



Impact of Dynamic Exercise & PNF Training on Anxiety of Early, Middle & Late Adolescent Boys

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ABSTRACT- PNF training and dynamic exercise are the two excellent treatments to improve mental health during the adolescent stage. The purpose of this study was to investigate how a dynamic exercise program and proprioceptive neuromuscular facilitation (PNF) training for a period of twelve weeks lowered the levels of anxiety experienced by adolescents in Bangalore. We divide the 240 participants into three distinct periods of development: early adolescence (n = 80), middle adolescence (n = 80), and late adolescence (n = 80). We evaluate the intervention's success by administering DASS-Y questionnaires both before and after the intervention. Using two-way ANCOVA and Bonferroni post-hoc statistics, we found that the experimental groups significantly reduced their anxiety levels across all three stages of development. The findings highlight the positive impact that the intervention had on anxiety, demonstrating that focused programs have the potential to successfully reduce depressive symptoms in young guys. This fact highlights the significance of early intervention tactics in fostering well-being during crucial stages of development. Considering these findings, it appears that incorporating dynamic exercise and proprioceptive neuromuscular facilitation (PNF) training into mental health programs may be especially useful for teenagers. Promoting mental health during these formative years can lead to the development of resilience and an overall improvement in psychological well-being.

Key words: Dynamic exercise, proprioceptive neuromuscular facilitation, Bonferroni post-hoc, Adolescent groups, DASS-Y.

1. Introduction

Dynamic exercise is physical activity that involves continuous, rhythmic motions, targets large muscle groups, and raises blood pressure and heart rate. Aerobic exercise can boost endurance, cardiovascular fitness, and overall physical well-being. Running, biking, swimming, and dancing are among the examples. Dynamic activities are an effective approach to managing weight and maintaining metabolic health since they improve oxygen transport to the muscles, boost energy levels, and promote fat burning. They also improve muscle coordination and joint mobility, which reduces the risk of injury and increases functional fitness for daily duties.

Exercise is an excellent method for managing and reducing anxiety symptoms. Exercise releases endorphins, also referred to as "feel-good" chemicals, which enhance your mood and overall well-being. It also promotes the manufacture of neurotransmitters such as dopamine and serotonin, which are necessary for mood modulation and anxiety reduction. Regular exercise can raise self-esteem, improve sleep, and provide a positive distraction from unpleasant thoughts. Weight training, yoga, swimming, and walking are all excellent exercises for both physical and emotional health. Even moderate exercise can boost long-term mental resilience and a sense of accomplishment.

The article's logical approach makes the subject simple to understand. The section I begins with the introduction then objectives describe the study's aim and purpose. The Hypothesis section presents the study's tested assumptions. Section II, Methodology, discusses the research design, participant selection, interventions, and data collection methods. Section III, Data Analysis and Interpretation, describes in detail the statistical methods used and the conclusions drawn from the findings. Section IV then discusses the findings, making comparisons to those from earlier studies. Section V closes by summarizing the findings and making

recommendations for future studies or practical applications. Finally, the References section contains a list of all the sources used in this article.

1. OBJECTIVES

- The study aimed to assess the impact of dynamic exercise and proprioceptive neuromuscular training on anxiety levels in early adolescent boys.
- Assessing the impact of dynamic exercise and proprioceptive neuromuscular training on anxiety in middle-aged boys.
- Assess the impact of dynamic exercise and proprioceptive neuromuscular training on anxiety in late adolescent boys.

2. HYPOTHESES

The subsequent hypotheses were formulated in alignment with the previously stated objectives:

- The hypothesis posited that a 12-week regimen of dynamic exercise and proprioceptive neuromuscular facilitation would markedly diminish anxiety levels in early adolescent boys.
- The hypothesis posited that a 12-week regimen of dynamic exercise and proprioceptive neuromuscular facilitation would lead to a significant reduction in anxiety levels among middle adolescent boys.
- The hypothesis posited that a 12-week regimen of dynamic exercise and proprioceptive neuromuscular facilitation would lead to a significant reduction in anxiety levels among late adolescent boys.

II. METHODOLOGY

The study assesses the impact of the researcher's training regimen on the anxiety variable in the adolescent group of students. The study, which employed a randomized treatment design, involved 240 urban students from Bangalore. We further subdivide each age group into 40 control and 40 experimental groups, assigning 80 individuals to each of the 3 equal groups: early adolescents, middle adolescents, and late adolescents.

