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The Effect of Musically Perceived Pleasantness and Unpleasantness on Cognitive Functioning of Patients with Depression: An Experimental Approach

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ABSTRACT

Research with Indian classical raga on clinical depression has identified a host of emotional factors that guides the harmonious interaction between feeling tone and cognition. Such a harmony between cognition and music which leads to subjectively pleasant and unpleasant mood can extract maximum possible cognitive output in human beings. To test this hypothesis, 36 female subjects with clinically diagnosed depression were taken, of which 16 preadolescent subjects were between the age 7-12 years and the rest 20 subjects was the adolescent group age ranging between 13-15 years. There were three conditions of this research study, A) a control condition where no IV (classical music) was presented; B) experimental condition 1, where pleasantness inducing classical music was presented, C) experimental condition 2, where unpleasantness inducing classical music was presented. Subjects' mood was estimated before and after the administration of the IV and also their cognitive faculties- attention, perception, learning-memorization and problem solving with different renowned tests and scales. Result was that all the faculties showed improvement due to the effect of independent variable except for the faculty of perception. It was also to be noted that the pre-adolescent group showed better performance in the experimental condition where a musical piece *(dhun)* with pleasant tone was presented and the adolescent group showed better performance in the experimental condition where less pleasant or mournful musical piece *(dhun)* was presented.

Keywords: *Classical Raga, Depression, Mood, Cognition, Pleasantness*

This study intends to assess the effects of instrumental sound on cognitive performance and uses "flute music", as it is a well known instrument used since ancient times which decreases agitation and aggression, helps in increasing performance and acts as motivation. It is said to be

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an organ which "can not only imitate a number of other instruments, but is so comprehensive as to possess the power of a numerous orchestra" (1)

Musicologists believe that music invokes a huge range of powerful and highly specific emotion states. Listeners report emotional responses as being the strongest motivation for listening to music. Our mind is filled with images, memories and emotions through music. From serenity of classical music, to heavy distortion of hard rock metal bands, to the twists and turns of country music, it can bring tears or evoke powerful memories of someone of love, death or of happy and sad moments from the past (2). This phenomenon may occur in humans and also in other species. Music, effects on our executive functions, and has a final effect on our performance, or in other words music through its action on mood, anxiety, intelligence, behavior, mental arousal and cognition affects finally the concentration required to perform a specific task.

The major music centre is the middle layer of the mammalian brain which is also concerned with emotions. Hence activities which help in the development of middle brain also helps in maintenance of attention, memory retention, motivation, problem solving and skills requiring critical thinking (3). It is common understanding that music affects mood which in turn affects performance i.e. positive mood facilitates performance while negative mood hinders it. It was reported that music used every day, resulted in significantly reduced negative moods, (4) even those choosing to listen "sad" music may actually be enjoying themselves; so the result still remains as a positive effect. Thus these responses to music vary at individual level.

Symphonies of raga have a definite soothing effect on the mind as well as on the body. Repeated listening to the particular raga being chosen for a particular disease produces a network of sound vibration (5). The muscles, nerves and the chakras of the affected part are contracted when one impulse is given and relaxed during the interval between two impulses. Thus, during contraction of the tissue, musical notes make a blood flow out from that particular area and in the interval there is relaxation and a state of reduced pressure is produced in these areas (6). Thus the blood from the adjacent area will flow there. This process is repeated again and again and the blood flow and energy flow in that part is enhanced. This makes quick and fast healing. Energy from URF (universal energy field) to HRF (human energy field) transmitted by the strokes of the different tones of raga affects the CNS (central nervous system) because the roots of the auditory nerves are more widely distributed and have more connections than any other nerves in the body. Music beats have a close relationship with heart beats. Music having 70-75 beats per minute equivalent to the normal heart beat of 72 has a soothing effect. Likewise rhythms which are slower than 72 beats per minute create a positive suspense on the mind and body since the mind body complex anticipates that the music will speed up and this restored vital energy gives a deep relaxation to the body (7).

There has rarely been any empirical study using Indian classical Ragas to induce a certain kind of mood (pleasant or unpleasant). Indian music literature offers many a theories to explain the curative effects of Indian classical music. But no scientific step has been taken in this regard to establish Indian Classical Music as an efficient means of producing the required mood in an experimental set-up and that would benefit in the cognitive functioning. In this present study, an effort has been taken to make a scientific step forward in utilizing Indian classical music as an effective means to induce the mood required in the preadolescents and adolescent patients with depression, in the experimental set-up, and to measure the improvement in the cognitive functioning in the specific domains of attention, perception, learning-memory and problem solving.

Sample:

20 female adolescents and 16 female preadolescents belonged to lower to upper middle socio-economic class and were from urban and suburban population, diagnosed with depression in psychiatric departments of Nil Ratan Sarkar medical college, Calcutta National Medical College and Psychology Department of College of Science, Technology and Agriculture were taken, whose Wechsler IQ scores as measured by BKT was found to be between dull normal to bright normal (80-120) and who scored on the Children's depression Inventory (CDI) ranged from 45-60.

