

Cognitive functioning of Adolescent: varying the exposure of different artistic extracurricular activities

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Abstract

Cognitive functioning is a constellation of abilities that leads to knowledge, or awareness of the world. Cognitive development is developmental processes which depend, to a great extent, on exposure to positive environmental factors and stimulation. In this study, researcher attempted to find out the possible impact of artistic extracurricular activities on specific cognitive abilities. The final sample of the study comprised of 48 children of 13 to 15 years of age, studying in 7th or 8th grade, and having level of intelligence between 75th to 90th percentile (as measured by Raven's Standard Progressive Matrices). Among them, 24 were engaged in any one artistic extracurricular activity (8 in Vocal Music, 8 in Drawing and 8 in Drama) for at least two years and maximum 3 years. The participants were administered five subtests (Similarities, Comprehension, Letter-number Sequencing, Symbol Search and Digit Span) of WISC-IV. Data was analysed using nonparametric statistics. Results indicate positive impact of artistic extracurricular activities on three cognitive abilities: Verbal abstract reasoning (Similarities), Social judgement (Comprehension), and Processing Speed (Symbol search). Specifically, Drama was associated with better comprehension while drawing was associated with better symbol search performance.

Keywords: *Artistic extra-curricular, cognitive functioning.*

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Cognitive functioning is conceptualized as constellation of different abilities like attention, concentration, learning & memorization of new information, manipulation of old knowledge; developing and utilizing language; social awareness, judgement; Perceptual-motor coordination & perceptual constructional functioning; use of abstract thinking in verbal and nonverbal materials etc, that are used in daily activities. These cognitive functioning(s) are not static across the lifespan for any individual. Rather, cognition development is a developmental process, based on Neuro-developmental milestones and exposure to different environmental factors. Among the different factors of environment, one of the resources from which cognition is developed and modified is acquiring knowledge and strategies from curriculum and extra-curricular activities.

Extra-curricular enrichment programmes are highly structured activities which are offered after school activities (where academic curriculum is mostly emphasised) on a regular basis, usually chosen by the student himself/herself, and are supervised by adult leader, based on academic and/or non-academic activities such as debate, sports, theatre, dance, music, gardening etc to enhance skill and value-aided knowledge. Usually, these activities do not follow any strict curriculum and performance is not graded. In this study, a widely practised form of extra-curricular activities i.e., artistic activities are investigated. Artistic activities are creative ones like drawing, painting, modelling, singing etc. Lowenfield (1982) described, "Art is a dynamic and unifying activity, with great potential for the education of our children. The process of drawing, painting or constructing is a complex one in which the children brings together diverse elements of his experience to make a new and meaningful whole". Besides drawing, other performing arts such as, performing vocal and instrumental music, theatre etc are also act as artistic extra-curricular activities. From the perspective of different levels of social system (Bronfenbrenner & Morris, 2006), it can be said that, these extra-curricular activities act as a micro-system for the bio psychosocial development of children whose life are embedded in the macro-system of school and families. As a whole, though extra-curricular activities have been an essential, vital and extensive part of education in developed countries, it is very popular practice in developing countries too. Digest of Gifted Research (2015) showed in a study that the talented students from India and USA prefer to engage in many extra academic activities and they like to invest more time to it.

Beside influence on cognitive functioning, empirical findings (for e.g., Mahoney & Cairns, 1997; Gerber, 1996; Branch, 2003; Kort-Butler & Hagewen, 2011) reveal a strong connection in between extracurricular activities and social outcomes, academic engagement & achievement and educational attainment of adolescents. In this connection, Oliver (1995) suggested that individual's participation in extracurricular activities can build young persons' interest in school, strengthen their sense of identity, and allow them greater exposure and self-satisfaction from service. Elder & Conger (2000) thought in the same line that participation in extracurricular activities has also been linked to increases in interpersonal competence, self-competence, self-concept, school engagement and educational aspirations.

In Indian tradition, training, and expertise in any one extra-curricular activity was an indispensable part of life. However, due to westernization and increasing urbanization & industrialization, extra-curricular activities are increasingly commercialized and are losing their essence as well as primary objective. Since extra-curricular activities are designed in specific

ways to promote growth in various aspects, it is only just to enquire their possible impact on cognitive abilities, which develops with age and positive environmental input. Also, there is a dearth of Indian research on this field. Thus, this study has attempted to find out the possible impact of artistic extra-curricular activities on specific cognitive abilities.

Objective of the study:

1. To find out the difference between group of children who do not receive any artistic extracurricular activities and group of children who got the exposure of artistic extra-curricular activities if any, with respect to different aspects of cognitive ability.
2. To find out the difference among three groups of children who got the exposure of artistic extra-curricular activities, i.e., singing, drawing and drama if any, with respect to different aspects of cognitive ability.

