Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 3, 2596–2605

Music Engagement and performance on Gardner's Intelligence Scale among Adolescents

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Abstract

The present study attempted to relate the level of music engagement with Gardner's multiple intelligences among adolescents. Certain studies explain that music listening influences various cognitive processes, creativity, and emotions. As a result, some adolescents were exposed to a mix of music types within their selected music genre during their ongoing academics in the online mode, while others received no such specific music exposure. The sample comprised of 162 adolescents from Vishwakarma Institutes' English-medium schools in Pune, India, with 82 having prior music experience and 80 having no prior music experience. The Music Use Questionnaire developed by Chin and Rickard (2012) was used to assess music engagement, while the Multiple Intelligence Profiling questionnaire developed by Tirri and Nokelainen(2011) was employed to assess intelligence. The application of product moment correlation explains the significant relationship between the types of intelligence like linguistics, spatial, music, and interpersonal intelligence with various aspects of music engagement styles. Significant correlation differences were explored among music experienced and music non-experienced students on the significant correlations. The discussion, application and suggestions for further research are also discussed in the study.

Keyword: music, intelligence, adolescents, music-engagement, correlations

Holistic education plays an important role in a child's complete growth. Holistic education is a method of instruction that aims to change a student's mentality and attitude for the betterment of himself and society. The five major aspects of holistic development are as follows: physical, mental, emotional, social, and spiritual well-being are all important. A child's motor, cognitive, and social-emotional aspects are all developed through holistic development.

In a study, Gardner's theory contends that a holistic view of education benefits children the most, and that teachers should employ a variety of methods, exercises, and activities to reach pupils who lack linguistic and logical ability. Gardner's idea of multiple intelligences can help pupils develop their "creativity" in the classroom (Cuadrado, 2019). According to O'Hara and Sternberg (1999), five types of possible relationships between creativity and intelligence exist: the former is a subset of the latter; the latter is a subset of the former; both variables are overlapping sets; both variables are fundamentally the same (coincident sets); and both variables are unrelated (disjoint sets).

Dr. Howard Gardner's theory of multiple intelligence is one of the best ways to help students develop cognitive skills to match their strengths while balancing their weaknesses. Multiple intelligence theory is associated with multi-sensory learning, which teaches children to learn through activities that have more than one meaning (Smith, 2002). Students with pronounced musical intelligence learn best in lecture halls where musical intelligence has a strong auditory component. Learning music uses logical,

mathematical, and linguistic intelligence, but can also be used to develop musical intelligence (Sadiku, & Musa, 2021). This theory deals with the way information is processed. Educators who have studied learning modalities-verbal, auditory, tactile, and kinesthetic methods of receiving information-recognize that not all students learn in the same way (Brualdi Timmins, 1996). Although many teachers view multiple intelligence theories as helpful frameworks for their curriculum, few studies on whether these theories are an accurate model of human intelligence and its success rate in school have been conducted.

However, these theories have been used in contrast to the advantages of the multiple intelligence theory of general intelligence to research and compare different types of intelligence in students to help students with poor academic performance (Gardner, 2011).

The findings revealed that humans can discriminate between different forms of intelligence's variability. The students were also found to have better intelligence in terms of kinesthetic, interpersonal, intrapersonal, and musical intelligence, according to the study (Tapia et al., 2013).

This study provides a cost-effective way of assessing the worth of a group of individuals based on three different forms of music consumption. Children's music instruction is crucial for the development of critical learning abilities such as listening, attention, focus, memory, and reading ability. Music has been employed in psychological studies by researchers, but little attention has been devoted to how music is used in ordinary life (Schäfer, 2016).

Certain studies explain that music listening influences various cognitive processes, creativity, and emotions. As a result, some adolescents were exposed to a mix of music types within their selected music genre during their ongoing academics in the online mode (music adolescents), while others received no such specific music exposure (non-music adolescents).

Objectives

i. To study the correlation among level of music engagement styles with the multiple types of intelligence among adolescents.

