to an adverse effect on the prefrontal cortex of the brain which is instrumental in memory and learning. An added consequence during such circumstances is the increase in the size of the amygdala which enhances the receptiveness to stress. All these factors also contribute to the stimulation of the sympathetic nervous system, increased levels of epinephrine and norepinephrine, and increased secretion of cortisol which is the major stress hormone (Goy & McEwen, 1980; McEwen et al., 2016).

A difference has been observed in the preferences of listening to music actively and playing music in the background. The majority of the respondents (n=42) belonging to the age group of 15 to 35 years of age prefer actively listening to music whereas there was an equal response for both active listening as well as background music in the case of people above that age group. Background music influences cognitive parameters like visuospatial memory, episodic memory, attention span as well as verbal and visual processing speed. This is, however, closely related to the kind of music. Listening to joyful and fast tempo music can increase the cerebral arousal levels of the listeners which in turn strengthens memory encoding capacity. On the other hand, soft and slow tempo music tends to lower arousal levels. Music related to someone's past can also bring in an element of nostalgia which significantly improves the episodic memory has been identified by Mado Proverbio et al., (2015).

Past studies have also shown a positive effect on both episodic memories as well as semantic memory under the influence of both 'negative' and 'positive' background music (Bottiroli et al., 2014). The genre of music also interferes with the attention span. Upbeat music like hip hop and rock is more distracting and therefore reduces concentration and attention span while performing tasks. Chou, (2010) notes that light music like classical music also leads to a decrease in attention span but the effect is much less compared to hard music. Therefore, individuals who preferred actively listening to music have mostly chosen pop, hip-hop, indie rock as their most preferred music genres since these are upbeat, fast tempo, and 'hard' music which usually people don't listen to while working. Whereas classical music and jazz have been opted by individuals who play background music more often. This observation was however different in the case of those who sing or play any musical instrument since they are much more aware of the technicalities of music and pay greater attention to the various elements of music like beat, timbre, pitch, harmony, texture, expression, etc. This can be related to the past findings that musical training increases the volume of gray matter in the brain which facilitates stronger long-range connections and enhanced auditory encoding.

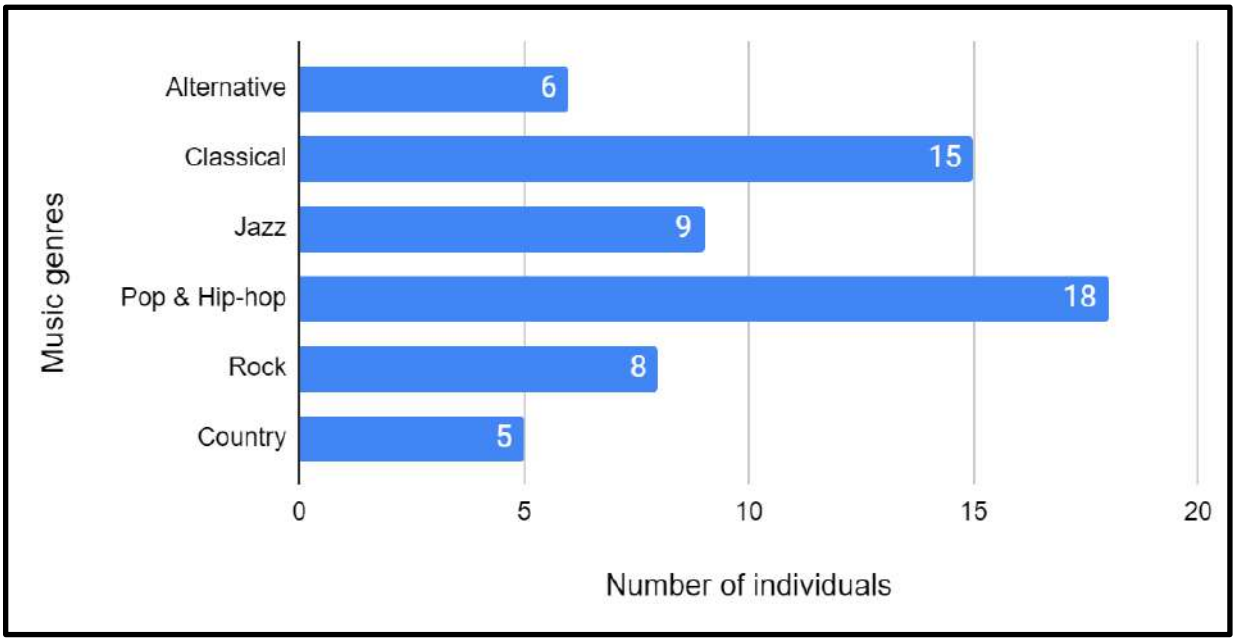

Fig 2(a). Preferences of different music genres in respondents from 15-35 years of age.