Method

Participants:

In this study, participants were selected based on the following criteria: To be included in the study, the inclusion criteria were: a) Participants were required to be studying in grade VII-VIII of private co-educational English medium schools b) to have level of intelligence in between 75th and 90th percentile, c) to be of the age range of 13-15 years, d) to be of Hindu religion and e) Bengali race and f) to have per capita income of 1,00,000 to 1,50,000 INR per year. Along with these criteria, for inclusion in the second group i.e. the group receiving extra-curricular activities, the participants were required to be involved in only one extra-curricular activity, to be involved in the respective activity for a continuous period of minimum of at least two years and maximum three years, and also to have chosen respective activity voluntarily and to be currently involved in this extra-curricular activity. The exclusion criteria were a) history of any chronic physical, sensory and neuro-developmental disability, b) presence of neurological and psychiatric disorder c) not giving informed consent.

Research design:

Selection of IV and DV : In the study, *Artistic extracurricular training* is the experimental type task related independent variable and three levels of IV are training in vocal Music, drawing and drama. Dependent variables are *different cognitive functioning (verbal comprehension, working memory and processing speed)*. There are two main groups of the study. Experimental group (EG) got the exposure of Artistic extra-curricular training and another group which is matched with this experimental group, i.e., control group did not get any exposure of any extra-curricular training. Then EG was divided into three matched groups – EG1, EG2 and EG3 (n= 8) who got three different extra-curricular training: Vocal music, Drawing and Drama respectively. In this study, all the groups were matched in terms of level of intelligence and socio-demographic variables. The mean level of intelligence in terms of percentile and age was 80.26 and 14.2 years respectively for the group receiving no extra-curricular activities and 80.6 and 14.1 years respectively for the group receiving extra-curricular activities. So, Subject relevant extraneous variables are controlled through matching techniques. Duration of extracurricular activities (six hours per week for last two years) and timing of training (evening in week days) were constant for all three levels of IV. So, situational extraneous variable was also controlled by matching technique of controlling. Hence pre assessments of DVs were done in this

study, here research design was – post-test only control group design as a type of matched group experimental design.

Materials:

1. Personal Information Schedule:

The information schedule was designed to elicit information regarding name, age, sex, religion, race, parental income, number of family members, address and history of physical/psychiatric illness, involvement in extracurricular activities, Nature of school based co curricular activity, the nature of activity and the duration of involvement, and whether the participant engaged voluntarily in extracurricular activity.

2. Standard Progressive Matrices (SPM):

Raven, Court & Raven developed this scale to measure the educative component of ‘g’ as defined in Spearman’s theory of cognitive ability. The SPM is both an individual and self administered or group test. Many studies covering a wide age range, many cultural groups and clinical as well as normal populations have reported good psychometric properties for SPM. This scale was used to assess intelligence level of the children. Children, whose levels of intelligence belong in between 75th and 90th percentile, were selected for further testing to assess different cognitive abilities.

3. Wechsler intelligence Scale for Children (WISC):

Developed by Wechsler, WISC is an individually administered intelligence test for children between the ages of 6 to 16. The WISC takes 65-80 minutes to administer and generates an IQ which represents a child’s general cognitive ability. Several studies have reported sound psychometric properties of WISC across different age and culture. In the present study, five subscales of this test, namely Similarities, Comprehension, were used to assess abstract reasoning, ability to deal with abstract reasoning, verbal categorization and concept formation, social awareness and judgement, in one hand; Digit Span & Letter-number sequencing were used to measure attention and concentration, working memory; and Symbol search subtest was used to measure processing speed of the subject.

Procedure:

Here the sampling method was purposive in nature. The Principals or Vice Principals of different private co-educational English medium schools were approached for their approval and cooperation to collect data from the students of the respective schools. The participants were given a consent form that also contained information regarding nature and purpose of the research. Those who gave consent were explained the work in further detail and filled up the personal Information schedule, which was designed to elicit information regarding the predetermined inclusion and exclusion criteria. The initial sample comprised of 68 participants of age range 13 to 15 years, educational qualification of seventh and eighth standard. Out of 68 participants, 5 did not complete the assessment, and thus were not included. 15 children were not included in this study due to level of intelligence below 75th percentile. Total sample is 48 individuals were divided into two groups: the first group (24 children) did not engage in any artistic extra-curricular activities and the second group (24 children) was engaged in extra-curricular activities. The second group was further sub-divided into three groups on the basis of nature of extra-curricular activities: Vocal music, Drawing and Drama. Number of participants in each subgroup was 8.