METHOD

Participants

The present study was conducted on 162 adolescents from the schools of Vishwakarma Institutes, Pune, India. There were 50% boys and 50% girls in the study. All of them were from English medium schools within the age range of 11 years to 14 years (Mean age = 12 years). The selected students for this study were from 6th grade up to 9th grade. Nuclear families account for 54.3% of adolescents, while joint families account for 45.7%. Adolescents from rural areas accounted for 39.5% of the total, while urban areas accounted for 60.5%. There were 50.6% of music adolescents, and 49.4% were non-music adolescents. All the students belonged to middle-class and upper-middle-class families.

Measures

i. Music Use Questionnaire developed by Chin and Rickard (2012).

It is a self-report questionnaire developed to assess both the quality and quantity of different forms of music use, four engagement styles (Cognitive and Emotional Regulation, Engaged Production, Social Connection, Dance and Physical Exercise). There are 58 items in total. Responses on the Music Engagement Style scale are made on a 6-point Likert-scale ranging from "0" (Not at all/Not applicable to me) to "5" (Strongly agree). The cronbach alpha ranges from .77 to .95. The tool has been validated on the entire children's population worldwide and possesses satisfactory psychometric properties.

ii. Multiple Intelligence Profiling Questionnaire developed by Tirri and Nokelainen (2011).

It is a five-point Likert scale self-rating questionnaire that is based on Howard Gardner's Multiple Intelligences. This version of MIPQ operationalizes seven multiple intelligence dimensions with 28 items: (1) Linguistic, (2) Logical-mathematical, (3) Musical, (4) Spatial, (5) Bodily-kinesthetic, (6) Interpersonal, and (7) Intrapersonal intelligence. The psychometric properties of the dimensions are validated by the earlier studies (Tirri & Komulainen, 2002; Tirri, K., Komulainen, Nokelainen & Tirri, H., 2002; Tirri, Nokelainen & Ubani, 2006; Tirri & Nokelainen, 2007). This has been administered and validated to adolescents cross-culturally.

iii. Music platform devised by researchers.

Music was provided by experts from Department of Music, Vishwakarma University, Pune. Information regarding music composition, flow, meaning was pre-recorded as a commentary in a video. The students enjoy the music of their preference with variation in music genre and theme.the mix of classic and eastern or western fusion which was prepared by the music experts and was validated. The preferred music styles and genres were included Indian Classical Vocal Music (Hindustani/ Carnatic), Indian Classical Instrumental Music, Indian Classical Dance, Indian Film Music (Hindi/Marathi/Retro/Contemporary), Indian Folk Music (Vocal /Instrumental), Indo-Jazz Crossover Music, Sufi Music, Fusion Music, Western Classical Music, Percussion music, Acapella music, Western Pop music, Western Jazz Music, Western Rock music (Ballads, Soft Rock/Heavy Metal).

The exposure to the preferred mix of music on some adolescents was integrated into the student's academic framework.

Design of the study and Procedures

All appropriate ethical procedures were followed when collecting data. The formal approval was obtained from the school administration. A total of 162 adolescents took part in the study. For 21 days, 82 adolescents were exposed to music intervention. The duration of each piece of music played online was roughly 9 minutes, and the music was played twice in a day (once at the commencement of the first session and again before returning to the session after the lunch break). This was taking place in the child's natural environment at home, where he or she was attending academic sessions and other activities. Data was collected in an online mode on the 21st day. Data was obtained on the same day from 80 adolescents who had not received music intervention and were of similar age, education, and physical region. Thus, the study followed an experimental-control equivalent group design.

RESULTS

Basic checks like the assessment of missing values, duplicate responses, faking good, outliers in the normal probability curve, and desirable response pattern analysis were performed and final 162 data was used for further analysis. As the dataset fulfilled the basic pre-requisites of normality, it was decided to make use of parametric statistics in further analysis.

As the data involved the use of experimental and controlled groups, both the data were checked to ensure that they fulfilled the required criteria of equivalence. It was observed that there were 82 participants who experienced the music and 80 participants who did not experience any special music treatment. To further explore the relationship between music engagement and multiple intelligence factors, it was decided to use product moment correlation, separately for each group. The outome of product moment correlation can be seen in Table 1 and Table 2.