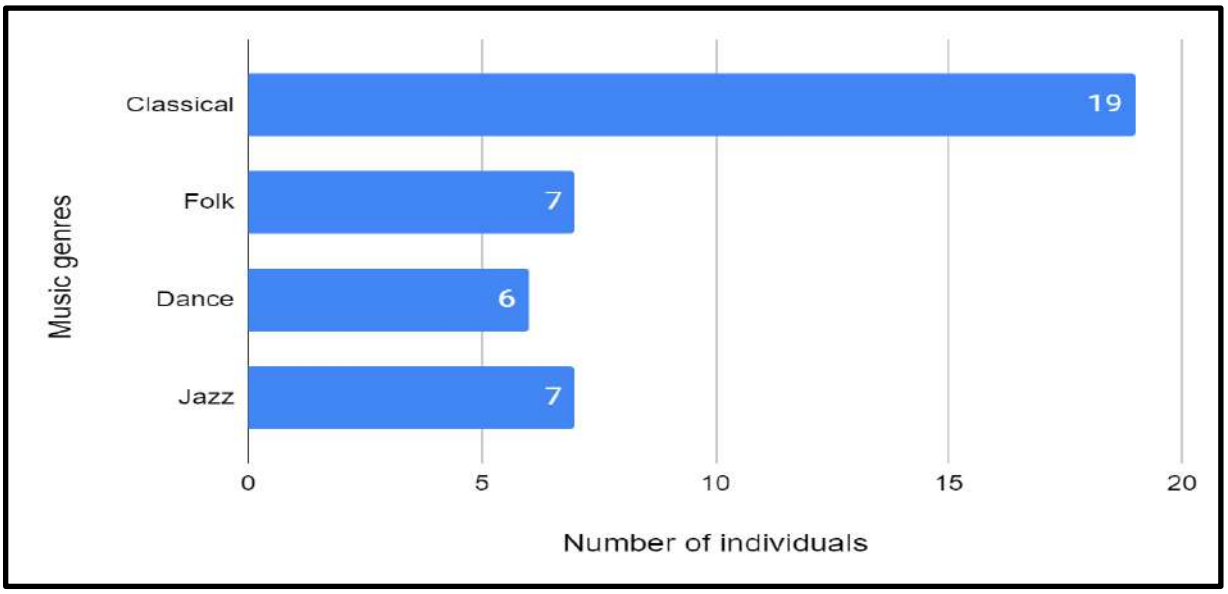

Fig 2(b). Preferences of different music genres in respondents above 35 years of age.

A major variation was found in the preference of a particular music genre among different age groups. Classical music was found to be the most preferred genre for most of the respondents (n=34), followed by pop (n=18), country, jazz, and hip-hop. Other genres which were opted for included folk, indie rock, alternative, and dance. In the past, the choice of any particular music genre has been closely associated with the personality traits of an individual. Most of the

respondents who opted for the classical music genre were also the ones who sing or play musical instruments and have a background in musical training. This can be easily correlated to the results of past studies which categorize classical music under complex forms of music. When later in the survey, the reason for their music preference was asked, a maximum of them (n= 80) agreed that it was best suited for their mood enhancement and regulation. Therefore, it is important to consider that the release of dopamine and reduction in cortisol levels for an individual is not only dependent on the tempo of the music but is also dependent on how an individual perceives any particular kind of music and hence it is difficult to give common reasoning for the musical choices.

