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Research Paper

Role of Music Training in Aggression and Anxiety of Adults

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ABSTRACT

Mental health problems like uncontrollable anxiety and abusive aggression of young adults create a serious concern for all in society. The present study examined the role of music and art training in aggression and anxiety of young adults. For this study a sample of 361 adults (consisting 187 males and 174 females) between 19 to 28 years of age was selected following stratified random sampling procedure. The male and female sample was divided into eight subgroups on the basis of the form of received training. They were as followed: 1) Trained in vocal music, 2) Trained in instrumental music, 3) Trained in other forms of art, and 4) Untrained Males and Females in each category with the lowest N being 40 in each group. Information schedule was administered as a screening device. The Aggression-Orientation Scale by Basu (2006) and State–Trait Anxiety Inventory by Chattopadhyay, Mallick and Speilberger (1986) were used for assessing aggression and anxiety of the participants respectively. The difference in aggression and anxiety among the eight subgroups was found out. The collected data was analysed using statistical techniques like Mean, S.D., Analysis of Variance and Post Hoc Analysis. The results revealed externalizing and internalizing tendency, verbal and indirect behavior of Aggression-Orientation dimension and Trait-anxiety of the participants varied significantly in terms of forms of training. Male and female participants varied significantly on the basis of scores of all the domains of Aggression-Orientation dimension and Trait-Anxiety. Finally, it could be elicited that the training in music (vocal and instrumental) and other forms of art helped the participants to channelize aggression and the participants with instrumental music training and other forms of art helped in alleviating anxiety.

Keywords: *Trait Anxiety, Aggression-Orientation, Music training (vocal and instrumental) and Other Forms of Art training*

Music is defined as "the science or art of ordering tones or sounds in succession, in combination, and in temporal relationships to produce a composition having unity and continuity", which includes "vocal, instrumental, or mechanical sounds having rhythm, melody, or harmony" (*Merriam-Webster's collegiate dictionary*, 2003). Training is defined as any specific instructional program or a set of procedure designed to yield as an end product an organism capable of making some specific responses or engaging in some complex skilled activity (Reber & Reber, 2001). Thus, in this study music training

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can be defined as an instructional program in vocal and instrumental music or a set of systematic procedure designed to yield skilled music activity. Several studies revealed music training can affect various variables like aggression, anxiety, self-esteem, depression etc.

Music can act as an anxiolytic treatment -an anxiety preventative or reducing measure and improve the emotional state of adults (Laiho, 2004; Lesiuk, 2005; Saarikallio & Erkkila, 2007; Silk, Steinberg, & Scheffield-Morris, 2003; Thayer, Newman, & McClain, 1994). Research findings suggest music's effect in controlling aggressive behavior in children with highly aggressive behavior (Choi, Lee & Lee, 2010). Music education involves a great deal of processing by the brain, which includes vision, hearing, touch, motor planning, emotion, and symbol interpretation.

The effect of music training is not sufficiently unfolded in Indian context, especially in Bengali culture. The differential effect of music intervention could only be found out, if a comparison could be drawn between the forms of music, other forms of art intervention and without any form of art training.

***Objectives**:*
Therefore, the main objectives of the present study are to examine the role of music training in aggression and anxiety of young adults.

Hypotheses:

1. Aggression-Orientation domains (i) predisposition, (ii) externalizing tendency, (iii) internalizing tendency, (iv) physical behavior, (v) verbal behavior, and (vi) indirect behavior of adults vary with their forms of training (A) i.e. in terms of (a) Training in vocal Music, (b) Training in instrumental Music, (c) Training in any other forms of art and (d) No training in any form of art irrespective of their gender (B).
2. Aggression-Orientation domains (i) predisposition, (ii) externalizing tendency, (iii) internalizing tendency, (iv) physical behavior, (v) verbal behavior, and (vi) indirect behavior of adults vary with their gender i.e. in terms of (a) male and (b) female irrespective of their forms of training.
3. There is an interaction effect of forms of training and gender on aggression-orientation domains (i) predisposition, (ii) externalizing tendency, (iii) internalizing tendency, (iv) physical behavior, (v) verbal behavior, and (vi) indirect behavior of adults.
4. Trait - anxiety of the adults varies with their forms of training (A) i.e. in terms of (a) Training in vocal Music, (b) Training in instrumental Music, (c) Training in any other forms of art and (d) No training in any form of art irrespective of their gender.
5. Trait -anxiety of the adults varies with their gender irrespective of their forms of training.
6. There is an interaction effect of forms of training (A) and gender (B) on trait anxiety of adults.

METHOD

***Sample**:*
A sample of 361 participants (187 males and 174 females) aged 19 to 28 years was selected. The sample was divided into eight groups: trained males and females in vocal music, instrumental music, and other art forms, along with untrained males and females, with each group comprising at least 40 participants. A disproportionate multistage stratified random sampling method was employed for the study. Stratification was performed based on the

three zones of Kolkata city—north, south, and central. From each zone, four undergraduate coeducational colleges, one university, and six music or art training institutes were identified to prepare an institutional list. From this list, six undergraduate coeducational colleges, three universities, and nine music or art training institutes were randomly selected for data collection. Among the students of these institutions, participants who provided informed consent and satisfied the inclusion criteria were randomly selected. Data sheets that were incomplete or incorrectly filled were excluded from the analysis.