Preparation of the Stimulus:

In the Empirical Study of Emotional Musical Influence on Face Using the Local Binary Pattern (LBP) Approach, classical raga such as raag Khamaj and raag Darbari evokes feelings and emotions. Raag Khamaj produces happiness, pleasantness and raag Darbari produces sad and depressed mood. In the present study, two classical ragas respectively for pleasant and unpleasant mood, were chosen for standardization in the Bengal Music College, Kolkata, India, from 76 expert classical and semi classical students. Two ragas that are perceived unpleasant are Raag Darbari and Raag Marwa and the Ragas perceived as pleasant are Raag Jaijayanti and Raag Khamaj were chosen to be rated as most happily perceived and most sadly. All the four pieces were rated by experts on a 5 point scale to assess how pleasant and how unpleasant the musical pieces are.

The scale was-

1: not at all pleasant
2: slightly pleasant
3: moderately pleasant
4: highly pleasant
5: extremely pleasant

All the music pieces (*dhun)* collected are in flute by Maestro (Pandit) Hariprasad Chaurasia. Intentionally instrumental flute music pieces (*dhun*) were collected because previous studies

conducted to assess the effect of different types of music on task performance like learning, memory, attention, have reported vocal music to be more disruptive and instrumental music to be more beneficial (over silence) on recall of visually presented verbal items such as digits, syllables, or word tasks. Among the respective musical pieces, which received the maximum rating among the chosen two, were chosen. Most pleasant, happy, cheerful raga was **Khamaj** and highly scored sad, unpleasant raga was **Marwa** as per the ratings of the experts. The Khamaj composite dhun received a mean rating of 4.5, while the Marwa composite piece received a mean rating of 3. The duration of both these two pieces were also found to be comparable, each being 10 minutes. These two music pieces (*dhun*) were then selected as one piece to induce pleasant mood and one to induce sad mood within the patients with depression.

Objectives of the Research

1. To determine the effect, if any, of musically induced pleasant and unpleasant mood as induced with Indian classical raga on the
    a) Learning and memorizing ability
    b) Perception
    c) Attention
    d) Planning/problem solving
    e) Mood

of the preadolescent and adolescent patients with depression.

2. To compare the effect, if any, of the classical ragas, between both the preadolescent and adolescent groups of patients.

Hypotheses

I. There is a significant effect of musically induced pleasant mood on the attention, perception, memorization and problem solving ability of the subjects.
II. There is a significant effect of musically induced sadness on the attention, perception, memorization and problem solving ability of the subjects.
III. There is a significant difference or similarity between the performances of the two groups of subjects by the effect of mood inducing classical music.

Design of the Experiment

Control Condition

Control Group 1 (preadolescents) Control Group 2 (adolescents)

Experimental Condition (preadolescents)

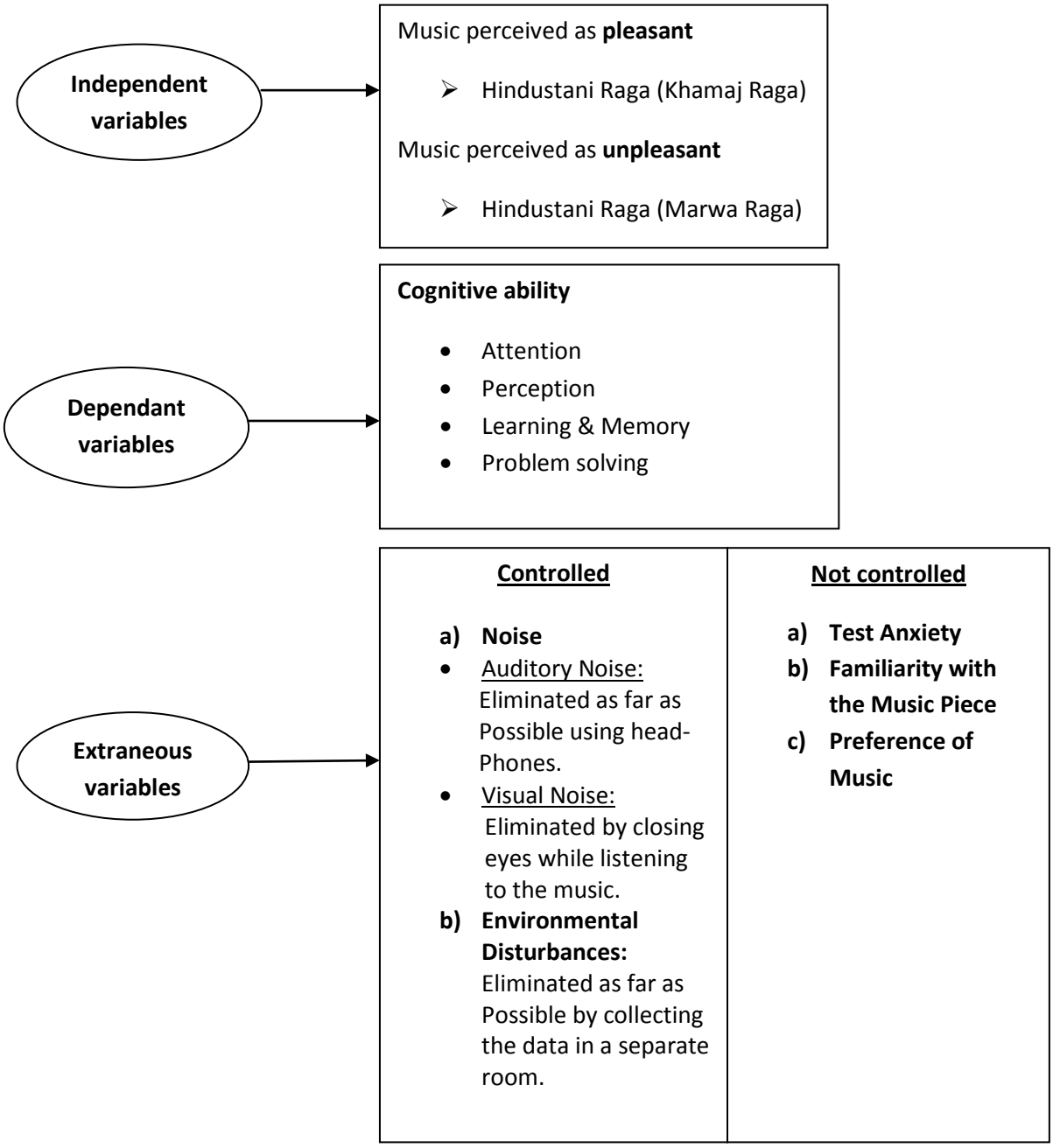
Group 1- musical piece perceived as pleasant, Group 2- musical piece perceived as unpleasant