In the age group 15-35 (n=34), a shift is observed towards classical music from their previously preferred genres of pop, K-pop and rock, etc. A similar trend is observed in the age group 35 and above. It is questionable whether this reflects the evolution in the taste of the music of these individuals. This shift could be attributed to the slow tunes and structure of classical music. While listening to classical music, a calm environment is created due to the release of dopamine, known as the feel-good hormone which is a vital component of the brain's reward system. Dopamine blocks stress and enhances a person's mood. Only 11% of the people preferred listening to music from any genre when stressed. While the rest choose to stick to their preferred genre. This could be due to greater emotional involvement, understanding, and comfort level with the music. People who have responded to being stressed often show a mixed trend in their duration of music listening at regular times.

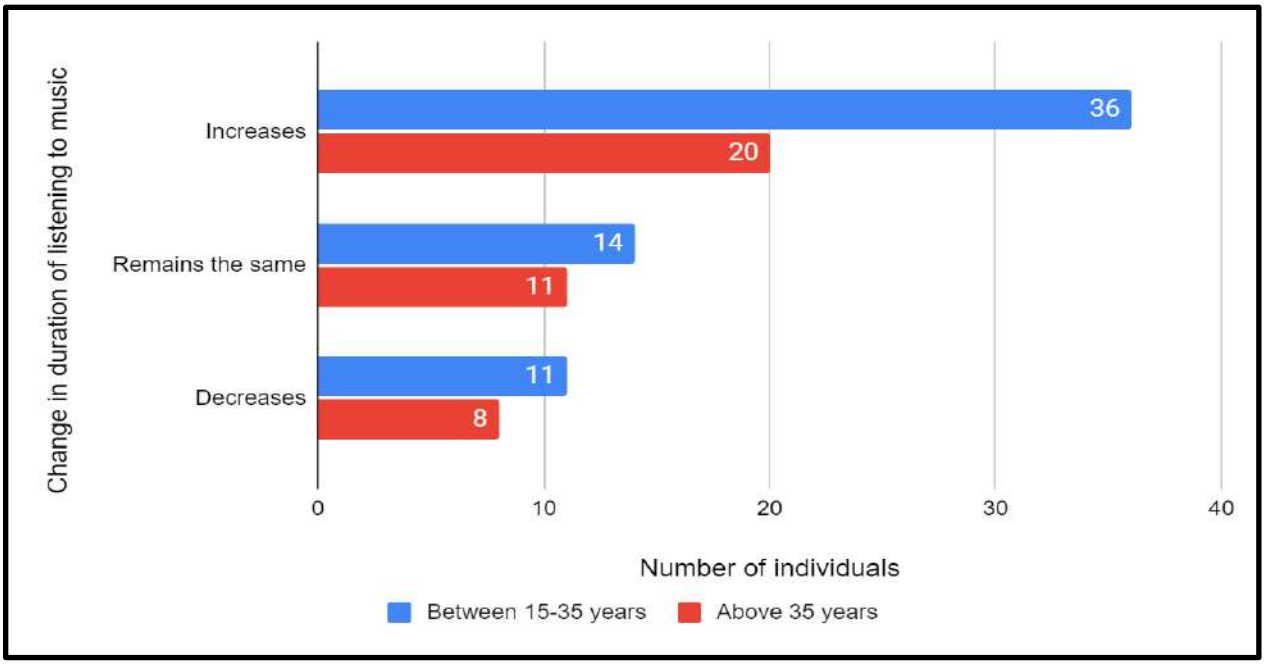

Fig 3. Comparison of the change in the duration of listening to music under stressful conditions.

However, 87% of these people have reported an increase in their music listening duration when they feel stressed. It decreases cortisol levels and activates the reward pathways and serotonin levels and also increases the recovery rate of the autonomic nervous system when it is exposed to stressful conditions (Malakoutikhah et al., 2020). The survey conducted reports that 19% preferred slow-tempo music while working. A majority of the individuals voted for a fast tempo. Whereas, a study conducted on a group of individuals who were exposed to musical stimuli, after analyzing fMRI scans of the participants it was concluded that fast-tempo music activated bilateral STG more than slow music. The highest ratings of pleasantness were also recorded during fast tempo music. (Liu, Y. et al.,2018). Participants who listened to a preferred tempo reported larger activation patterns as opposed to those who did not. Beta wave activation in the brain can be cited as the cause of this increased arousal (Hunter Gentry et al., 2013).

