

Effect of Flute Music on Anxiety of Secondary School Students in Namchi, Sikkim: An Experimental Study

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Abstract: This study explores the impact of flute music, specifically by Pandit Hari Prasad Chaurasia, on reducing anxiety among secondary school students in Namchi. Music has been recognized for its therapeutic benefits, particularly in regulating emotions and improving well-being. Historically, music education was integral to Greek society, serving both spiritual and martial purposes. In modern contexts, music therapy has proven effective in treating various psychological issues, including anxiety. The study employed a quantitative experimental research design with a pretest-posttest control group design. A sample of 20 students was randomly assigned to experimental and control groups. The experimental group was exposed to flute music for 20 minutes over 15 days, while the control group received no intervention. Anxiety levels were measured using the Beck Anxiety Inventory, assessing four dimensions: neurophysiological, subjective, panic, and autonomic anxiety. Results showed a significant reduction in anxiety levels in the experimental group across all dimensions, while the control group showed no significant changes. This indicates that flute music effectively alleviates anxiety symptoms such as numbness, tingling, wobbliness, dizziness, unsteadiness, trembling, shakiness, fear, nervousness, heart pounding, choking, difficulty breathing, fear of dying and face flushing. Furthermore, the study found no significant gender differences in the effects of the music intervention. This research fills a gap in the existing literature by focusing on the effects of flute music on a younger population in a place like Namchi, highlighting the therapeutic potential of music in educational settings. The findings showed that the use of music therapy is a viable tool for reducing anxiety and enhancing psychological well-being among students.

Keywords: Flute Music, Anxiety, Secondary School Students, Neurophysiological, Subjective, Panic, Autonomic

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I. INTRODUCTION

Music is accessible everywhere, socially acceptable, healthy, and reasonably priced. It has the exceptional potential to enhance learning and well-being for students, especially in terms of emotion regulation and behaviour modification (Wang et al., 2021). Happiness and excitement are typically evoked by music which also offers resources for the development of emotional control and competency (Miranda et al., 2012). Music education was developed as a part of the duty to sing for God. Greek educational systems were often built on music to purify the soul. The education system of both Sparta and Athens included music in their curricula. Sparta's musical culture was reflected in its educational system (Mark & Mark, 2013). The purpose of music education was to prepare men to be soldiers.

Music helped students to develop loyalty to the state and was a natural accompaniment to the activities of war. Greek students learned both instrumental and vocal music. The mood improvement is at the centre of music experiences for teenagers (McFerran et al., 2015).

Music has a significant impact on psychiatry as the brain, psyche, and music are all interconnected. Music has the effect of lowering stress hormone levels. Blood pressure, breathing rate, heart rate and muscular relaxation all drop as a result of the action of these hormones (Icel & Basogul, 2021). Listening to music is frequently utilized as a form of coping strategy for stress reduction. The term coping refers to a variety of cognitive methods for controlling one's feelings, thoughts, actions and bodily responses in challenging circumstances (Miranda et al., 2012). Music therapy is the use of music as an essential to the treatment of individuals to enhance their physical, psychological, cognitive and social functioning (Miranda et al., 2012). Major psychiatric problems can be effectively treated with music therapy which is a sort of alternative therapy. Numerous advantages of using music in therapy include increasing focus, improving mood, attention span, coping, relaxation abilities, discovering insight, enhancing self-awareness and self-esteem, and promoting social relationships. Music therapy is a therapeutic approach that promotes relaxation (Icel Basogul, 2021).

Music can be played through various instruments and flute is the earliest instrument known to science.

Indian flutes are referred to as spiritual, therapeutic, transformative instruments (Wiand, 2006). The flute is a family of musical instruments within the woodwind group. The word bansuri originated from Baans (bamboo) and Sur (musical note). The bansuri has six to seven holes, and, counting on the pitch varies in its size. Gharana (means “family” or “lineage” in Hindi language) in Hindustani music of India is a community of performers who share a particular expressive style that traces to a specific instructor or region (Mondal, 2021). The Maihar gharana is a gharana or school of the Hindustani classical music, a mode of Indian classical music originating within the northern parts of the Indian subcontinent. Pandit Hari Prasad Chaurasia belongs to Maihar Gharana. He is a unique talent who has developed an unprecedented style by assimilating elements from every conceivable tradition, from instrumental to vocal and folk music (Mondal, 2021, pp. 122-131).