- **Inclusion Criteria:** Participants in the 12-week study must not have any underlying medical conditions.
- **Exclusion Criteria:** The study did not include students with disabilities, injuries, or medical issues that interfered with their ability to engage in physical activity.
- **Data Collection and Intervention:** Early, middle, and late adolescent groups received three sessions per week of dynamic exercise and proprioceptive neuromuscular facilitation training for 12 weeks. We administered pre- and post-tests on anxiety using a DASS-Y questionnaire before and after the intervention.
- **Statistical Method:** We examined the before- and post-data for each group using the same statistical process. We used the two-way analysis of covariance (ANCOVA) to figure out how important the differences between the groups were. This included pre reading as a covariate and relevant descriptive data. We combined the profile plot and bar diagram with the Bonferroni post-hoc test for a more in-depth analysis of pairwise comparisons.

III. Data Analysis and Interpretation

Table 1.1: Descriptive Statistics of Anxiety split by Group, Age group & Time

Group	Age Group	Time	N	Min	Max	Mean	SD Error	SD
Control	Early Adolescence	Pre	40	2.00	13.00	7.00	0.27	1.73
		Post	40	2.00	12.00	6.72	0.24	1.55
	Middle Adolescence	Pre	40	5.00	14.00	7.55	0.30	1.94
		Post	40	4.00	12.00	7.02	0.29	1.84
	Late Adolescence	Pre	40	3.00	9.00	7.35	0.19	1.25
		Post	40	3.00	9.00	6.85	0.20	1.31
Experimental	Early Adolescence	Pre	40	4.00	7.00	5.75	0.13	0.86
		Post	40	4.00	6.00	5.05	0.11	0.74
	Middle Adolescence	Pre	40	4.00	8.00	6.05	0.19	1.25
		Post	40	3.00	6.00	4.47	0.15	0.98
	Late Adolescence	Pre	40	3.00	9.00	6.35	0.26	1.65
		Post	40	1.00	8.00	2.77	0.20	1.29

Table 1.2 Analysis of Covariance results of the Intervention program on Anxiety

Source	Sum of Squares	df	Mean Square	F-ratio	p-value
Anxiety Pre	328.13	1	328.13	842.29	<0.05
Group	161.12	1	161.12	413.60	<0.05
Age Group	86.35	2	43.17	110.83	<0.05
Group X Age Group	72.44	2	36.22	92.98	<0.05
Within Group	90.77	233	0.39	--	--

Conclusion: The following conclusions are drawn from the above table:

- The scores of anxiety on the pre-test have a substantial impact on the scores of anxiety on the post-test [F (1,233) = 842.29, p-value < 0.05].
- When the age group is not taken into consideration, there is a noteworthy disparity in the post-test anxiety ratings (after controlling for pre-anxiety scores) between the group that received treatment and the group that did not get treatment [F (1,233) = 413.60, p-value < 0.05].
- When the levels of the group are ignored, there is a significant difference in the influence of the age group on post-test anxiety scores [F(2,233)=110.83, p-value <0.05]. This is the case even after correcting for pre-test anxiety scores.
- By controlling for pre-test anxiety, there is a statistically significant interaction between group and age group on post-test anxiety [F (2,233) = 92.98, p-value < 0.05]. Controlling for testing anxiety reveals this interaction.
- **Table 1.3 Anxiety Pre Test, Post Test & Adjusted Post Test Mean Scores split by Group**

Group	Pre Mean	Post Mean	Adjusted Mean
Control	7.30	6.87	6.37
Experimental	6.05	10	4.59

Interpretation: Table 1.3 displays the average scores for each of the groups. For the control group, the mean scores on the pre-test, the mean scores on the post-test, and the adjusted mean are 7.30, 6.87, and 6.37, respectively. 6.05. This is the mean score for the experimental group on the pretest. In terms of the posttest, the mean is 4.59, while the adjusted mean is 10.

Table 1.4 Anxiety Mean Scores split by Age Group

Age Group	Pre Mean	Post Mean	Adjusted Mean
Early Adolescence	6.38	5.89	6.12
Middle Adolescence	6.80	5.75	5.65
Late Adolescence	6.85	4.81	4.67

Interpretation: Table 1.4 displays the mean scores for the various age group as given below:

Early Adolescence: 6.38, 5.89, and 6.12 are the respective values for the early adolescent group's mean scores on the pre-test, post-test, and adjusted averages, respectively.

Middle Adolescence: For the group of middle adolescents, the mean scores on the pre-test, the mean scores on the post-test, and the adjusted mean are 6.80, 5.75, and 5.65, respectively.