Participants aged 19 to 28 years, currently pursuing undergraduate, postgraduate, or Ph.D. studies, and having at least five years of training in music or any other form of art were included in the study. Only individuals whose primary occupation was student or researcher were considered eligible. Vocal music training included Rabindrasangeet, classical, semi-classical, and folk styles, while instrumental music training included sitar, sarod, violin, guitar, and other string instruments. Other art forms included painting, photography, and related creative disciplines. Additional inclusion criteria required that participants be unmarried, Indian nationals, Hindu by religion, with a family income between ₹30,000 and ₹80,000 per month, living in families with no more than six members, having no more than one sibling, and having Bengali as their mother tongue. Individuals who had previously received long-term art training but were not currently undergoing training were excluded. Participants who were simultaneously receiving training in both music and other art forms were also excluded from the study.

Tools used*:*

- Detailed information schedule to collect familial and personal information.
- Aggression-Orientation Scale by Basu (2006): In this scale, aggression has been operationally defined as behavior intended to hurt people (Baron, 1977). When directed towards others, it is known as externalized aggression and when toward self, internalized aggression (Choynowski, 1995). Aggression orientation is defined as the sum total of action orientation or impulse toward aggressive acting out in a given direction. This scale assess aggression both directionally, i.e., internal and external and assess quality of aggression that is physical, verbal, or indirect aggression. Along with this, the scale also assesses issue of aggressive trait or predisposition.
- State–Trait Anxiety Inventory by Chattopadhyay, Mallick and Speilberger (1986): FORM X-2, which is the cultural adaptation of State-Trait Anxiety Inventory by Spielberger, Gorsuch and Lushene (1970), to provide a brief and reliable means of distinguishing between two distinct aspects of anxiety, viz., State anxiety and Trait anxiety. For the present research only the trait anxiety questionnaire was used. The trait anxiety is conceptualized as a relatively stable individual characteristic.

Statistical Procedures:

We analyzed the collected data using statistical techniques such as the mean, standard deviation (S.D.), analysis of variance (ANOVA), and post hoc analysis.

RESULT

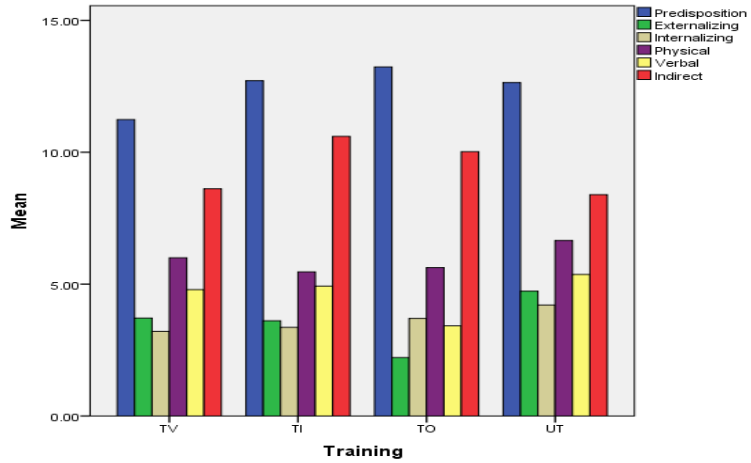
Table 1: The mean, standard deviation and N for dimensions of Aggression-Orientation (predisposition, externalizing tendency, internalizing tendency, physical behavior, verbal behavior and indirect behavior) as dependent variable and music training (trained vocal music, trained in instrumental music, trained in other forms of art and untrained) as independent variable (N= 361)

Music Training	Statistic	predisposition	externalizing tendency	internalizing tendency	physical behavior	verbal behavior	indirect behavior
Trained in vocal music (N=101)	Mean	11.2376	3.7129	3.2079	6.0000	4.7921	8.6139
	SD	5.54824	1.86728	1.88317	3.07571	2.55858	3.51844
Trained in instrumental music (N=80)	Mean	12.7125	3.6125	3.3625	5.4625	4.9250	10.6000
	SD	6.16892	1.94542	2.11830	3.16605	2.46892	3.30937
Trained in other forms of art (N=93)	Mean	13.2366	2.2151	3.6989	5.6237	3.4194	10.0215
	SD	5.15288	1.62754	2.13554	3.06422	2.32343	3.72996
Untrained (N=87)	Mean	12.6437	4.7356	4.2069	6.6552	5.3678	8.3908
	SD	5.70185	1.61720	2.15200	2.98768	2.52483	3.74897

Table 2: The mean, standard deviation and N for dimensions of Aggression-Orientation (predisposition, externalizing tendency, internalizing tendency, physical behavior, verbal behavior and indirect behavior) as dependent variable and gender as independent variable (N= 361)

Gender	Statistics	Predisposition	Externalizing Tendency	Internalizing Tendency	Physical Behavior	Verbal Behavior	Indirect Behavior
Male (N=187)	Mean	13.3209	3.7754	3.4011	6.2781	4.9358	8.8503
	SD	5.30507	1.93242	2.09058	3.10354	2.58119	3.72135
Female (N= 174)	Mean	11.4483	3.3103	3.8333	5.5805	4.2529	9.9138
	SD	5.88278	2.00179	2.08236	3.04719	2.51340	3.57876