Experimental Condition (adolescents)

Group 1- musical piece perceived as pleasant, Group 2- musical piece perceived as unpleasant

Distribution Of N And Variables In The Study

N for Female preadolescents = 16
N for Female adolescents = 20



Tools Used

Children's Depression Inventory (CDI) has been employed to measure the level of depression of the preadolescent subjects and the adolescent subjects to check that all of the subjects included in the present sample are within the range of 45-60.

Binet-Kamat Test of Intelligence (BKT) Was used to assess the intelligence quotient of the population to check that all of the taken subjects are within the range of dull normal to bright normal.

For Different Cognitive functioning following tests were chosen

Picture recall test - to assess the memorization capacity

Digit span test - to assess the level of attention and recall

Linear perception test - to assess the level of perception.

Number Cancellation Test – to assess sustain attention and concentration.

Maze test - to assess the problem solving ability

Traditional Hedonic Scale and Face Scale was used to assess the mood of the subjects. This test was mainly administered to see the effect of music on their feeling and if that is liked by them or not.

Analysis of Data

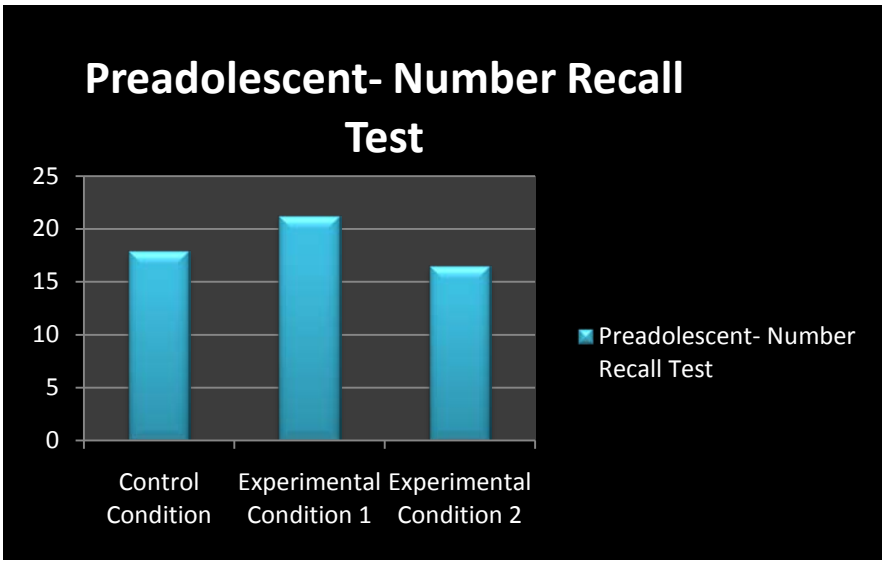
With the help of the SPSS software, the statistical analysis was done. The assumptions of the parametric test has been met, as measured by the Mauschly's test of sphericity and Box's test.