Data Analysis:

Since sampling method was purposive in nature, sample size was very low, nonparametric statistics were used in this study. Statistical analysis of the data was done with the help of Statistical Package for Social Sciences, Windows Version 21 (SPSS 21.0). Firstly, Mann Whitney U test was used to analyse significance of difference between children who did not receive any artistic extracurricular activities and children who received artistic extracurricular activities. Secondly, Kruskal Wallis One Way ANOVA by ranks was used to find out significance of difference, among three sub-groups of children who received artistic extracurricular activities i.e. vocal music, drawing and drama with respect to different cognitive abilities .

Results

Table 1: Mann Whitney U scores on 5 subtests of the WISC IV of two groups:

Subtests	No extra-curricular activities (N=24)		Extra-curricular activities (N=24)		U	Sign.
	Mean Rank	Sum of Rank	Mean Rank	Sum of Rank		
Digit Span	19.29	4.98	21.62	4.63	192	N.S. at 0.05 level
Similarities	14.17	4.86	18.75	3.99	122.5	Sig. at 0.01 level
Letter Number Sequencing	18.62	4.16	19.75	4.07	236	N.S. at 0.05 level
Symbol Search	12.58	2.93	21.21	3.551	11.0	Sig. at 0.01 level
Comprehension	11.25	3.49	20.21	2.89	18.0	Sig. at 0.01 level

N= Number of participants in the group NS = Non-Significant Sign. =Significant

Table 2: Kruskal Wallis One Way ANOVA scores on five subtests of the WISC IV of three different groups artistic extracurricular activities (Vocal Music, Drawing & Drama):

Subtests	Drawing (N=8)	Vocal Music (N=8)	Drama (N=8)	K	Significance
	Mean Rank	Mean Rank	Mean Rank		
Digit Span	13.42	13.44	10.19	1.90	N.S. at 0.05 level
Similarities	11.62	15.25	10.62	1.91	N.S. at 0.05 level
Letter Number Sequencing	12.06	16.88	8.56	5.61	N.S. at 0.05 level
Symbol Search	18.44	10.00	9.06	8.62	Sig. at 0.01 level
Comprehension	7.19	14.25	16.06	7.23	Sig. at 0.05 level

N= Number of participants in the group NS = Non-Significant Sign. =Significant

Table 1 show that there exists significant difference between the two groups (i.e. group of children receiving no extra-curricular activities and group of children receiving extra-curricular activities) in terms of three cognitive abilities which are Similarities, Symbol Search and Comprehension. The tables also show that in these cognitive abilities, children who received extra-curricular activities performed better than children who did not receive extra-curricular activities.

Table 2, it may be observed that there exists significant difference between children receiving the three different types of artistic extracurricular activities i.e. Drawing, Vocal music and Drama with respect to the cognitive abilities of Symbol search and Comprehension. Scores of Comprehension were highest in the group of Drama whereas the scores of Symbol Search were highest in the group of Drawing.

Discussion:

The present study portrays fruitful implication of artistic extracurricular activities (drama, vocal music and drawing) on verbal comprehension and processing speed components. The possible linking mechanism between enhancement of cognitive skills in artistic extracurricular activities engagement, and its reflection in other domains of cognitive functioning might be transfer of learning, i.e., process of gaining or developing insight into the use of concepts and generalizations in one situation and employing it afterwards in other situations.

The results of this study found that those who practise artistic activities have better performance in similarities subtest than their peers who does not practise any artistic activities. The similarities task requires abstract reasoning, and verbal concept formation. Lessons in artistic activities can train a constellation of abilities like concentrating on a specific object of focus, decoding underlying meaning, and so on. Training in this activities can, in turn, improve abstract reasoning. Another point is that, art is inherently abstract in nature. For example, in music, a tune is defined solely by its relational position and relational information. Thus, a tune is, basically, an abstraction. A listener can identify a tune irrespective of whether it is played in slow or fast tempo, or whether in different instruments. Further, listener's representations must generalise to patterns that are close but not identical, for this is what builds their conception of music. Thus, thinking in abstract terms and mentally representing similarities and differences between tunes and themes are very central to music training, which, in turn, may boost abstract reasoning capacities. Rauscher et al (1996) reported that listening to ten minutes of Mozart's music increased the abstract reasoning ability of college students, as measured by IQ scores, by 8 or 9 points compared with listening to relaxation instructions or silence, respectively. This startling finding became known as the 'Mozart effect'. Even for a painter, learning to recognise as well as create patterns is very basic, which, again, involves abstract reasoning, and thus, it is only natural that practising artistic activities would have a positive impact on abstract reasoning.