Graph 1: The mean, for dimensions of Aggression-Orientation with all its domains (predisposition, externalizing tendency, internalizing tendency, physical behavior, verbal behavior and indirect behavior) as dependent variable and music training (trained vocal music (TV), trained in instrumental music (TI), trained in other forms of art (TO) and untrained (UT) as independent variable (N= 361)



Graph 2: The mean, for dimensions of Aggression-Orientation with all its domains (predisposition, externalizing tendency, internalizing tendency, physical behavior, verbal behavior and indirect behavior) as dependent variable and gender as independent variable (N= 361)

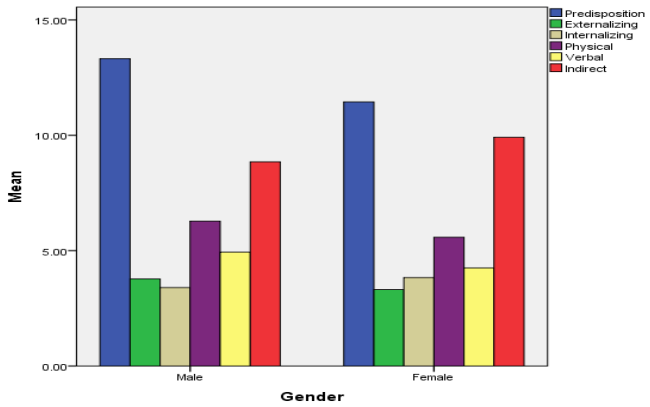


Table 3: Result of MANOVA with Multivariate test (Wilk's Lambda) for determining significance of main effects of forms of training (A) i.e. in terms of (a) Training in vocal Music, (b) Training in instrumental Music, (c) Training in any other forms of art and (d) No training in any form of art, Gender and their interaction effect on Aggression-Orientation dimension (predisposition, externalizing tendency, internalizing tendency, physical behavior, verbal behavior, and indirect behavior) scores.

Source	Value	Hypothesis df	Error df	F	Sig.
Training in Music	.653	18.000	984.778	8.896**	.000
Gender	.907	6.000	348.000	6.075**	.000
Training in Music* Gender	.954	18.000	963.837	.924	.549

**p<0.05, **p<0.01*

For verification of above research hypotheses, Multiple Analysis of Variance (MANOVA) was computed with Aggression Orientation Dimension (with 6 domains-Predisposition, Externalizing Tendency, Internalizing Tendency, Physical Behavior, Verbal Behavior and Indirect behavior) as dependent variable and training and gender as independent variables. As per the MANOVA table, music training and g ender had significant effect on aggression orientation dimensions with all its domains. But the interaction effect found between Music training and gender had no significant effect on aggression orientation.

Table 4: Results of 2x4 Factorial Analysis of Variance for significance of main effects of Music Training, Gender and their interaction effect on Aggression Orientation (Predisposition, Externalizing Tendency, Internalizing Tendency, Physical, Verbal and Indirect) scores.

Source	Predisposition	Externalizing	Internalizing	Physical	Verbal	Indirect
Training in Music	2.254	31.532**	4.265*	2.564	10.728**	8.222**
Gender	9.908**	7.504*	3.792	4.983*	7.278*	7.766*
Training in Music * Gender	.136	.060	1.791	.720	.669	1.841

**p<0.05, **p<0.01*

Table 5: Results of least significant difference table, Externalizing Tendency as dependent variable and Music Training as independent variable with four levels (TV-Trained in Vocal Music, TI-Trained in Instrumental Music, TO-Trained in Others form of Art and UT- Not Trained in any form of Art)

Dependent Variable: Externalizing Tendency LSD						
(I) Training	**(J) Training**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
TV	TI	.1004	.26332	.703	-.4175	.6182
	TO	**1.4978***	.25284	**.000**	1.0006	1.9951
	UT	**-1.0228***	.25734	**.000**	-1.5289	-.5166
TI	TV	-.1004	.26332	.703	-.6182	.4175
	TO	**1.3974***	.26828	**.000**	.8698	1.9251
	UT	**-1.1231***	.27252	**.000**	-1.6591	-.5872
TO	**TV**	**-1.4978***	.25284	**.000**	-1.9951	-1.0006
	TI	**-1.3974***	.26828	**.000**	-1.9251	-.8698
	UT	**-2.5206***	.26241	**.000**	-3.0367	-2.0045
UT	**TV**	**1.0228***	.25734	**.000**	.5166	1.5289
	TI	**1.1231***	.27252	**.000**	.5872	1.6591
	TO	**2.5206***	.26241	**.000**	2.0045	3.0367
Based on observed means. The error term is Mean Square(Error) = 3.095.						
*. The mean difference is significant at the .05 level.						