[Table 1 near here]

The product moment correlation, reported in Table 1, explains the correlation among the subscales of music engagement with sub-dimensions of multiple intelligence among adolescents with music experience.

On multiple intelligence scales, all the sub-dimensions were inter-correlated from moderate to high level, within the range of .40 to .70. Similarly, on music engagement, all the sub-scales except the element of music index, got intercorrelated from moderate to high level, with a range of .54 to .70.

The Music Listening Index was found to be positively correlated with musical intelligence (r =.25, $p < .05$).of music training was observed to be positively correlated with logical-mathematical intelligence (r = .26, $p < .05$) and musical intelligence (r = .24, $p < .05$). Among the music engagement styles (Cognitive and Emotional Regulation, Engaged Production, Social Connection, and Physical Exercise), Linguistic, Logical-Mathematical, Bodily-Kinesthic, Musical, Interpersonal, and Intrapersonal were found to be positively correlated with Linguistic, Logical-Mathematical, Bodily-Kinesthic, Musical, Interpersonal, and Intrapersonal.Coorelation coe-efficients can be seen in Table 1. Only the dance style of music engagement, was observed to be positively correlated with Logical-Mathematical (r = .25, $p < .05$), Spatial (r = .26, $p < .05$), Musical (r = .30, $p < .01$), and Intrapersonal (r = .29, $p < .01$). The remaining

possible correlations were found to be insignificant.

[Table 2 near here]

The product moment correlation reported in Table 2, explains the correlation between the subscales of music engagement with sub-dimensions of multiple intelligence among the adolescents who did not experience music.

On multiple intelligence scales, all the sub-dimensions got inter-correlated from low to moderate level, within the range of .22 to .48. Similarly, on music engagement, all the sub-scales except the element of music index, got intercorrelated from low to high level, with a range of .23 to .85.

The Index of Music Listening (r =.34, p <.01) was found to be positively correlated with musical intelligence.The Index of music training was observed to be positively correlated with musical intelligence (r = .31, p < .01) and Index of Music Instrument Playing got positively correlated with musical intelligence (r = .29, p < .01). Among the music engagement styles, Cognitive and Emotional Regulation found to be positively correlated with Linguistic (r = .29, p < .01), Spatial (r = .24, p < .05), Musical (r = .36, p < .01), and Interpersonal (r = .28, p < .05). Engaged production was found to be positively related to linguistics (r =.35, p.01) and music (r =.40, p.01). Social Connection was observed positively correlated with Linguistic (r = .33, p < .01), Musical (r = .43, p < .01), and Interpersonal (r = .27, p < .05). Physical Exercise found to be positively correlated with Linguistic (r = .33, p < .01), Spatial (r = .25, p < .05), Musical (r = .38, p < .01). Dance was observed to be positively correlated with Linguistic (r = .45, p < .01), Bodily_Kinesthic (r = .31, p < .01), and Musical (r = .35, p < .01). The remaining possible correlations were found to be insignificant.

With the purpose of evaluating whether there is any difference between the sets of correlations, it was planned to compare and evaluate the correlational differences. To assess the difference between correlations, one must transform the correlations into Fisher Z scores. After calculating the standard error of the difference between these Z scores, they calculate the ratio of the difference to the standard error and compare this ratio to a standard normal distribution (Snedecor & Cochran;1980). Accordingly, the scores were calculated and they are shown in Table 3.

[Table 3 near here]

As it can be observed from Table 3, that almost all the z-test scores are below the value of 1.96, it can be interpreted that there is no significant difference found among the correlations of the adolescents with music experience and non-music experience. Further, the possible reason for the present findings is reported in the discussion section.

DISCUSSION

The present study was planned with the purpose of evaluating the relationship of music engagement with multiple intelligence factors. The data was collected in the experimental-control group design, and two sets of data were obtained. There were a total of 82 adolescents with music experience, and around 80 adolescents without music experience. This study also demonstrated the effectiveness of the type of music that was played during the session. It was observed that music engagement styles correlated significantly with the multiple intelligence factors.