Late Adolescence: The late teenage group has a mean score of 6.85 on the baseline assessment. The mean score on the posttest is 4.81, whereas the adjusted mean score is 4.67.

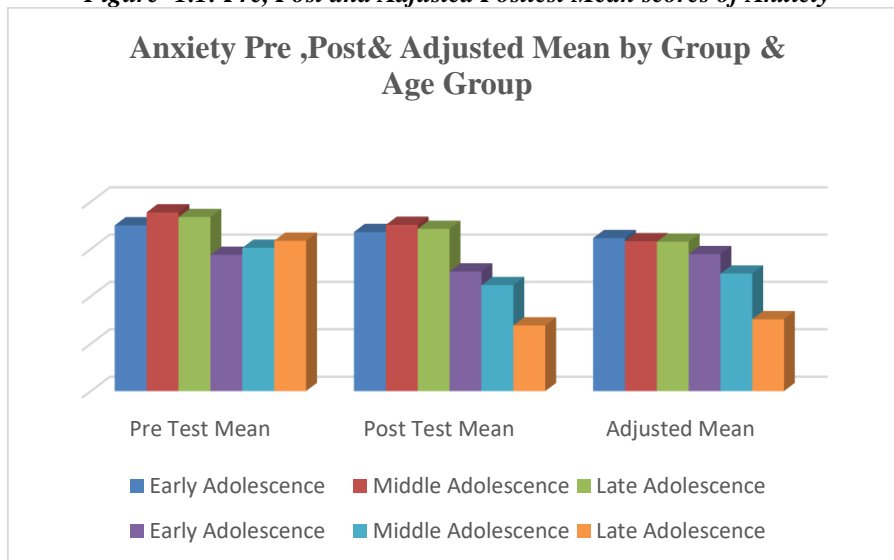
Table 1.5 Anxiety Mean Scores split by Group & Age Group

Group	Age Group	Pre Test Mean	Post Test Mean	Adjusted Mean
Control	Early Adolescence	7.00	6.72	6.46
	Middle Adolescence	7.55	7.02	6.33
	Late Adolescence	7.35	6.85	6.31
Experimental	Early Adolescence	5.75	5.05	5.78
	Middle Adolescence	6.05	4.47	4.96
	Late Adolescence	6.35	2.77	3.03

Interpretation: Table 1.5 displays the mean scores for the various group and their respective age group. The following are some observations:

- **Control group:** We determine that the adjusted mean for early adolescence is 6.46, the pretest mean is 7.00, and the posttest mean is 6.72. The adjusted mean, the mean of the pretest, and the mean of the posttest for middle adolescents are, respectively, 6.33, 7.55, and 7.02. We determine that the adjusted mean for late adolescence is 6.31, the pretest mean is 7.35, and the posttest mean is 2.77.
- **Experimental group:** The adjusted mean, the pretest mean, and the posttest mean for early adolescence are 5.78, 5.75, and 5.50, respectively. The mean of the adjusted mean, the mean of the pretest, and the mean of the posttest for middle adolescents are, respectively, 4.96, 6.05, and 4.47. We determine the adjusted mean, pretest mean, and posttest mean for late adolescence to be 3.03, 6.35, and 2.77, respectively.

Figure- 1.1: Pre, Post and Adjusted Posttest Mean scores of Anxiety



Interpretation: Figure 1.1 provides a graphical representation of table 1.5. We considered the post-test anxiety score, the adjusted mean anxiety score, and the pre-test mean anxiety score for the early, middle, and late adolescent groups in both the control group and the experimental group.

Table 1.6 Pairwise Comparison of Anxiety Scores between Age Group

Age Group			Mean Difference	p-value	95% confidence Interval for Difference	
Early Adolescence	Middle Adolescence	Late Adolescence			Lower Bound	Upper Bound
6.12	5.65	--	0.47	<0.05	0.23	0.71
6.12	--	4.67	1.45	<0.05	1.21	1.69
--	5.65	4.67	0.97	<0.05	0.73	1.21

Conclusion: There are statistically significant differences between early adolescence and middle adolescence, early adolescence and late adolescence, and middle adolescence and late adolescence, according to the adjusted mean scores of anxiety. These differences are also present between early adolescence and late adolescence. The corresponding p-values are less than 0.05. It is therefore possible for us to draw the conclusion that the adjusted post-test mean of anxiety scores for the early adolescent group is considerably greater than the mean scores for the middle adolescent group and the late adolescent group.