Limitations of the study:

It was a survey-based study and no clinical examinations were done to affirm the stress level of participants and the effect of music for the same (Bazeley & Brindle, 2015). Equal representation from all age groups could not be obtained during data collection (Curry et al., 2009; Shorten & Smith, 2017). The study thus suffered from a lack of generalizability as all age groups could not be uniformly analyzed (Layder, 2014). Since the subjects of the study were not interviewed personally, the study lacks a custom touch and is narrowed only to questions provided. Responses from around 100 participants were received which is a rather small sample size and increases the margin of error in the study (Newby, 2010). Further, a proper justification for the various musical preferences of individuals belonging to different age groups could not be established.

Conclusion:

Different stress-causing factors are prevalent in society. Stress is known to influence an individual's performance in everyday life, sleeping patterns, and behavior. Participants of the survey have responded to being benefitted through music in areas of sleep, coping with anxiety, and enhancement in their concentration. A majority of the participants have reported an increase in the music listening duration during stressful conditions.

From this we conclude that although there are various stress relieving tools available today, the music's varied, dynamic and ever evolving nature make it the most viable and inexpensive option for stress relief. Participants have also reported that music helped them relax by ushering in a sense of equanimity and tranquility. Participants belonging to the young age group mostly prefer the hip-hop music genre, they also prefer listening to music actively and a significant increase is observed in their music listening duration under stressful conditions. Whereas the old age group opt for classical music, passive listening and slight increase in duration under stressful conditions. These differences could be attributed to the variation in stress causing factors reported by the two age groups. However, the customizable characteristics of music bridges the gap across generations and helps them to achieve the ultimate and common goal of stress relief.

Acknowledgment:

We would like to thank the Department of Chemistry and its faculty, St. Xavier's College, Mumbai for their constant support throughout the research project. We would also like to extend a special gratitude to all the participants who submitted their responses for this study. A special thanks to Ms. Neha S. Kapadia (a faculty with the department) for her constant support, reviews and guidance.

References:

1) Bazeley, & Brindle. (2015). Mixed methods research. (P. Bazeley & P. Brindle, Eds.) [Unknown].
2) Boso, M., Politi, P., Barale, F., & Emanuele, E. (2006). Neurophysiology and neurobiology of the musical experience [Article]. Functional Neurology, 21(4), 187–191.
3) Bottiroli, S., Rosi, A., Russo, R., Vecchi, T., & Cavallini, E. (2014). The cognitive effects of listening to background music on older adults: Processing speed improves with upbeat music, while memory seems to benefit from both upbeat and downbeat music [Article]. Frontiers in Aging Neuroscience, 6, 284–284. https://doi.org/10.3389/fnagi.2014.00284
4) Burns, N., & Burns, N. (Nancy A. (2005). The practice of nursing research : conduct, critique and utilization / Nancy Burns, Susan K. Grove. (S. K. Grove, Ed.; 5th ed.) [Book]. Elsevier Saunders.
5) Chang, H.-C., Yu, C.-H., Chen, S.-Y., & Chen, C.-H. (2015). The effects of music listening on psychosocial stress and maternal–fetal attachment during pregnancy [Article]. Complementary Therapies in Medicine, 23(4), 509–515. https://doi.org/10.1016/j.ctim.2015.05.002
6) Chou, P. T.-M. (2010). Attention Drainage Effect: How Background Music Effects Concentration in Taiwanese College Students. Journal of the Scholarship of Teaching and Learning, 10(1), 36–46. https://www.proquest.com/scholarly-journals/attention-drainage-effect-how-background-music/docview/2387864365/se-2
7) Conard, N. J., Malina, M., & Münzel, S. C. (2009). New flutes document the earliest musical tradition in southwestern Germany. Nature, 460(7256), 737–740. https://doi.org/10.1038/nature08169
8) CROSS, I. (2001). Music, Cognition, Culture, and Evolution [Article]. Annals of the New York Academy of Sciences, 930(1), 28–42. https://doi.org/10.1111/j.1749-6632.2001.tb05723.x
9) Curry, L. A., Nembhard, I. M., & Bradley, E. H. (2009). Qualitative and Mixed Methods Provide Unique Contributions to Outcomes Research. Circulation, 119(10), 1442–1452. https://doi.org/10.1161/CIRCULATIONAHA.107.742775
10) Davis, W. B., & Thaut, M. H. (1989). The Influence of Preferred Relaxing Music on Measures of State Anxiety, Relaxation, and Physiological Responses. Journal of Music Therapy, 26(4), 168–187. https://doi.org/10.1093/jmt/26.4.168