Anxiety is a state in which an individual cannot control negative bodily, emotional, or mental reactions and feels intense worry and fear in response to external or internal stimuli. Freud claimed that it was caused by the suppression of emotions and desires.

According to Freud, anxiety serves as a trigger for one's self-defense system and reaction to danger (Osmanoglu & Yilmaz, 2019). Freudian theories on anxiety states that it is caused by a feeling of loneliness and isolation (Wiand, 2006). When people feel positive emotions regularly and strongly, as compared to unpleasant emotions frequently and when their daily activities are fulfilling, their subjective well-being rises. This demonstrates that there is a strong relationship between anxiety and subjective well-being (Osmanoglu & Yilmaz, 2019). There are four dimensions of anxiety viz. neurophysiological, subjective, panic and autonomic and under which there are 21 symptoms (Beck et al., 1993).

Numerous studies have highlighted the beneficial effects of music across various groups. Gold et al. (2007) discovered that music therapy is effective for children and adolescents dealing with psychopathological issues. Similarly, Kara and Ozel (2007) found that listening to reed flute music has a soothing effect. According to McFerran et al. (2015), most young people use music to uplift their spirits, especially when they are already in a positive mood. Osmanoglu and Yilmaz (2019) reported that a 60-day period of classical music listening significantly enhances Trait Anxiety and Psychological Well-Being. Guetin et al. (2009) supported the beneficial impact of music therapy on depression and anxiety in individuals with mild to moderate Alzheimer's disease. Bharadwaj and Bharadwaj (2013) suggested that regular exposure to instrumental music significantly boosts an adult's

emotional competency. Jiang et al. (2016) highlighted the significant stress-relieving effects of music. Zareena (2017) noted that medical students often use music to calm down during high-stress periods. Joshi and Kiran (2020) concluded that flute music is particularly effective for stress reduction. Finally, Pan et al. (2021) indicated that music significantly influences graduate student's depression levels and could be a useful strategy for mitigating depression.

The research study identified research gap that most studies conducted so far have focused on specific groups like medical students (Zareena, 2017), and patients with specific conditions like Alzheimer's (Guetin et al., 2009). There are limited studies on secondary school students. While much of the work has been conducted so far in specific region.

There is no study on the effect of flute music by Pandit Hari Prasad Chaurasia. While some studies have used mixed-method approaches (Perkins & Williamon, 2014) there is a need for more research employing experimental research.

1.1 Objectives of the study

1. To study the effect of flute music on the anxiety of the secondary school students in Namchi Municipal area..
2. To study the effect of flute music on dimensions of anxiety of the secondary school students in Namchi Municipal area.
 - a. neurophysiological anxiety
 - b. subjective anxiety
 - c. panic anxiety
 - d. autonomic anxiety
3. To find out the effect of flute music on anxiety with regard to Gender.

1.2 Hypothesis

H₀₁: There is no significant difference in the effect of flute music on anxiety among secondary school students in Namchi Municipal area.

H₀₂: There is no significant difference in the effect of flute music on neurophysiological anxiety among secondary school students in Namchi Municipal area.

H₀₃: There is no significant difference in the effect of flute music on subjective anxiety among secondary school students in Namchi Municipal area. There is no significant difference in the effect of flute music on subjective anxiety among secondary school students in Namchi Municipal area.

H₀₄: There is no significant difference in the effect of flute music on panic anxiety among secondary school students in Namchi Municipal area.

H₀₅: There is no significant difference in the effect of flute music on autonomic anxiety among secondary school students in Namchi Municipal area.

H₀₆: There is no significant difference in effect of flute music on anxiety between male and female student.

II. RESEARCH METHODOLOGY

Under the quantitative approach, the experimental research method is employed. The pretest-posttest control group design was used wherein participants were randomly assigned to the control and experimental group. While participants in the control group do not get the experimental treatment, a participant in the experimental group is provided with the treatment of music.