Table 6: Results of least significant difference table, Internalizing Tendency as dependent variable and Music Training as independent variable with four levels (TV-Trained in Vocal Music, TI-Trained in Instrumental Music, TO-Trained in Others form of Art and UT- Not Trained in any form of Art)

Multiple Comparisons						
Dependent Variable: Internalizing Tendency LSD						
(I) Training	**(J) Training**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
TV	TI	-.1546	.30727	.615	-.7589	.4497
	TO	-.4910	.29504	.097	-1.0713	.0893
	UT	**-.9990***	.30029	.001	-1.5896	-.4084
TI	TV	.1546	.30727	.615	-.4497	.7589
	TO	-.3364	.31306	.283	-.9521	.2793
	UT	**-.8444***	.31801	.008	-1.4698	-.2190
TO	TV	.4910	.29504	.097	-.0893	1.0713
	TI	.3364	.31306	.283	-.2793	.9521
	UT	-.5080	.30621	.098	-1.1102	.0943
UT	**TV**	**.9990***	.30029	.001	.4084	1.5896
	TI	**.8444***	.31801	.008	.2190	1.4698
	TO	.5080	.30621	.098	-.0943	1.1102
Based on observed means. The error term is Mean Square(Error) = 4.215.						
*. The mean difference is significant at the .05 level.						

Table 7: Results of least significant difference table, Verbal Behavior as dependent variable and Music Training as independent variable with four levels (TV-Trained in Vocal Music, TI-Trained in Instrumental Music, TO-Trained in Others form of Art and UT- Not Trained in any form of Art)

Multiple Comparisons						
Dependent Variable: Verbal Behavior LSD						
(I) Training	**(J) Training**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
TV	TI	-.1329	.36698	.717	-.8547	.5888
	TO	**1.3727***	.35238	.000	.6797	2.0658
	UT	-.5757	.35865	.109	-1.2811	.1296
TI	TV	.1329	.36698	.717	-.5888	.8547
	TO	**1.5056***	.37389	.000	.7703	2.2410
	UT	-.4428	.37981	.244	-1.1898	.3042
TO	**TV**	**-1.3727***	.35238	.000	-2.0658	-.6797
	TI	**-1.5056***	.37389	.000	-2.2410	-.7703
	UT	**-1.9485***	.36572	.000	-2.6677	-1.2292
UT	TV	.5757	.35865	.109	-.1296	1.2811
	TI	.4428	.37981	.244	-.3042	1.1898
	TO	**1.9485***	.36572	.000	1.2292	2.6677
Based on observed means. The error term is Mean Square(Error) = 6.012.						
*. The mean difference is significant at the .05 level.						

Table 8: Results of least significant difference table, Indirect Behavior as dependent variable and Music Training as independent variable with four levels (TV-Trained in Vocal Music, TI-Trained in Instrumental Music, TO-Trained in Others form of Art and UT- Not Trained in any form of Art)

Multiple Comparisons						
Dependent Variable: Indirect Behavior LSD						
(I) Training	(J) Training	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TV	**TI**	**-1.9861***	.52965	.000	-3.0278	-.9445
	TO	**-1.4076***	.50858	.006	-2.4079	-.4074
	UT	.2231	.51763	.667	-.7950	1.2411
TI	**TV**	**1.9861***	.52965	.000	.9445	3.0278
	TO	.5785	.53963	.284	-.4828	1.6398
	UT	**2.2092***	.54817	.000	1.1311	3.2873
TO	**TV**	**1.4076***	.50858	.006	.4074	2.4079
	TI	-.5785	.53963	.284	-1.6398	.4828
	UT	**1.6307***	**.52783**	.002	.5926	2.6688
UT	TV	-.2231	.51763	.667	-1.2411	.7950
	TI	**-2.2092***	.54817	.000	-3.2873	-1.1311
	TO	**-1.6307***	.52783	.002	-2.6688	-.5926
Based on observed means. The error term is Mean Square (Error) = 12.523.						
*. The mean difference is significant at the .05 level.						

From Table 1-8, following findings were revealed:

In the domain Predisposition, Levene's Test of Equality of Error Variances F value is 1.552 (significant at .149) indicating homogeneity of the variance. It may be observed that predisposition varied significantly among male and female participants irrespective of training received by them. The main effect of training and Interaction effect were not found to be significant indicating that interaction between training and gender had no effect on aggression orientation scores. Therefore, hypothesis 2(1) is accepted and hypotheses 1(1) and 3(1) are rejected. Results indicate that, male participants (M=13.32) possessed significantly greater predisposition than female participants (M=11.45).

In the domain Externalizing Tendency, Levene's Test of Equality of Error Variances F value is 1.532 (significant at .0.155) indicating homogeneity of the variance. It may be observed that main effect of music training and gender was significant. The interaction effect between music training and gender was found to be insignificant. Therefore, hypotheses 1(2) and 2(2) are accepted and 3(2) is rejected. Results indicate that participants trained in other forms of art (M=2.22) experienced significantly lesser Externalizing Tendency than participants trained in instrumental music (M=3.61), participants trained in vocal music (M=3.71), participants without training in any form of art (M= 4.74). Though the participants trained in vocal and instrumental music did not differ significantly in Externalizing Tendency of Aggression. Male participants (M= 3.78) experienced significantly lesser externalizing tendency than female participants (M=3.31) in different categories of training.