In Table 1, it was observed that the index of music listening and training showed a positive correlation with musical intelligence. In a study, Schellenberg (2006) revealed a definite lack of a link between IQ increase via learning, emotional intelligence, or social skills. However, he hints at a broad impact of music learning on intelligence, despite the fact that this enhancement was not limited to a certain sort of intellectual capacity. Participants with music instruction had better IQ scores than untrained people, and predicted factors such as gender, parent education, family income, and first languages were constant. In addition, he observed that nonverbal IQ improved more than verbal IQ Schellenberg (2011).

Furthermore, in the present study, adolescents who enjoyed the music session showed significant corelation among music engagement styles and multiple intelligence factors. Gustavson, Coleman, Iversen, Maes, Gordon, and Lense (2021) focused extensively on investigating the mental health benefits of musical engagements.

Schellenberg, and Weiss (2013) investigated the possibility of a causal

link between music and cognition. The study focuses on studies with behavioural outcome measures that were published in English. It is separated into four parts: music aptitude, cognitive abilities after listening to music, the so-called Mozart effect, background music and cognitive abilities, and music training and cognitive skills. Therefore, the present finding relates to the previous findings. As per Weinberg and Joseph (2017) as well as Lense, Beck, Liu, Pfeiffer, Diaz, Lynch, and Fisher (2020), music engagement has been linked to improved quality of life, well-being, prosocial conduct, social connectivity, and emotional competence.

However, adolescents who did not participate in music, on the other hand, demonstrated a significant correlation between music engagement styles and multiple intelligence factors, most notably linguistic and musical intelligence only. François, Chobert, Besson, and Schön (2013) in a study observed that for the music group exclusively, both behavioural and electrophysiological metrics demonstrated increased speech segmentation skills over testing sessions. These findings suggest that music training improves speech segmentation directly, highlighting the relevance of music for speech perception and, more broadly, language development in children. Several studies have found that language and music have similar behavioural and neurological resources. However, findings demonstrating lateralization of speech and music functions in the hemispheres of the brain (and consequently differing neural architectures for speech and music) have also been found. According to the findings, the right hemisphere is in charge of certain neurocognitive functions related to music, whereas the left hemisphere is in charge of language skills (Zatorre, Belin, & Penhune, 2002).

The results of Table 3 show an insignificant difference among the correlations between music experience and non music experience adolescents. This could be possible due to the access of the music through open platforms and the ease of use available with the online platform. However, stronger correlations with multiple intelligence were observed with almost all the music engagement styles where adolescents were exposed to unique music sessions, which were based on their preferences and had folk and classical touches, as explained above in the section. This shows that the type of music which was used in the session is different from the regular music and has positively influenced the scores on the other intelligence factors like Logical-Mathematical, Bodily-Kinesthic, Interpersonal, and Intrapersonal. This can be observed as the unique findings of the present study.

CONCLUSION

In the present study, the framed objective of studying the correlation between the level of music engagement styles and the multiple types of intelligence among adolescents has been observed to be significant. However, stronger correlations were observed among the adolescents who experienced the music during their academic sessions. This demonstrated the fact that if a similar music session is planned for a longer duration, the possible correlation with the music engagements might increase. This could become the study for further reaseach along with the specific music rthym and tone, which can impact the academic level of adolescents positively.

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Table 1: Correlations on factors of intelligence and musical engagement among music experienced students (N=82).

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Linguistic	1														
2	Logical-Mathematical	.47**	1													
3	Spatial	.43**	.64**	1												
4	Bodily_Kinesthic	.46**	.62**	.57**	1											
5	Musical	.40**	.58**	.62**	.59**	1										
6	Interpersonal	.40**	.56**	.59**	.64**	.57**	1									
7	Intrapersonal	.52**	.67**	.70**	.67**	.62**	.65**	1								
8	Index of Music Listening	.20	.13	.10	.08	.25*	.09	.11	1							
9	Index of Music Instrument Playing	.04	-.07	-.14	-.08	-.03	-.15	-.15	.24*	1						
10	Index of Music Training	.11	.26*	.08	.22	.24*	.11	.14	.17	.07	1					
11	Cognitive and Emotional Regulation	.24*	.33**	.30**	.26*	.40**	.26*	.30**	.35**	-.07	.02	1				
12	Engaged Production	.32**	.39**	.38**	.30**	.45**	.38**	.39**	.41**	.15	.07	.62**	1			
13	Social Connection	.28*	.39**	.36**	.44**	.46**	.47**	.37**	.31**	-.02	.16	.58**	.62**	1		
14	Physical Exercise	.24*	.36**	.41**	.33**	.47**	.30**	.41**	.37**	-.06	.05	.70**	.57**	.63**	1	
15	Dance	.21	.25*	.26*	.19	.30**	.17	.29**	.27*	-.09	.01	.54**	.54**	.57**	.54**	1