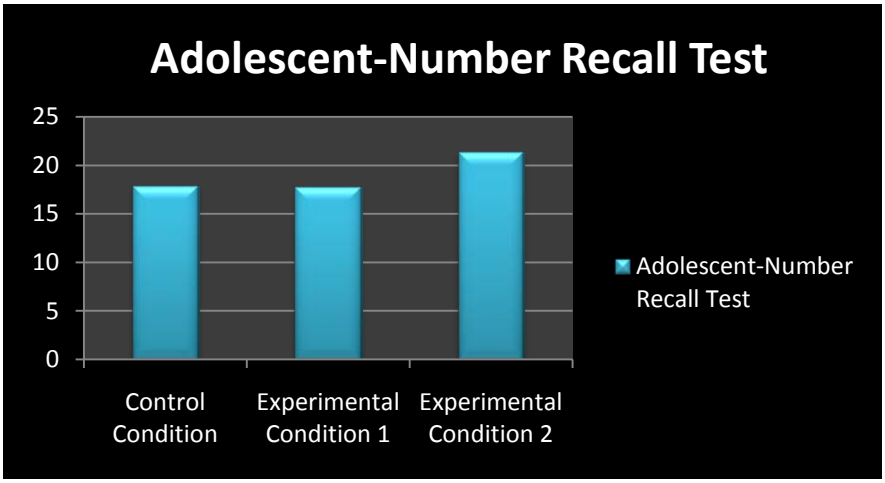
1. Attention by Number Cancellation Test

CODE	Mean	Std. Deviation	N
C/N.C adolescence	17.90	3.01	20
Pre-adolescence	17.88	2.28	16
Total	17.89	2.67	36
E1/NC adolescence	17.85	3.07	20
Pre-adolescence	21.25	3.02	16
Total	19.36	3.46	36
E2/NC adolescence	21.40	2.26	20
Pre-adolescence	16.50	3.22	16
Total	19.22	3.65	36

Effect	F	Hypothesis df	significance	Eta Squared
Number cancellation test	3.438	2.000	.044	.172
Number cancellation test between two groups	18.279	2.000	.000	.526

The Independent variable shows significant effect on the 1st Dependant variable, Number cancellation test for attention for both