In the domain Internalizing Tendency, Levene's Test of Equality of Error Variances F value is 1.367 (significant at .218) indicating homogeneity of the variance. It may be observed that only the main effect of music training is significant. The effect of gender and the interaction effect between music training and gender both were found to be insignificant. Therefore, hypothesis 1(3) is accepted and hypotheses 2(3) and 3(3) both are rejected. Results indicate that participants trained in vocal music (M=3.21) experienced significantly lesser Internalizing Tendency than participants trained in instrumental music (M= 3.36), participants trained in other forms of art (M= 3.70), untrained (M=4.21) Though, the participants trained in vocal and instrumental music did not differ significantly in Internalizing Tendency of Aggression. Male participants (M= 3.4011) did not differ significantly in internalizing tendency than female participants (M=3.8448).

In the domain Physical Behavior, Levene's Test of Equality of Error Variances F value is .552 (significant at 0.818), indicating homogeneity of the variance. It may be observed that physical aggression varied significantly among male and female participants irrespective of training received by them. The main effect of training and interaction effect found to be insignificant. Therefore, hypothesis 2(4) is accepted and hypotheses 1(4) and 3(4) are rejected. Results indicate that male participants (M=6.28) reported of showing significantly greater physical behavior than female participants (M=5.58).

In the domain Verbal Behavior, Levene's Test of Equality of Error Variances F value is .231(significant at .978) indicating homogeneity of variance. It may be observed that main effect of training and gender is significant. The interaction effect between music training and gender is found to be insignificant. Therefore, hypotheses 1(5) and 2(5) are accepted and 3(5) is rejected. Results indicate that participants trained in other forms of art (M=3.42) expressed significantly lesser verbal behavior than participants trained in vocal music (M=4.79), instrumental music (M=4.93), untrained (M= 5.37). Male participants (M-4.94) experienced significantly greater verbal behavior than female participants (M=4.25) in different categories of training.

In the domain Indirect Behavior, Levene's Test of Equality of Error Variances F value is .812 (significant at 0.578), indicating homogeneity of the variance. It may be observed that main effect of music training and gender was significant. The interaction effect between music training and gender was found to be insignificant. Therefore, hypotheses 1(6) and 2(6) are accepted and 3(6) is rejected. Results indicate that untrained participants (M=8.39) claimed to exhibit least indirect behavior than participants trained in vocal music (M= 8.61), other forms of art (M=10.02) and instrumental music (M= 10.60). Female participants (M=9.91) reported significantly greater indirect behavior than male participants (M=8.85) in different categories of training.

Table 9: The mean, standard deviation and N of Trait-Anxiety as dependent variable and music training (trained vocal music, trained in instrumental music, trained in other forms of art and untrained) as independent variable (N= 361)

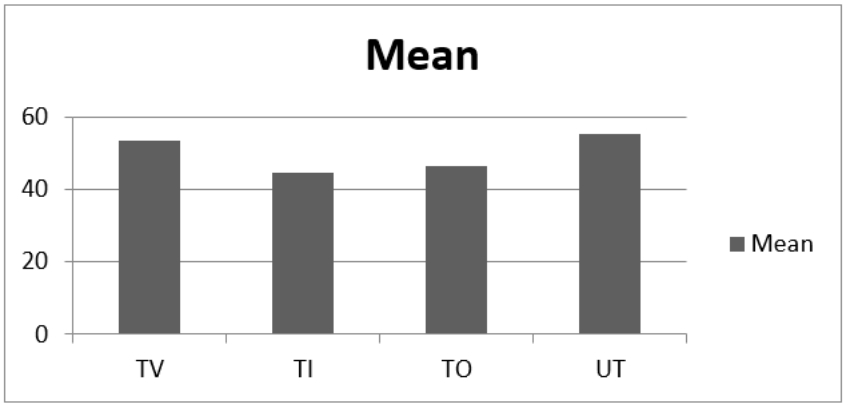
Music Training	**Statistic**	**Trait-Anxiety**
Trained in vocal music (N=101)	Mean	53.594
	SD	1.033
Trained in instrumental music (N=80)	Mean	44.738
	SD	1.161
Trained in other forms of art (N=93)	Mean	46.430
	SD	1.077

Untrained (N=87)	Mean	55.161
	SD	1.114

Table 10: The mean and standard deviation of Trait-Anxiety as dependent variable and gender as independent variable (N= 361).

Gender	Statistics	Trait-Anxiety
Male	Mean	49.0909
	SD	10.73419
Female	Mean	51.3161
	SD	11.69102

Graph 3: The mean of dimensions of Trait-Anxiety as dependent variable and music training (trained vocal music, trained in instrumental music, trained in other forms of art and untrained) as independent variable (N= 361)



Graph 4: The mean of dimensions of Trait-Anxiety as dependent variable and gender as independent variable (N= 361)

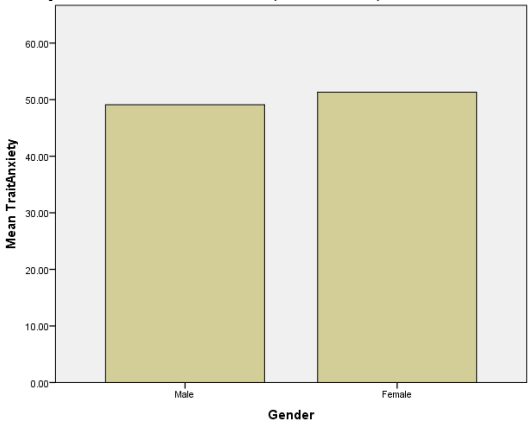


Table 11: Results of 2 x 4 Factorial Analysis of Variance for significance of main effects of Music Training, Gender and their interaction effect on Trait –Anxiety scores.