Note: ** $p < .01$, * $p < .05$

Table 2: Correlations on factors of intelligence and musical engagement among music non-experienced students (N=80).

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Linguistic	1														
2	Logical-Mathematical	-.05	1													
3	Spatial	.37**	-.02	1												
4	Bodily_Kinesthic	.29*	-.04	.48**	1											
5	Musical	.19	.08	.22	.30**	1										
6	Interpersonal	.30**	.30**	.22*	.37**	.26*	1									
7	Intrapersonal	.37**	.21	.19	.17	.27*	.34**	1								
8	Index of Music Listening	-.04	-.17	-.14	.08	.34**	.11	.04	1							
9	Index of Music Instrument Playing	.17	.01	.12	.12	.31**	.08	-.08	-.07	1						
10	Index of Music Training	.10	.17	.10	.01	.29**	-.09	-.06	.15	.38**	1					
11	Cognitive and Emotional Regulation	.29**	-.01	.24*	.16	.36**	.28*	.11	.19	.21	.20	1				
12	Engaged Production	.35**	.03	.20	.17	.40**	.09	.13	.05	.24*	.43**	.67**	1			
13	Social Connection	.33**	.03	.12	.17	.43**	.27*	.07	.17	.27*	.25*	.85**	.66**	1		
14	Physical Exercise	.33**	.06	.25*	.17	.38**	.20	.16	.17	.23*	.33**	.82**	.65**	.72**	1	
15	Dance	.45**	-.21	.15	.31**	.35**	.05	.11	.19	.25*	.27*	.51**	.63**	.50**	.62**	1

Note: ** $p < .01$, * $p < .05$.

Table – 3: Difference in the significant correlation of music engagement and intelligence among music experienced and non-experienced students

Music Variables	**Multiple Intelligence factors**	**Music experienced (N=82)**	**Non-experienced (N=80)**	**Music exp. Group (z score)**	**Non-experienced (z score)**	**sezdiff**	**ztest**	**Alpha score**
Cognitive and Emotional Regulation	Linguistic Intelligence	.236*	.293**	.24	.30	.16	-.38	.70
Engaged Production		.324**	.346**	.34	.36	.16	-.15	.88
Social Connection		.275*	.332**	.28	.35	.16	-.39	.69
Physical Exercise		.236*	.330**	.24	.34	.16	-.64	.52
Dance		.236*	.446**	.24	.48	.16	-1.49	.14
Cognitive and Emotional Regulation	Spatial Intelligence	.304**	.238*	.31	.24	.16	.45	.66
Physical Exercise		.406**	.248*	.43	.25	.16	1.11	.27
Index of Music Listening	Musical Intelligence	.245*	.343**	.25	.36	.16	-.67	.50
Index of Music Training		.240*	.292**	.24	.30	.16	-.35	.73
Cognitive and Emotional Regulation		.404**	.357**	.43	.37	.16	.34	.73
Engaged Production		.449**	.403**	.48	.43	.16	.35	.73

Social Connection		.457**	.432**	.49	.46	.16	.19	.85
Physical Exercise		.474**	.377**	.52	.40	.16	.74	.46
Dance		.299**	.353**	.31	.37	.16	-.38	.71
Cognitive and Emotional Regulation	Interpersonal Intelligence	.264*	.282*	.27	.29	.16	-.12	.90
Social Connection		.474**	.273*	.52	.28	.16	1.47	.14

Note: ** $p < .01$, * $p < .05$, sezdiff = standard error z-difference, ztest = z score.