11) Ebrahimi, R., & Tan, W. (2018). Role of Music for Conscious Sedation During Invasive Cardiac Catheterization. The American Journal of Cardiology, 122(6), 1095–1097. https://doi.org/10.1016/j.amjcard.2018.05.039
12) Fancourt, D., Ockelford, A., & Belai, A. (2014). The psychoneuroimmunological effects of music: A systematic review and a new model. Brain, Behavior, and Immunity, 36, 15–26. https://doi.org/10.1016/j.bbi.2013.10.014
13) Frühholz, S., Trost, W., & Grandjean, D. (2014). The role of the medial temporal limbic system in processing emotions in voice and music. Progress in Neurobiology, 123, 1–17. https://doi.org/10.1016/j.pneurobio.2014.09.003
14) Fukui, H., & Toyoshima, K. (2008). Music facilitate the neurogenesis, regeneration and repair of neurons. Medical Hypotheses, 71(5), 765–769. https://doi.org/10.1016/j.mehy.2008.06.019
15) Gerra, G., Zaimovic, A., Franchini, D., Palladino, M., Giucastro, G., Reali, N., Maestri, D., Caccavari, R., Delsignore, R., & Brambilla, F. (1998). Neuroendocrine responses of healthy volunteers to `techno-music': relationships with personality traits and emotional state. International Journal of Psychophysiology, 28(1), 99–111. https://doi.org/10.1016/S0167-8760(97)00071-8
16) Goy, & McEwen. (1980). Sexual differentiation of the brain : based on a work session of the Neurosciences Research Program / [edited by] Robert W. Goy and Bruce S. McEwen (R. W. Goy, B. S. McEwen, Neurosciences Research Program, & Massachusetts Institute of Technology, Eds.) [Book]. MIT Press.
17) Hughes, G. H., Pearson, M. A., & Reinhart, G. R. (1984). Stress: sources, effects, and management. Family and Community Health, 7(1), 47–58. http://www.jstor.org/stable/44952650
18) Hunter Gentry, Ethan Humphries, Sebastian Pena, Aldijana Mekic, Nicole Hurless, & David. F. Nichols. (2013). Music genre preference and tempo alter alpha and beta waves in human non-musicians [Article]. Impulse (Columbia, S.C.), 1–11.
19) Jiang, J., Zhou, L., Rickson, D., & Jiang, C. (2013). The effects of sedative and stimulative music on stress reduction depend on music preference. The Arts in Psychotherapy, 40(2), 201–205. https://doi.org/10.1016/j.aip.2013.02.002
20) KHALFA, S., BELLA, S. D., ROY, M., PERETZ, I., & LUPIEN, S. J. (2003). Effects of Relaxing Music on Salivary Cortisol Level after Psychological Stress. Annals of the New York Academy of Sciences, 999(1), 374–376. https://doi.org/10.1196/annals.1284.045
21) Knight, W. E. J., & Rickard, N. S. (2001). Relaxing Music Prevents Stress-Induced Increases in Subjective Anxiety, Systolic Blood Pressure, and Heart Rate in Healthy Males and Females. Journal of Music Therapy, 38(4), 254–272. https://doi.org/10.1093/jmt/38.4.254
22) Labbé, E., Schmidt, N., Babin, J., & Pharr, M. (2007). Coping with Stress: The Effectiveness of Different Types of Music. Applied Psychophysiology and Biofeedback, 32(3–4), 163–168. https://doi.org/10.1007/s10484-007-9043-9