Source	Trait-Anxiety
Forms of Training	21.920**
Gender	4.277*
Forms of Training *Gender	.852

**p<0.05, **p<0.01*

Table 12: Results of least significant difference table, Trait-Anxiety as dependent variable and Music Training as independent variable with four levels (TV-Trained in Vocal Music, TI-Trained in Instrumental Music, TO-Trained in Others form of Art and UT- Not Trained in any form of Art)

Multiple Comparisons						
Dependent Variable: Trait-Anxiety **LSD**						
(I) Training	**(J) Training**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
TV	**TI**	**8.8566***	1.54876	.000	5.8106	11.9025
	TO	**7.1640***	1.48713	.000	4.2392	10.0887
	UT	-1.5669	1.51360	.301	-4.5437	1.4099
TI	**TV**	**-8.8566***	1.54876	.000	-11.9025	-5.8106
	TO	-1.6926	1.57793	.284	-4.7959	1.4107
	UT	**-10.4234***	1.60290	.000	-13.5758	-7.2710
TO	**TV**	**-7.1640***	1.48713	.000	-10.0887	-4.2392
	TI	1.6926	1.57793	.284	-1.4107	4.7959
	UT	**-8.7308***	1.54343	.000	-11.7663	-5.6953
UT	TV	1.5669	1.51360	.301	-1.4099	4.5437
	TI	**10.4234***	1.60290	.000	7.2710	13.5758
	TO	**8.7308***	1.54343	.000	5.6953	11.7663
Based on observed means. The error term is Mean Square (Error) = 107.079.						
*. The mean difference is significant at the .05 level.						

From the above tables, it may be observed that main effect of music training and gender was significant. The interaction effect between music training and gender was found to be insignificant. Therefore, hypotheses 4 and 5 are accepted and 6 is rejected. Results indicate that participants trained in instrumental music (M=44.74) experienced least trait-anxiety than participants trained in other forms of art (M=46.43), participants with vocal music training (M=53.59) and untrained participants (M=55.16). Female participants (M=51.32) reported greater trait-anxiety than male participants (M=49.09).

DISCUSSION

Music is widely regarded as means of enjoyment and entertainment. However, music has also been used toward improving the well-being of individuals. While the brain interprets music, successive biochemical reactions are induced within the body.

Aggression and Forms of training:

Pathological forms of aggression are usually inhibited by serotonin (De Boer, Caramaschi, Natarajan, & Koolhaas, 2009). Specifically, low levels of the neurotransmitter serotonin (5-HT) have been associated with impulsive aggression in both human and animal studies (Linnoila & Virkkunen, 1992). Listening to pleasant music can raise the serotonin levels (Evers & Suhr, 2000). It can be inferred from these findings that if low levels of serotonin results in aggressive behavior then music training can be helpful in controlling the behavior by releasing higher level of serotonin. Research suggests that reactive aggression is strongly correlated with elevated cortisol (van Bokhoven et al., 2005).Studies explored that music intervention and even presence of music can reduce salivary cortisol level in a stressed out condition (Khalfa et al., 2003, Laohawattanakun et.al, 2011).These findings also imply that

elevation of cortisol found in aggressive individuals can be reduced through music training which might alleviate cortisol level in participants.

Research on the role of the amygdala in modulating aggression in subjects revealed that there was a highly significant negative correlation between amygdala volumes and trait aggression (Matthies.al, 2012).Whereas a larger grey matter volume of the bilateral amygdala was found to be positively correlated with one's ability to perceive melodic intervals suggesting that the amygdala, which is the neural substrate of emotional processing, is also involved in music processing (Li et al., 2014). Findings of these two studies may imply that neuro-anatomical changes which take place due to receiving music training may inhibit aggressive behavior.

The participants trained in vocal and instrumental music expressed lesser internalizing tendency and indirect behavior than other participants. They were not tending to direct their aggression towards themselves or harm others using indirect means (like spreading rumors) rather they may had preferred to restore calmness through receiving training in vocal or instrumental music. Music may impart a cathartic effect in releasing an individual from feelings of anger and aggression (Bell, 2009). Music can act as a medium through which the person could transfer his feelings and emotions. Music might also act as a safety valve for expressing aggression.

The participants trained in other forms of art reported significantly lesser externalizing tendency and verbal behavior than other participants whereas they reported greater indirect and internalizing behavior. Painting activities has been effective in reducing internalizing and externalizing angers (Behpazhouh & Nouri, 2003). The findings partially support the present finding. Making art provides opportunity to express anger in a symbolic way. The present findings in fact showed the participants trained in other forms of art had more opportunity to control externalizing tendency or verbal aggression than participants trained in music through creating piece of art and replacing externalizing tendency or verbal aggression by creativity. Solitude is an ideal condition for art activity where the artist can portray his ideas and emotions without others' assistance and interference. Hence, they are not left with the choices of venting out their aggression externally or verbally rather they can vent out their aggression through their creation or they might have used indirect way of venting out the aggression. They also showed internalizing tendency. The primary reason of showing indirect ways again might be because during the art making, they do not get to mix up with other people. Thus, chances of externalizing their aggression might have become limited. Aggression can better be expressed through sharp colors or aggressive plot than singing or playing music where musicians do not always get to disburse aggression through music.