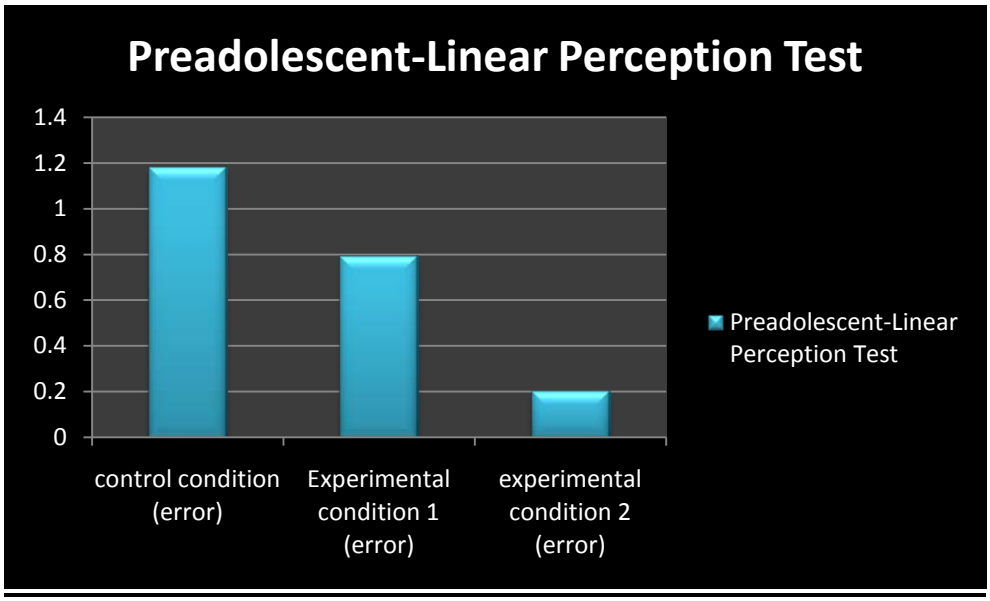


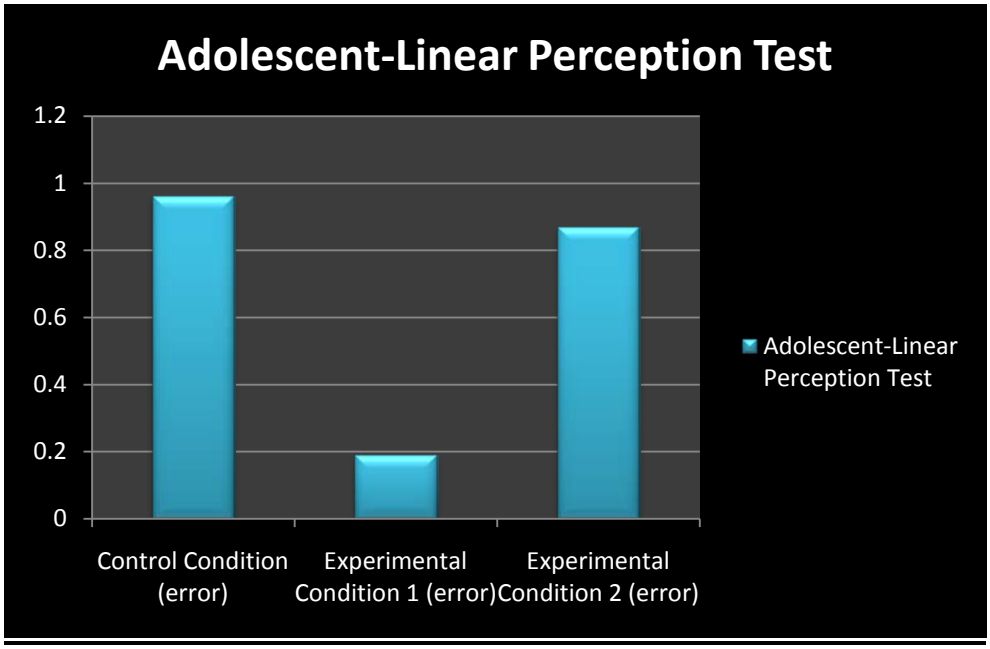
2. Perception by Linear Perception Test

The mean difference of result table indicates adolescent and preadolescent group in the control condition shows better ability in the test of perception. But there is no improvement in performance for both the experimental conditions in case of both the groups for the effect of IV. But again if only the experimental conditions are compared between each other, it is seen that the preadolescent group shows better performance in the 1st experimental condition and adolescent group shows better performance in the 2nd experimental condition.

CODE		Mean	Std. Deviation	N
C/ML	adolescent	0.96	.729	20
	pre-adolescent	1.18	.418	16
	Total	1.06	.613	36
E1/ML	adolescent	0.19	.25	20
	pre-adolescent	0.79	.71	16
	Total	0.52	.62	36
E2/ML	adolescent	0.87	.252	20
	pre-adolescent	0.20	.323	16
	Total	0.50	.447	36

Effect	F	Hypo. df	significance	Eta Squared
Linear perception	15.822	2.000	.000	.490
Linear perception Between two groups	19.565	2.000	.000	.542