23) Layder, D. (2014a). Doing Excellent Small-Scale Research. In Doing Excellent Small-Scale Research. SAGE Publications Ltd. https://doi.org/10.4135/9781473913936
24) Layder, D. (2014b). Doing Excellent Small-Scale Research. In Doing Excellent Small-Scale Research. SAGE Publications Ltd. https://doi.org/10.4135/9781473913936
25) Mado Proverbio, A., Lozano Nasi, V., Alessandra Arcari, L., de Benedetto, F., Guardamagna, M., Gazzola, M., & Zani, A. (2015). The effect of background music on episodic memory and autonomic responses: listening to emotionally touching music enhances facial memory capacity. Scientific Reports, 5(1), 15219. https://doi.org/10.1038/srep15219
26) Malakoutikhah, A., Dehghan, M., Ghonchehpoorc, A., Parandeh Afshar, P., & Honarmand, A. (2020). The effect of different genres of music and silence on relaxation and anxiety: A randomized controlled trial. EXPLORE, 16(6), 376–381. https://doi.org/10.1016/j.explore.2020.02.005
27) Marazban S. Kotwal, Saima Khan, & Abhilasha Jain. (2020). Inverted Undergraduate Physical Chemistry Class: A Survey of Attitudes of Student Groups at Different Levels of Commitment towards Chemistry. Xplore - The Xavier's Research Journal, 11(1), 80–90.
28) McEwen, B. S., Nasca, C., & Gray, J. D. (2016). Stress Effects on Neuronal Structure: Hippocampus, Amygdala, and Prefrontal Cortex. Neuropsychopharmacology, 41(1), 3–23. https://doi.org/10.1038/npp.2015.171
29) McKinney, C. H., Tims, F. C., Kumar, A. M., & Kumar, M. (1997). The effect of selected classical music and spontaneous imagery on plasma β-endorphin. Journal of Behavioral Medicine, 20(1), 85–99. https://doi.org/10.1023/A:1025543330939
30) Menon, V., & Levitin, D. J. (2005). The rewards of music listening: Response and physiological connectivity of the mesolimbic system. NeuroImage, 28(1), 175–184. https://doi.org/10.1016/j.neuroimage.2005.05.053
31) Meyers, K., Kapadia, N., & Sengupta, M. (2021). A Preliminary Study Connecting Covid-19 and the influence of Psychoacoustic Therapies Introduction. Xplore - The Xavier's Research Journal, 12(2), 1–13.
32) Meyers K., K. N. , R. C. , J. K. ,Yadav v. (2021). A STUDY ON NEUROPSYCHIATRIC IMPACTS OF SARS-COV-2 PANDEMIC. AGPE The Royal Gondwana Research Journal of History, Science,Economic, Political and Social Science, 2(1), 85–99. https://agpegondwanajournal.co.in/index.php/agpe/article/view/19/16
33) Newby, P. (2010). Research methods for education / Peter Newby [Book]. Longman.
34) Pan, Y. Y., Sun, X. Y., Dang, Y. N., Chen, M., Wang, L., & Shen, L. (2021). Effect of music intervention on depression in graduate students. Music Education Research, 23(1), 41–49. https://doi.org/10.1080/14613808.2020.1847058
35) Peretz, I. (2001). Cortical deafness to dissonance. Brain, 124(5), 928–940. https://doi.org/10.1093/brain/124.5.928
36) Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. Psychology of Music, 35(1), 88–109. https://doi.org/10.1177/0305735607068889

37) Shorten, A., & Smith, J. (2017). Mixed methods research: expanding the evidence base [Article]. Evidence-Based Nursing, 20(3), 74–75. https://doi.org/10.1136/eb-2017-102699
38) Sutoo, D., & Akiyama, K. (2004). Music improves dopaminergic neurotransmission: demonstration based on the effect of music on blood pressure regulation. Brain Research, 1016(2), 255–262. https://doi.org/10.1016/j.brainres.2004.05.018
39) The Bookseller. (2011). Happiness with a flourish: Psychologist's title divides critics. Gale Literature Resource Center, 5481, 32. https://link.gale.com/apps/doc/A258818585/LitRC?u=ucl_ttda&sid=bookmark-LitRC&xid=8e7e6a5e
40) van Goethem, A., & Sloboda, J. (2011). The functions of music for affect regulation. Musicae Scientiae, 15(2), 208–228. https://doi.org/10.1177/1029864911401174
41) Walcott, B. (1999). Human Physiology: The Mechanisms of Body Function. Arthur Vander , James Sherman , Dorothy Luciano [Article]. The Quarterly Review of Biology, 74(2), 253–254. https://doi.org/10.1086/393149
42) Yamamoto, M., Naga, S., & Shimizu, J. (2007). Positive musical effects on two types of negative stressful conditions. Psychology of Music, 35(2), 249–275. https://doi.org/10.1177/0305735607070375

■ ■ ■