Music training as well as training in other forms of art may impart a cathartic effect on individual's aggression by channelizing their pent-up aggression. Individuals with training in any art form thus may not exhibit externalizing or internalizing tendencies neither they require verbal behavior to display their aggression. Whereas the participants without training in any form of art thus lack the opportunity to channelize their pent-up aggression through a more socially acceptable and realistic means. As they are lacking a medium of pouring out their pent up aggression, they tend to use other possible ways like screaming, abusing physically or verbally which are not as healthier options. Music training especially vocal music training thus helped in controlling direct as well as indirect behavior.

Anxiety and Forms of Training:

In the present study forms of training had significant effect on trait-anxiety of the participants. Further exploration suggested participants trained in instrumental music and other forms of art experienced significantly lesser trait-anxiety than participants with vocal music training and participants without any training in art form.

Abnormal functioning of neuro-chemicals such as serotonin, norepinephrine, dopamine and gamma-amino butyric acid systems as well as abnormal chemoreceptor reactivity leads to anxiety (Millan & Brocco, 2003). Prolonged elevated cortisol levels—as often seen in chronic stress and heightened anxiety disrupt sleep, impair immune function, and increase risk for cognitive and cardiovascular health issues (Mayo Clinic, 2025; Rupa Health, 2024). Music intervention also has effects on the brain function resulting in neural network activation, and ultimately leads to activation of different regions of the brain if performed regularly (Schmithorst & Holland, 2003). These effects also produce better physical and psychological function, and therefore have beneficial effects on stress responses; reducing anxiety, improving mood and lessening pain perception (Hillecke, Nickel & Bolay, 2005; Sacks, 2006).

Though, these research findings do not completely support the present research findings. In the present study the participants with vocal music training along with untrained participants reported greater anxiety than other participants. This contrasting finding may be explained based on presence or absence of a medium through which anxiety can be released. The participants with vocal music training did not get the opportunity to unwind their anxiety because they were lacking a medium like musical instrument while performing or practicing solo or chorus. The participants with instrumental music more often get the opportunity to release anxiety via the instruments they are playing while performing or practicing as accompaniment or solo. Beside this Music performance anxiety (Sieger, 2017) experienced by musicians may be cited as another reason of heightened anxiety of the participants with vocal music training. Singers are sometimes overwhelmed by an on-going sense of anxiety that has the potential to negatively affect their work (Barefield, 2012). The reason can be the condition of voice which can get easily affected by various uncontrollable conditions. People tend to be more anxious when they find they have little control over certain conditions affecting their performances. Thus, the playing of instrument had been keeping the therapeutic effect of music intact, whereas the vocal music training could not bring the anti-anxiolytic effect of music in the participants.

Previous studies had shown the extent to which playing a musical instrument is associated with cortical thickness development among healthy youths whereas thinning of the cortex in specific places is associated with mental health problems in children, such as anxiety, depression and attention problems (Hudziak et al., 2014). Studies have also shown that playing music increases one's body's production of immunoglobulin and can reduce levels of the stress hormone, cortisol, based on the sound frequencies that come with playing an instrument (Levitin, 2007). Playing an instrument requires a remarkable investment of physical and mental skill—the fastest pianists often manage ten or more notes per second using intricate spatial and dynamic control, reflecting the intense physical demands of musical performance (Clarke, 2002). Playing an instrument requires musicians to adopt correct posture and positioning—sitting properly and holding the instrument correctly. These physical demands, combined with the fine motor skills developed through training, provide tangible physical benefits. The benefit of physical activity in controlling anxiety symptoms is claimed by several researches (van Minnen, Hendriks, & Olff, 2010, Anderson,

& Shivakumar, 2013, Strohle et al., 2009). Other than these, instruments can act as support they can totally rely on unlike in vocal music where they lack the support as they have to rely only on their voices. The cited reasons may together help the participants with instrumental music training combat daily anxieties in the best possible way by keeping trait-anxiety level lowest among the participants. Physically learning the control and effort required to play an instrument can help ease anxiety and practice mindfulness. Playing an instrument forces individuals to take time away from the screen. In today's world socializing has become increasingly reliant on technology. Playing a musical instrument which keeps anyone away from the technological world for the time being is a perfect way to unwind his anxieties.

Participants with training in other forms of art reported significantly lesser anxiety same as like the individuals with instrumental music training. Researcher Katz coined the phrase "neurobics" to describe brain exercises that use our senses in new and novel ways, and creating art certainly fits this definition (Katz & Rubin, 1999). From the established link between dopamine and artistic behavior (Walker, Warwick & Cercy, 2006; Flaherty, 2005; De Manzano, Cervenka, Karabanov, Farde & Ullen, 2010) it can be inferred that if low levels of dopamine results in anxiety then art making can be helpful in alleviating anxiety. Participation in art making can work as preventive (Visnola et al., 2010) as well as curative measure for anxiety (Sandmire et al., 2012). Activities like painting, sculpting, drawing, and photography are relaxing and rewarding hobbies that can also lower one's stress levels by providing one's brain a break from his usual thoughts. When one gets totally engrossed in a creation, he can have the benefit of meditation which helps in controlling anxiety. Research has shown the negative relationship between creativity and anxiety (Saxena & Kumar, 1985; Peter, 1986). The reason behind possessing second greater trait-anxiety just after untrained participants among other participants may be due to the missing creativity component involved in vocal music training. The participants get lesser opportunity to sing classical music or a folk song in a new innovative way. Whereas the participants with instrumental music training and other forms of art training can continue their training involving innovations.