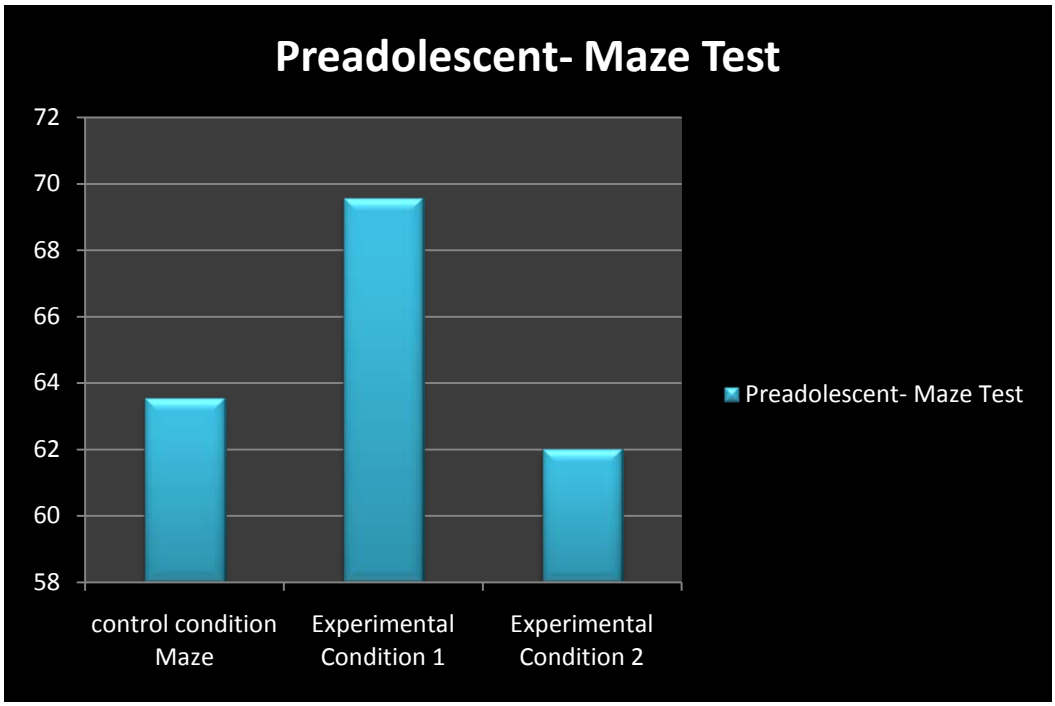
3. Problem solving Ability by Maze Test

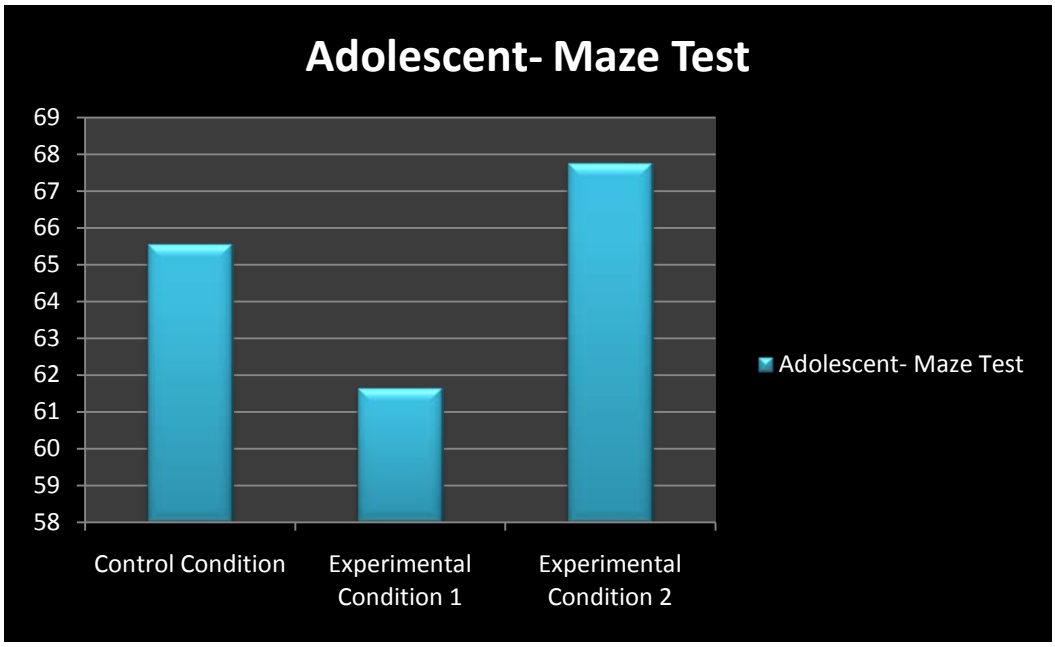
Descriptive Statistics

	CODE	Mean	Std. Deviation	N
C/MZ	adolescent	65.55	5.82	20
	pre-adolescent	63.38	5.02	16
	Total	64.58	5.51	36
E1/MZ	adolescent	61.65	5.52	20
	pre-adolescent	69.56	5.01	16
	Total	65.17	6.57	36
E2/MZ	adolescent	67.75	5.82	20
	pre-adolescent	61.88	4.38	16
	Total	65.14	5.95	36

Effect	F	Hypo. df	significance	Eta Squared
Maze Test	.682	2.000	.513	.040
Maze Test between two groups	15.960	2.000	.000	.492

The mean difference of result table indicates adolescent group showed relatively poor performance under the 1st experimental condition, but showed improvement in the 2nd experimental condition. Completely reverse happened with the preadolescent group.





4. (a) Memory by Digit Span Test (adolescents)

Descriptive Statistics

	Mean	Std. Deviation	N
C/DS-PRT	72.40	10.01	20
E1/DS-PRT	76.40	10.38	20
E2/DS-PRT	81.05	8.32	20

Effect	F	Hypotheses df	Sig.	Eta squared
Digit span	8.611	2.000	.002	.489

The mean difference of result table indicates adolescent group showed relatively poor performance under the 1st experimental condition, but showed improvement in the 2nd experimental condition. But mean of both the experimental conditions show improvement of performance than the control condition mean.

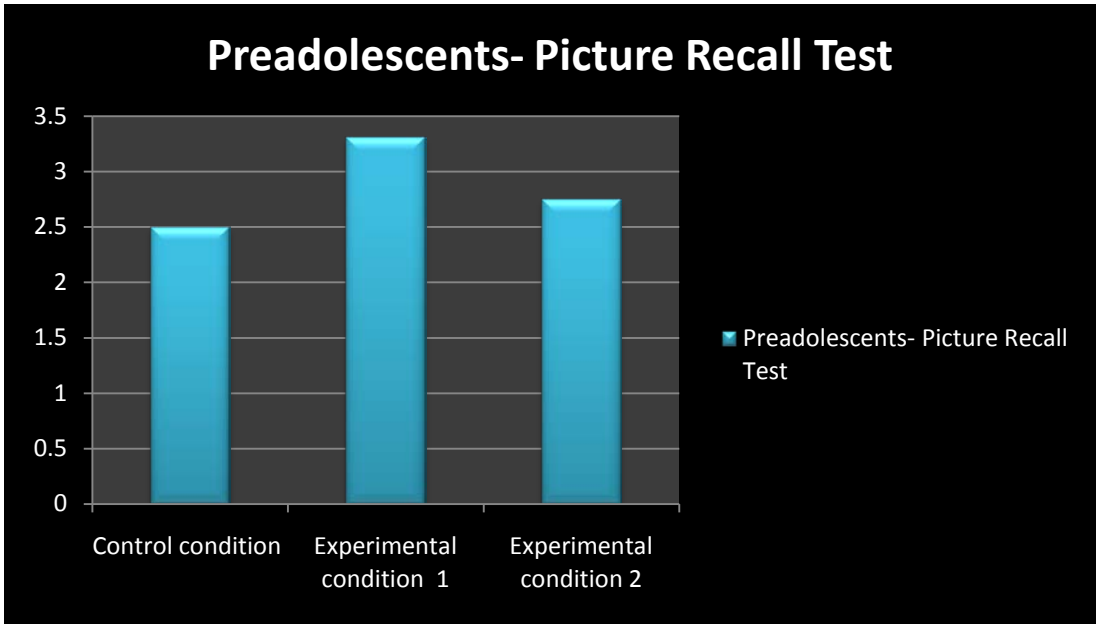
(b) Memory Picture recall Test (Preadolescents)