The population of the present study consists of 275 secondary school students of class X from three government secondary schools in Namchi Municipal Area. In order to establish the effect of Flute Music on Anxiety, 20 students of Secondary school specifically of class X of Namchi Municipal area were taken as the sample of the study. To select participants for the study, the researcher has utilized random assignment to allocate individuals into two groups: the Control and Experimental groups. Beck Anxiety Inventory a standardised tool developed by Aaron T. Beck & Robert A. Steer, 1993 was used. There are 21 (twenty-one) items in the tool with four dimensions viz. neurophysiological, subjective, panic and autonomic. Participants of both the Control groups and Experimental groups underwent a Pretest to assess baseline measures of anxiety. After the Pretest, the experimental group received the treatment of flute music. The control group did not receive any intervention of flute music. The intervention of the flute music period lasted 20 minutes for 15 days. The intervention was given to the experimental group in a classroom. The students of the experimental group were asked to sit and close their eyes, and take a deep breath. Flute music by Pandit Hari Prasad Chaurasia was played. After the intervention period concluded, both Control groups and Experimental group were administered a Posttest to measure any changes in the level of anxiety.

III. RESULTS AND DISCUSSIONS

Table 1
Level of anxiety of secondary school students in experimental group and control group.

Test	Experimental Group	f (%)	Level of Anxiety	Control Group	f (%)	Level of Anxiety
Pretest	26 to 63	10 (100%)	Severe	26-63	10 (100%)	Severe
posttest	8 to 15	10 (100%)	Mild	26-63	10 (100%)	Severe

Initially, all students in both the experimental and control groups were classified with severe anxiety, scoring between 26 to 63. After the intervention, 100% of the experimental group moved from severe to mild anxiety, scoring between 8 to 15, while the control group showed no change, with all students remaining in the severe anxiety category. This

demonstrates that flute music alleviated anxiety (numbness, tingling, wobbliness, dizziness, unsteadiness, trembling, shakiness, fear, nervousness, heart pounding, choking, difficulty breathing, and fear of dying and face flushing) in the experimental group, whereas the control group did not experience any reduction in anxiety levels.

H₀1: There is no significant difference in the effect of flute music on anxiety among secondary school students in Namchi Municipal area.

Table 2
Result of t-test examining the effect of flute music on student's anxiety

Group	Pretest		Posttest		T(18)	p-value
	Mean	SD	Mean	SD		
Experimental	46.4	2.41	12.3	2.58	30.5	<.001
Control	42.2	2.7	40.3	1.7	1.88	0.076

***p<0.001

The experimental group showed a significant reduction in anxiety scores, with a mean pretest score of (M = 46.4, SD = 2.41) decreasing to (M = 12.3, SD = 2.58) in the posttest. The t-test result revealed that there is a significant difference (t (18) = 30.5, p = 0.001) in the pre-test and post-test of the experimental group. The control group's mean score slightly decreased from pre-test (M = 42.2, SD = 2.7) to the post-test (M = 40.3, SD = 1.7).

The t-test result revealed that there is no significant difference (t (18) = 1.88, p = 0.076) in pre-test and post-test of control group. This suggests that the intervention of flute music had a significant impact on reducing anxiety in the experimental group. The control group showed no significant change difference. The highlighted data shows that the effect in the experimental group was due to treatment or flute music.

Effect of flute music on neurophysiological anxiety of the secondary school students in Namchi Municipal area

Table 3
Mean Score of secondary school students in Neurophysiological Anxiety

Group	Test	Level of Anxiety	n	Mean
Experimental Group	Pretest	Severe	10	13.20
	Posttest	Mild	10	3.20
Control Group	Pretest	Severe	10	11.40
	Posttest	Severe	10	10.30
Total			40	38.10

In the Experimental Group, all 10 students initially had severe anxiety with a mean level of (M = 13.20). After the flute music intervention, their mean anxiety level significantly decreased to (M = 3.20) which indicates a shift from severe to mild anxiety. The Control Group's mean anxiety level slightly decreased from (M = 11.40) to (M = 10.30) with all students still experiencing severe anxiety. The data showed that flute music affected reducing neurophysiological anxiety in the Experimental

Group, while the Control Group saw no significant difference.