The study indicates that children with exposure to artistic activities perform better in the subtest of comprehension. Specifically, children with exposure to drama perform the best. The subtest of comprehension taps ability to deal with abstract social conventions, rules and expressions.(Elver & Wilkerson(2015) All these abilities draw on language. Language allows people to learn from others and to communicate: functions which are actively practised in drama. Drama creates opportunities for children to interact in a productive and purposeful way, with

other members. In the zone of proximal development, with the help of teachers ‘scaffolding’ in drama class (Bruner 1988) (providing guidance, reinforcement, structure etc.) children’s own experience can be extended. Drama can direct children toward extending their curriculum experiences, to solve problems and deal with situations, which on the surface would appear to be too difficult. Study by DuPont (2010) Showed that creative drama enhances reading comprehension ability. The findings of this study is supported by the results of the study conducted by De la Cruz, Lian & Morreau (1998), which found that creative drama improved social and oral language skills of children with learning disabilities. Various situations, and scenes drama makes use of in its plot, usually is not detached from the cultural/ social reality of the participants. In fact, they simulate reality and real-life issues. Various activities involved in drama like role-playing, writing scripts, involves taking perspectives, analysing the socio-cultural milieu, and humans in general. Thus drama may enhance interpersonal intelligence. As a form of social practice, drama is highly dependent upon both inter- and intra-personal skills where the intra-personal is concerned with the development of the internal aspects of the self and inter-personal with relationships in social world. In drama, a participant playfully interacts on many levels, and it is a complex social art (Wright & Rasmussen, 2001). Also, in drama, while playing roles, children are exposed to various moral dilemmas and social issues, which might actually boost their social understanding and sharpen abstract reasoning related to social phenomena. Also, drama is firmly grounded in the use of the body to skilfully communicate ideas and emotions through movement and gesture. This was, drama can assist children in developing and refining ability to use and interpret body language; a vital social skill. It is well-known that movements play a functional role in cognition. Gestures aid spatial memory; and some investigators (e.g., Krauss& Hadar, 1999; Morsella & Krauss, in press) contend that they can facilitate the retrieval of words with spatial semantic content. Gestures are widely made use of in drama. The idea that co-speech gestures can facilitate speech production is not new (Butterworth & Hadar, 1989; De Laguna, 1927) and might indirectly provide an indirect explanation for the association between drama and comprehension- in which speech is an important part. Kincheloe et al (1999) have asserted that ‘the verbal meaning (knowing) learners acquire is shaped by their interpretive activities’ and these activities are ‘constructed in relation to some form of action’. Thus, knowing is facilitated by action (mimesis) in drama. The influential drama scholar Richard Courtney (1990) has voiced similar opinions while describing how drama can influence various domains of functioning. According to him, the fictional world in drama always has the possibility of the real world, and this helps us to project and transform what we know. So, in drama, knowledge is transformed by action.

The study indicates that in the subtest of symbol search, the group with exposure to artistic activities performed better than their matched peer group. Specifically, the group with exposure to drawing performs the best in this task. In the subtest of symbol search, children are required to visually scan a search group and indicate whether the target symbol(s) matches any of the symbols in the search group within a stipulated time limit. This task may involve both processing speed (Gs) and the ability to perceive and think with visual stimuli (Gv) (Keith et al., 1993). The symbols are geometric figures, rather than familiar letters or numbers. It requires visual perception and organization, to discriminate between, and sequentially order visual

information, visual scanning and the efficient production of multiple motor responses, capacities, which undoubtedly are involved in drawing. The nature of artists' perceptual abilities has long been the subject of discussion and speculation. However, psychological studies of artists' perceptual and cognitive abilities are surprisingly scant. When the participants are involved in drawing sessions, their selective attention and concentration, visual discrimination, visuo-motor coordination are nurtured and sharpened. Thus, these sharpened cognitive processes might lead to more efficient visual information processing and thus, to faster processing. So, here, drawing acts as a cognitive training and this is reflected through better performance in processing speed subtest (here, symbol search). Several studies demonstrated that artists or experts in visual arts showed high ability on visual processing of objects. Winner & Colleagues (Winner & Casey, 1992; Winner, 1996) found that art students show superior performance compared to students on other domains on generation and transformation of mental image tasks, as well as imagery processing style. In a study by Kavakli et al (1999), analysis of design protocols of novice and expert designers have shown that there are differences in the balance of cognitive actions between novice and expert designers, which implies that sustained exposure to drawing activity, i.e, practising drawing can lead to a more efficient executive cognitive processes.

Conclusion:

Thus, in summary, this study implicates the role of artistic extracurricular activities in development of different cognitive abilities like comprehension, processing speed. It is safe to say, in the light of the results obtained from the study, that 'extra-curricular' activities might actually be no less important, and that these activities should be considered with more importance for the overall development of children. However, this study is not without its limitations, which should also be considered while noting its results. The sample size of the study was quite low. Also, only three types of extra-curricular activities were included in this study while there lies so many more types of activities. Also, the study was cross-sectional in nature, which did not allow it to observe the role extra-curricular activities may play in cognitive developmental trajectory of children. Thus, a future study, with a bigger sample size, more comprehensive consideration of different kinds of activities and a longitudinal design would benefit this field.

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