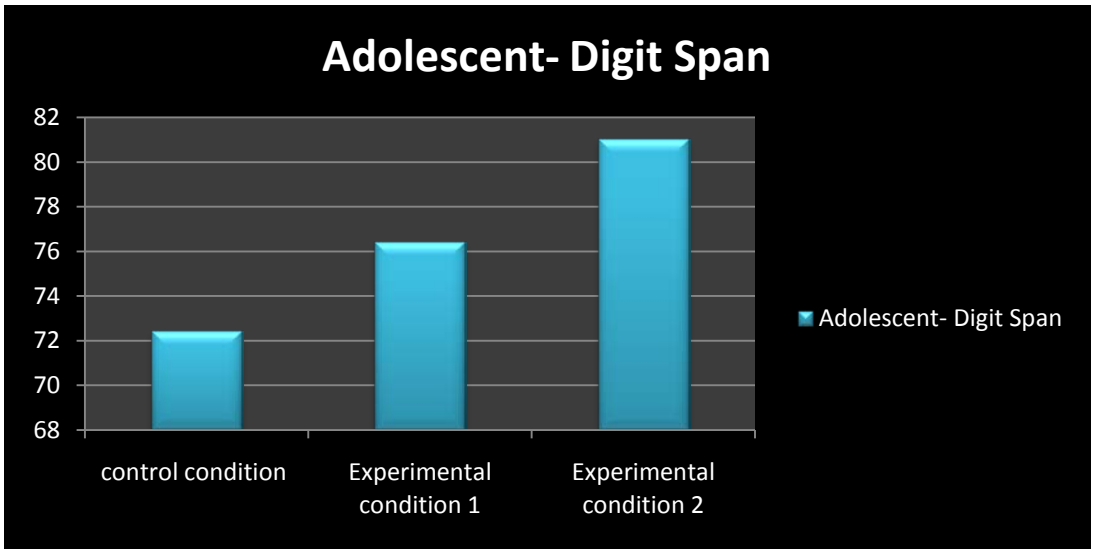
Descriptive Statistics

	Mean	Std. Deviation	N
C/DS-PRT	2.50	.63	16
E1/DS-PRT	3.31	.70	16
E2/DS-PRT	2.75	.58	16

Effect	F	Hypotheses df	Sig.	Eta squared
Picture Recall test	7.883	2.000	.005	.530

The mean difference of result table indicates preadolescent group showed relatively poor performance under the 2nd experimental condition, but showed improvement in the 1st experimental condition. But mean of both the experimental conditions show improvement of performance than the control condition mean.





DISCUSSION

In the research findings, it was prominent that the preadolescent subjects with depression performed better in the first experimental condition due to the effect of pleasant Raag-Khamaj, than in the second experimental condition where less pleasant or mournful Raag Marwa was presented. This is may be because they perceived the music as peaceful, cheerful and soothing. A soothing mind can always perform better in any cognitive task. Music inducing positive mood can selectively modulate components of cognitive control [(8)]. In case of the pre adolescent group of the present study, their performance in the second experimental condition was not up to the mark. May be that was because, in the second experimental condition, the music piece that was

presented before the test taking, was perceived as mournful and sad. Consistent with previous analogue studies of depression rejection [(9)], participants responded with greater rejection to a depressive than to a non-depressive stimulus. In the recent study it was described that a depression vulnerable individual or a depressed individual is more likely to repel a sad stimulus [(10)]. This could be a probable reason of the preadolescent group in the present to perform better in the pleasant musical piece than in the sad musical piece [(11)].

There was also a chance that the pre adolescent might wanted to come out of their prevalent state of mood, and thus moved by the music inducing positive mood in them.

In case of the adolescent group, the result was pretty different from the pre-adolescent subjects. Depression is not "one size fits all," particularly when it comes to the genders. Not only are women more prone to depression than men, but the causes of female depression and even the pattern of symptoms are often different. Many factors contribute to the unique picture of depression in women—from reproductive hormones to social pressures to the female response to stress. , Particularly in girls, feeling worse after listening to the music may be indicators in adolescents of vulnerability to suicidal thoughts and actions. Women are mostly masochistic, they are more likely to remain in the traumatized situation and often gets moved by the similar memories or reminiscent of the original trauma [(12)]. In the present study, the depressed adolescent subjects showed their preference for the music inducing sadness. They described verbally how peaceful the music was to them. They appeared to feel calmness during the presentation of the IV. During the testing session they performed remarkably well than the first experimental condition.