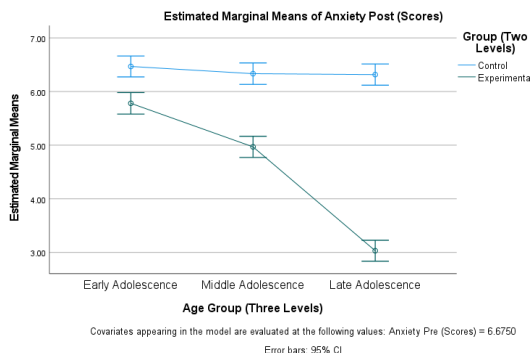
Table 1.7 Pairwise Comparison of Anxiety Score Control & Experimental Group with respect to Age Group

Age Group	Group		Mean Difference	p-value
	Control	Experimental		
Early Adolescence	6.46	5.78	0.68	<0.05
Middle Adolescence	6.33	4.96	1.36	<0.05
Late Adolescence	6.31	3.03	3.28	<0.05

Conclusion: The following are the conclusion drawn from the above table.

- **Early adolescence:** A statistically significant difference exists between the control and experimental groups in adjusted anxiety levels among early adolescent students (p-value < 0.05).
- **Middle adolescence:** A statistically significant difference occurs between the control and experimental groups in adjusted anxiety levels (p-value < 0.05). The adjusted anxiety levels among middle adolescents in the experimental group are lower than those in the control group, thus indicating the treatment's effectiveness on anxiety.
- **Late adolescence:** A statistically significant difference occurs between the control and experimental groups in adjusted anxiety levels (p-value < 0.05). The adjusted anxiety levels among the students in the experiment are lower than those in the control group, indicating the treatment's effectiveness for reducing anxiety.

- **Figure - 1.2: Profile plot showing Adjusted Posttest Mean scores of Anxiety of Early, Middle and Late Adolescence group of both Control and Experimental Group**



Interpretation: The graphical representation distinctly illustrated the disparities in posttest outcomes among different age groups within both the control and experimental groups. The experimental group exhibits reduced anxiety scores in comparison to the control group. The middle adolescence group placed second, the early adolescence group placed lowest in relevance, but the late adolescence group excelled in efficacy above all other groups.

Table 1.8: Percentage of Relative Changes of Anxiety in Experimental group with respect to Control group in different age groups

Group	Experimental			
	Age	Early Adolescence	Middle Adolescence	Late Adolescence
Control	Early Adolescence	10.52	--	--
	Middle Adolescence	--	21.64	--
	Late Adolescence	--	--	51.81

Interpretation: Table 1.7 reveals that After 12 weeks of dynamic exercise and PNF training, anxiety levels dropped by 10.52 percent in the early adolescent group, 21.6 percent in the middle adolescent group, and 51.81 percent in the late adolescent group compared to their control groups. The notable reduction in anxiety levels among all teenage cohorts demonstrates the efficacy of the integrated fitness program, with the greatest enhancement evident in late adolescents. These findings indicate that focused therapies can significantly reduce anxiety during essential developmental stages.

IV. DISCUSSION OF FINDINGS

This study's results linked certain psychological and physical fitness factors to early, middle, and late teenage groups after 12 weeks of training. They also showed that the experimental group and the control group had different outcomes. The results show that the training had different effects on samples at different steps of the process. This suggests that differences in mental and physical fitness could be big depending on age. Also, the big differences between the experimental group reveals that the training plan used in this study has worked effectively.

The results showed that the early adolescence group had 10.55% less anxiety, the middle adolescence group had 21.64% less anxiety, and the late adolescence group had 51.81% less anxiety when compared with their respective control groups. These results suggest that as children get older, their anxiety levels may drop even more, possibly because they have more ways to deal with it and more social support. This trend underscores the significance of tailored interventions for each developmental stage to effectively address the complexities of adolescence.

This shows that late adolescents are especially receptive to these kinds of interventions, probably because their emotional and mental strength is growing, could lead to major improvements in mental health through organized exercise programs.

V. CONCLUSION AND RECOMMENDATIONS

CONCLUSION : The 12-week dynamic exercise and PNF training regimen significantly reduced the anxiety levels of students in the early, middle, and late adolescent groups.

RECOMMENDATIONS : The following recommendations were made based on the conclusions:

- Schools should include similar training programs in their lessons to help students stay healthy physically and mentally.
- In the future, researchers could look into how the training plan affects other psychological factors, like stress, self-efficacy, mood, etc.

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