However, the participants without training in any form of art reported greater anxiety than other participants. They might devoid of the means to flee from their daily worries in the high-speed internet era, where socialization may be somehow controlled by technologies and gadgets. They did not get at all the pleasure of nurturing their creative mind. They may be trapped in the same old struggles of everyday. Any artistic endeavor promotes relaxation through reducing anxiety whereas untrained participants do not reach the relaxed state by nurturing creativity. Beside these, underlying brain plasticity (Hudziak et al., 2014) and neuro-chemical evidences (Levitin, 2007), resulted from training in instrumental music and neuro-chemical changes due to art making (Walker et al., 2006; Flaherty, 2005) can be attributed to the reduction of anxiety in the participants with instrumental and other art form training.

Aggression and Gender:

As per the multivariate analysis (MANOVA), in the present study aggression orientation dimension with all its domains varied significantly in terms of gender. It has been seen from literature review that males are more aggressive than females (Maccoby & Jacklin, 1974). Later reviews though claimed existing sex differences in aggression is more qualitative than quantitative (White, 1983; Hyde, 1984; Eagly & Steffen; 1986; Björkqvist & Niemelä, 1992).

As per the domain wise analysis of variance (ANOVA), in the present study male participants experienced significantly greater predisposition, externalizing tendency, physical and verbal aggression whereas female participants reported significantly greater indirect behavior than males. According to Evolutionary Neuroandrogenic theory, male sex hormones (androgens) are correlated with the increased ability of males to acquire resources, hierarchical position, and sexual partners. Hormonal difference may be to some extent blamed for this difference which have shown that the positive relation between elevated testosterone and aggression (Ellis, 2004, Book, Starzyk & Quinsey, 2001). Men have inherited aggressiveness from their evolutionary ancestors, because gaining a higher hierarchical status, resources, protecting the family and obtaining competitive advantages in conquering women involves increased physical contest and increased aggressiveness (Buss & Duntley, 2006). This finding partly supports the present finding of male participant's higher predisposition to aggression. Alone the hormonal difference cannot justify the qualitative difference in aggression experienced by males and females. The difference may be attributed to the gender socialization. Females and males are treated differently by their family, peers, societal institutions, and the media (Hussain, Naz, Khan, Daraz, & Khan, 2015). Men are more likely to engage in physical aggression than women (Eagly & Steffen, 1986). Since societal expectations often cast females to be somehow physically weaker than males, they may early in life learn to avoid physical aggression and instead develop other means. Choice of aggressive strategy may become partly habitual, and reinforced by social norms in the society in question.

Anxiety and Gender:

As per the analysis of variance (ANOVA), in the present study female participants experienced significantly greater trait-anxiety than male participants. Human gender differences in sex differences in anxiety-like behaviors may be controlled by reproductive steroid hormone-dependent modulation in the midbrain dorsal raphe nucleus which is responsible for sex differences in emotional behavior (Donner & Lowry, 2013). Developmental sex differences in cerebral blood flow blamed for the underlying sex differences in anxiety (Kaczkurkin et al., 2016). Socialization processes cultivate and promote processes related to anxiety, and moderate gender differences in human being (McLean & Anderson, 2009).

Research evidence suggested females are more anxious than males (Hosseini & Khazalib 2013; Pigott, 1999). Women may be more likely to report their symptoms anxiety. In addition to biological mechanisms, women and men seem to experience and react to events in their life differently. Women tend to be more prone to stress, which can increase their anxiety. Several studies have found that women tend to use emotion focused coping to a stressful situation, whereas men resort to more problem-focused to deal with stressful experiences (Endler & Parker, 1990; Matud, 2004; Ptacek, Smith & Dodge, 1994). One of the major reasons of women being more anxious gender than men is that the way women and men typically cope with stress (Matud, 2004; Mazure & Maciejewski, 2003, Kuehner, 2003).The gender gap can be accused as the result of growing conflict between the traditional female role of getting married and bearing children and the new endeavors of gaining education and working outside the home (Al-Subaie & Al-Hamad, 2000). However, many research finding associated this difference with the cyclical fluctuations of estrogens and progesterone which confers susceptibility to depression and anxiety (Seeman, 1998). The brain system involved in the fight-or-flight response is activated more readily in women and stays activated longer than men, partly because of the action of estrogen and

progesterone (Seeman, 1998). Therefore, the present finding of gender difference in trait-anxiety may be attributed to the interaction of physiological and psychological factors.

CONCLUSION

The present study shows that training in music and other forms of art significantly helps adults control aggression and reduce anxiety. Through regular engagement in artistic training—individuals develop emotional regulation skills, find constructive outlets for pent-up tension, and cultivate mindfulness. These experiences foster a calmer mental state, empowering adults to manage stress and frustration more effectively.

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