Cognitive theories of depression have focused primarily on enhanced processing of negative stimuli as an explanation for the etiology and maintenance of depression. Consistent with these formulations, depressed subjects have been found to exhibit faster responses to negative stimuli than they do to neutral or positive stimuli. A different conceptualization of depression focuses on the absence of positive affect. Consistent with this perspective, studies of depressed individuals have documented significantly diminished responsiveness to positive (but not negative) stimuli. Taken together, depression appears to be associated with increased processing of negative stimuli and/or diminished processing of positive stimuli.

In the study of ‘Music alters visual perception’ [(13)], it was discussed about the relation between mood and perception. They have also investigated how a particular mood is induced by music and how the perceptual process alters. The illusory percepts are strongly influenced by the observers’ mood. The illusory percepts are believed to reflect the content of internal representation that is employed by the brain. But in the present study, both the group of the subjects showed less erroneous performance in the linear illusion test. This may be because the

test was mood congruent with the music. In such an interpretation, the sensory representations on which a subsequent perceptual decision would be based would be directly influenced by the subjects' state of mind. In this case music has some effect on the subjects as their performance ability slightly increased in the experimental conditions due to the presence of music as IV.

Therefore in this study it is prominent that music has some significant effect on the cognitive level of the present population. The study hence, is a small step towards the therapeutic process with Indian classical music as a healing way out for children suffering from depression. The same study can be done on various populations with large sample size and thus can form a more generalized method.

CONCLUSION

There are rare works on the interaction between Indian classical music and cognition taking the clinically depressed population. Music is a combination of frequency, beat, tone, rhythm, repetition, pitch and lyrics. These have been shown to have a profound impact upon the human physiological state, including behavior, emotional response, relaxation and wellness. Different basic personalities tend to be attracted to certain styles of music. Personal life experiences, memories, levels of stress, excitement or fatigue, environmental factors and type of music affect the way the brain processes sound. Music influences our emotions because it acts as our languages and helps express our emotions.

The present study is expected to help in further research areas in different fields of psychology, musicology and physiology. And in near future there will soon be a more authentic process of improving a depressed child's cognitive condition through music. Children suffering from depression shows irritability, poor academic performance, vulnerability to death themes and suicidal thoughts, withdrawn peer relationship. Further research on this area can formulate a way out to this grave problem. And as right music act as a healing process since the historical period, music is believed to cure mental condition to a great extent. And this study is probably a minor attempt to reach the goal.

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Conflict of Interests

The author declared no conflict of interests.

REFERENCE

1. Burney C and Mercer F. A general history of music From the Earliest Ages to the Present Period. New York. Harcourt, Brace and company. 1789.

2. Wigram T, Pedersen I, Bonde L. Introduction to Music Therapy. In: Wigram T, Pedersen I, Bonde L, eds. A Comprehensive Guide to Music Therapy. London, UK: Jessica Kingsley. 2002:17-44
3. Weinberger NM. Music and the Brain. Scientific American. 2004; 291: 88-95
4. Slaboda J. Music structure and emotional response. Some empirical findings. Psychology of Music. 1991; 19(2): 110-20
5. Schellenberg, E.G. (2012). Cognitive performance after music listening: A review of the Mozart effect. R.A.R. MacDonald, G. Kreutz, & L. Mitchell (Eds.), Music, health and wellbeing (pp. 324-338). Oxford, UK: Oxford University Press.
6. Adalarasu, K., Jagannath, M., & Ramesh, N. (May 2012) EEG Based Neurophysiological Responses To Music Among Sleep Disorder Patients.
7. Sairam TV. Melody and rhythm- 'Indianness' in Indian music and music therapy. Music Therapy Today (Online 22nd December). 2006; 4: 876-891. Available from http://musictherapyworld.net
8. Gray, J.R. and Reis, D.L. (2001). Affect and action control. Handbook of action control, 2nd ed. Emotion-cognition interaction.
9. Sacco, W.P., & Dunn, V. (1990). Effect of actor depression on observer attributions: Existence and impact of negative attributions toward the depressed. Journal of Personality and Social Psychology, 59, 517-524
10. Wenicke, R.A., Pearlman, M.Y., Thorndike, F.P., and Haaga, (Jan 2006), D. Depression proneness and reaction to depressive stimulus. J Psychol, 140(1): 69–79.
11. Hunter, P.G., Schellenberg, E.G., & Schimmack, U. (2010). Feelings and perceptions of happiness and sadness induced by music: Similarities, differences, and mixed emotions. Psychology of Aesthetics, Creativity, and the Arts, 4, 47-56.
12. Bessel, June 1989. The Compulsion to Repeat the Trauma. Psychiatric Clinics of North America, Volume 12 (2):389-411.
13. Jolji, J. and Meurs, M. (2011). Music alters visual perception. Journal.pone.0018861, DOI:10.1371.

Websites visited:

www.googlesearch.com
www.pubmed.com
www.researchnavigator.com
www.apajournals.org
www.ingentaarticles.com

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