Ho2: There is no significant difference in the effect of flute music on neurophysiological anxiety among secondary school students in Namchi Municipal area.

Table 4

Result of t-test examining the effect of flute music on student's neurophysiological anxiety

Group	Pretest		Posttest		T(18)	p-value
	Mean	SD	Mean	SD		
Experimental	13.20	1.48	3.20	0.91	18.20	<.001
Control	11.40	1.96	10.30	1.16	1.53	0.14

***p<0.001

A t-test revealed a significant difference in neurophysiological anxiety between the experimental ($t(18) = 18.20$, $p = 0.001$) and control groups ($t(18) = 1.53$, $p = 0.14$). The experimental group showed a statistically significant reduction in anxiety levels from pretest ($M = 13.20$, $SD = 1.48$) to posttest ($M = 3.20$, $SD = 0.91$). The control group showed no significant change from pre-test ($M = 11.40$, $SD = 1.96$) and post-test ($M = 10.30$, $SD = 1.53$). This means that flute music effectively reduced anxiety symptoms, such as numbness, unsteadiness, and trembling, in the experimental group. Therefore, the null hypothesis was rejected, confirming the significant effect of flute music on reducing student's neurophysiological anxiety. Effect of flute music on subjective anxiety of the secondary school students in Namchi Municipal area.

Table 5

Mean score of secondary school students in Subjective Anxiety

Group	Test	Level of Anxiety	n	Mean
Experimental Group	Pretest	Severe	10	14.90
	Posttest	Mild	10	3.70
Control Group	Pretest	Severe	10	12.40
	Posttest	Severe	10	12.90
Total			40	43.90

In the Experimental Group, all 10 students initially had severe anxiety with a mean level of ($M = 14.90$). After the flute music intervention, their mean anxiety level significantly decreased to ($M = 3.70$), shifting from severe to mild anxiety. The Control Group's mean anxiety level slightly increased from ($M = 12.40$) to ($M = 12.90$) with all students still experiencing severe anxiety. This data demonstrates that flute music significantly reduced subjective anxiety symptoms such as inability to relax, fear, nervousness, and feeling scared in the experimental group, while the Control Group showed no reduction in anxiety levels.

Ho3: There is no significant difference in the effect of flute music on subjective anxiety among secondary school students in Namchi Municipal area.

Table 6

Result of t-test examining the effect of flute music on student's subjective anxiety

Group	Pretest		Posttest		t(18)	p-value
	Mean	SD	Mean	SD		
Experimental	14.90	2.28	3.70	1.25	13.60	<.001
Control	12.40	1.51	12.90	1.97	0.63	0.53

***p<0.001

The t-test showed a significant difference in subjective anxiety between the experimental ($t(18) = 13.60$, $p = 0.001$) and control group ($t(18) = 0.63$, $p = 0.53$). The experimental group demonstrated a statistically significant reduction in anxiety from pretest ($M = 14.90$, $SD = 2.28$) to posttest ($M = 3.70$, $SD = 1.25$). The control group showed no significant change in anxiety levels from pretest ($M = 12.40$, $SD = 1.51$) to posttest ($M = 12.90$, $SD = 1.97$). Therefore, the null hypothesis was rejected. This indicates that flute music significantly reduced subjective anxiety symptoms such as inability to relax, fear, nervousness, and feeling scared in the experimental group.

Effect of flute music on panic anxiety of the secondary school students in Namchi Municipal area

Table 7

Mean score of secondary school students of Panic Anxiety

Group	Test	Level of Anxiety	n	Mean
Experimental Group	Pretest	Severe	10	9.20
	Posttest	Mild	10	2.50
Control Group	Pretest	Severe	10	10.30
	Posttest	Severe	10	8.90
Total			40	30.90

In the Experimental Group, all 10 students initially had severe panic anxiety with a mean level of ($M = 9.20$). After the flute music intervention, their mean anxiety level significantly decreased to ($M = 2.50$) shifting from severe to mild panic anxiety. In the Control Group, all students also had severe panic anxiety initially, with a mean level of ($M = 10.30$) which slightly decreased to ($M = 8.90$) but they remained in the severe anxiety category. This data demonstrates that flute music significantly reduced panic anxiety symptoms, such as heart pounding, difficulty breathing, and fear of dying, in the Experimental Group. The Control Group showed no significant difference in anxiety levels from pretest to posttest.

Ho4: There is no significant difference in the effect of flute music on panic anxiety among secondary school students in Namchi Municipal area.

Table 8

Result of t-test examining the effect of flute music on student's panic anxiety

Group	Pretest		Posttest		t(18)	p-value
	Mean	SD	Mean	SD		
Experimental	9.20	1.32	2.50	0.85	13.50	<.001
Control	10.30	1.34	9.50	1.18	1.42	0.17

***p<0.001

The t-test revealed a significant difference in panic anxiety between the experimental ($t(18) = 13.50$, $p =$

0.001) and the control group ($t(18) = 1.42, p = 0.17$). The experimental group showed a statistically significant reduction in anxiety from the pretest ($M = 9.20, SD = 1.32$) to the posttest ($M = 2.50, SD = 0.85$). The control group showed no significant change in anxiety levels from the pretest ($M = 10.30, SD = 1.34$) to the posttest ($M = 9.50, SD = 1.18$). Therefore, the null hypothesis was rejected. This indicates that flute music significantly reduced panic anxiety symptoms, such as heart pounding, difficulty breathing, and fear of dying, in the experimental group.

Effect of flute music on autonomic anxiety of the secondary school students in Namchi Municipal area

Table 9

Mean score of secondary school students in Autonomic Anxiety

Group	Test	Level of Anxiety	n	Mean
Experimental Group	Pretest	Severe	10	9.10
	Posttest	Mild	10	2.90
Control Group	Pretest	Severe	10	8.10
	Posttest	Severe	10	8.20
Total			40	28.30

In the Experimental Group, all 10 students initially had severe autonomic anxiety with a mean level of ($M = 9.10$). After the flute music intervention, their mean anxiety level significantly decreased to ($M = 2.90$), indicating a shift from severe to mild anxiety. In the Control Group, all students also had severe autonomic anxiety initially, with a mean level of ($M = 8.10$) which slightly increased to ($M = 8.20$) showing no significant change. This data demonstrates that flute music effectively reduced autonomic anxiety symptoms, such as feeling hot, face flushing, and sweating, in the Experimental Group. The Control Group saw no significant difference in Autonomic anxiety levels from pretest to posttest.

Ho5: There is no significant difference in the effect of flute music on autonomic anxiety among secondary school students in Namchi Municipal area.

Table 10

Result of t-test examining the effect of flute music on student's autonomic anxiety

Group	Pretest		Posttest		t(18)	p-value
	Mean	SD	Mean	SD		
Experimental	9.10	1.60	2.90	0.73	11.20	<.001
Control	8.10	2.08	8.20	2.15	0.106	0.917

*** $p < 0.001$

The t-test showed a significant difference in autonomic anxiety between the experimental ($t(18) = 11.20, p = 0.001$) and the control group ($t(18) = 0.106, p = 0.917$). The experimental group had a statistically significant reduction in anxiety from the pretest ($M = 9.10, SD = 1.60$) to the post-test ($M = 2.90, SD = 0.73$). The control group showed no significant change in anxiety levels from the pretest ($M = 8.10, SD = 2.08$) to the post-test ($M = 8.20, SD = 2.15$). Therefore, the null hypothesis was rejected.

This indicates that flute music significantly reduced autonomic anxiety symptoms such as feeling hot, face flushing, and sweating in the experimental group.

Effect of flute music on anxiety with regard to Gender

Table 11 Mean Score of secondary school students with regard to gender in experimental and control group

Dimension	Male		Female		t(18)	P value
	Mean	SD	Mean	SD		
Neuro physiological Anxiety	9.50	3.80	9.55	4.44	0.03	0.97
Subjective Anxiety	11.00	4.32	10.95	5.15	0.03	0.97
Panic Anxiety	7.80	3.12	7.65	3.54	0.14	0.88
Autonomic Anxiety	6.75	2.63	7.40	3.33	0.68	0.49
Total	35.05	12.5	35.55	15.35	0.11	0.91

According to the outcome of the t-test, it can be seen that there is no significant difference in male and female mean and standard deviation in all four dimensions. There is no statistical significant difference in male and female. The total p-value shows that there is no significant difference in the student's anxiety based on the gender after the treatment (flute music) is given to secondary school in Namchi Municipal area. Since the t-test result revealed there is no significant difference (neurophysiological anxiety) ($t(18) = 0.03, p = 0.97$), (Subjective anxiety) ($t(18) = 0.03, p = 0.97$), (panic anxiety) ($t(18) = 0.14, p = 0.88$) and (autonomic anxiety) ($t(18) = 0.68, p = 0.49$) which is greater than 0.05. Gender does not effect the experiment of flute music on anxiety.

Discussion

The results of the study demonstrate a significant reduction in anxiety levels across various dimensions for the experimental group exposed to flute music. Specifically, the data reveal a notable decrease in overall anxiety, neurophysiological anxiety, subjective anxiety, panic anxiety, and autonomic anxiety, as measured by mean scores and supported by significant t-test results. This reduction was not observed in the control group, which experienced minimal or no change in anxiety levels. The findings suggest that flute music effectively mitigates anxiety symptoms such as numbness, tingling, wobbliness, dizziness, unsteadiness, trembling, shakiness, fear, nervousness, heart pounding, choking, difficulty breathing, and fear of dying and face flushing. Moreover, the analysis indicates that the intervention's effectiveness does not significantly differ between male and female students, suggesting that flute music can be universally applied across genders. These results emphasize the potential of flute music as a non-invasive, accessible intervention for managing anxiety in educational settings.

Suggestions

- Integrate music therapy particularly flute music into the secondary school curriculum as a regular activity to help reduce student's anxiety levels.
- Establish dedicated relaxation spaces within secondary schools where students can listen to calming flute music during breaks or stressful periods.
- Encourage secondary school students to participate in music-related activities, including learning to play the flute, as part of extracurricular programs to help manage anxiety.
- Teach secondary school students how to use flute music as a self-regulation tool for managing their anxiety, providing them with personal strategies for mental health care.
- Develop peer support programs where secondary school students can share their experiences and benefits of using flute music to manage anxiety, fostering a supportive school community.
- The government should allocate funding for the development and implementation of music therapy programs in secondary schools, emphasizing the proven benefits of flute music in reducing anxiety.
- Government should formulate policies that mandate the inclusion of mental health support programs in secondary schools, with a specific focus on music therapy as a non-invasive and cost-effective intervention for anxiety management.

CONCLUSION

The study explored the impact of flute music on the anxiety levels of secondary school students in the Namchi Municipal area, with a specific focus on various dimensions of anxiety including neurophysiological, subjective, panic, and autonomic anxiety. The experimental group, exposed to flute music by Pandit Hari Prasad Chaurasia for 20 minutes over 15 days, demonstrated significant reductions in all anxiety dimensions compared to the control group. While the experimental group showed a substantial decrease in anxiety from severe to mild levels, the control group exhibited minimal changes, indicating that the intervention had a profound calming effect. The experimental group experienced marked improvements in neurophysiological symptoms like dizziness and trembling, subjective symptoms like fear and nervousness, panic symptoms like heart pounding and difficulty breathing, and autonomic symptom like face flushing and sweating. The study found no significant difference in the effect of flute music on anxiety based on gender, suggesting that the calming effects of the intervention were equally beneficial for both male and female students. The use of a standardized measure, the Beck Anxiety Inventory, ensured reliable assessment across the various dimensions of anxiety. The findings underscore the therapeutic potential of flute music as a non-invasive, cost-

effective method for reducing anxiety among adolescents. This research fills a gap in the literature by focusing on secondary school students, a group less studied in previous research, and highlights the unique contribution of Indian classical music in therapeutic settings.

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