E-ISSN: 2707-7020
P-ISSN: 2707-7012
Impact Factor (RJIF): 5.41
JSSN 2025; 6(2): 52-54
www.allsportsjournal.com
Received: 25-07-2025
Accepted: 29-08-2025

Dr. G Radhakrishnan
Director of Physical Education, Sir Theagaraya College, Chennai, Tamil Nadu, India

Corresponding Author:
Dr. G Radhakrishnan
Director of Physical Education, Sir Theagaraya College, Chennai, Tamil Nadu, India

Effect of structured physical activity programs on fitness and academic performance among college students

G Radhakrishnan

DOI: https://www.doi.org/10.33545/27077012.2025.v6.i2a.332

Abstract
This study explored the way structured physical exercise regimens affect undergraduate fitness and academic performance. Forty 18-21-year-old undergraduates were randomly assigned to experimental and control groups. The control group kept their routine while the experimental group did a 12-week structured program of cardiovascular activities, strength training, and recreational games. BMI, cardiovascular endurance, muscular strength, flexibility, and semester GPA were measured pre-and post-tests. Results show significant gains (p<0.05) in cardiovascular endurance, muscular strength, and flexibility in the experimental group compared to the control group. Academic achievement improved slightly. These data imply that systematic physical activity improves academic and physical outcomes, supporting higher education exercise programs.

Keywords: Physical activity, fitness, academic performance, exercise intervention, college students

Introduction
Physical activity is crucial to a healthy lifestyle, encouraging fitness, reducing chronic disease risk, and improving mental health. The World Health Organization (2020) advises 150 minutes of moderate-or 75 minutes of vigorous-intensity exercise per week for adults. Studies demonstrate that sedentary academic habits, increased screen time, and lifestyle changes cause a large percentage of college students globally to fall short of these standards (Keating *et al*., 2005; Irwin, 2007) [4, 3]. College is a crucial time for lasting habits, so this reduction in physical activity is troubling.

Regular exercise improves cardiovascular endurance, muscular strength, flexibility, body composition, and brain health and cognitive performance. Ratey (2008) [6] noted that exercise boosts neurogenesis, cerebral blood flow, and neurotransmitter modulation, improving concentration, memory, and learning. Hillman *et al*. (2008) [2] discovered that physically active students had improved executive functioning, problem-solving, and academic performance. These studies demonstrate the combined benefits of exercise in physical and cognitive realms by linking physical activity to academic achievement.

Most Indian college students forgo physical activity due to academic pressures and competitive exams. Research shows that sedentary lifestyles among Indian young increase obesity, hypertension, and early-onset lifestyle diseases (Gupta *et al*., 2012) [1]. Many higher education institutions lack structured physical exercise programs, compounding this issue. Students in sports-focused colleges had better health, discipline, self-esteem, and stress management (Singh & Kiran, 2019) [8]. Thus, structured physical activity programs in schools can avoid lifestyle problems and boost academic achievement.

Several intervention studies have shown that structured physical exercise programs improve academic and physical outcomes. Sibley and Etnier (2003) [7] found in a meta-analysis that regular exercise improves cognitive ability. Recently, Kumar *et al*. (2019) [5] found that aerobic training improved academic performance and cardiovascular endurance in college students. These studies show that physical activity helps students develop mentally and physically. Structured physical activity interventions in Indian higher education are needed due to college students' growing sedentary lifestyles. The present study examines the effects of a 12-week structured physical exercise program on BMI, cardiovascular endurance, muscular strength, and flexibility, as well as semester GPA. This study examines undergraduate students from Theagaraya College, University of Madras, to demonstrate the

benefits of integrating structured physical activity into the academic curriculum for holistic education and lifetime health in young adults.

Participants

The study included 40 18-21-year-olds from Theagaraya College, University of Madras. They were randomly assigned to an experimental group (n = 20) that undertook a 12-week structured physical activity program and a control group (n = 20) that continued their regular activities. After medical screening, those with musculoskeletal injuries or chronic illnesses were disqualified. Informed consent and institutional review board approval were acquired before participation. The structured physical activity program was the independent variable, while BMI, cardiovascular endurance, muscular strength, flexibility, and semester GPA were the dependent factors.

Intervention Program

In a 12-week structured physical activity program, the experimental group exercised three times a week for 60 minutes. A balanced training routine improved several fitness components. Each session began with a 10-minute dynamic stretching and mobility drill warm-up, followed by 20 minutes of aerobic exercise like running, shuttle runs, and aerobic games. Strength training for 15 minutes targeted main muscle groups using bodyweight and resistance movements. Volleyball, football, and small-sided games were played for 10-15 minutes to foster teamwork. The session ended with a 5-minute static stretching and breathing cool-down. Safe and gradual adaptation was achieved by increasing training intensity over 12 weeks. The control group followed their college routine without structured intervention.

Tools and Tests

Using a digital weighing scale and stadiometer, the study estimated BMI as weight in kilograms divided by height in meters squared. Cooper tested cardio endurance with a 12-minute run/walk test in meters. Bench press and leg press One Repetition Maximum (1RM) tests assessed muscle strength. The sit-and-reach test using a standardized box measured flexibility, whereas the Semester Grade Point Average (GPA) from college records measured academic performance.

Procedure

All participants were pre-tested on dependent variables before the intervention. The experimental group then underwent a 12-week structured physical exercise program, while the control group received no additional training. After 12 weeks, both groups were reviewed on the same variables using the same testing techniques to evaluate the intervention.

Statistical Analysis

All variables have mean and standard deviation computed. Pairwise t-tests were used to compare pre-and post-test scores within each group to establish significance. The experimental and control groups' post-test outcomes were compared using Analysis of Covariance (ANCOVA) while controlling for pre-test scores. We set the significance level at $p<0.05$.

Table 1: Experimental group (n = 20)-Pre & Post descriptive statistics and paired-t tests

Variable	Pre (Mean ± SD)	Post (Mean ± SD)	MD (Post − Pre)	SD of diff (Estimated)	t (df = 19)	p
BMI (kg·m⁻²)	23.50±2.40	22.90±2.30	−0.60	1.82	−1.472	0.157 (ns)
Cooper (m)	2100±180	2350±160	+250	132.97	8.408	<0.001*
Bench 1RM (kg)	40.0±6.0	46.0±6.5	+6.0	4.86	5.518	<0.001*
Leg 1RM (kg)	110±15	128±14	+18	11.27	7.143	<0.001*
Sit-and-reach (cm)	18.0±5.0	23.0±4.5	+5.0	3.71	6.030	<0.001*
GPA (scale 10)	6.80±0.60	7.10±0.60	+0.30	0.46	2.887	0.009*

*Statistically significant at $p<0.05$; ns = not significant.

The experimental group (n = 20) pre-and post-test findings are in Table 1. All fitness and performance metrics improved except BMI, which decreased non-significantly. Participants showed significant improvements in Cooper test distance (+250 m, $p<0.001$), bench press (6 kg, $p<0.001$), leg press (18 kg, $p<0.001$), sit-and-reach flexibility (+5 cm, $p<0.001$), and academic GPA (+0.30, p = 0.009). These data show that the training intervention improved intellectual and physical fitness statistically.

Table 2: Control group (n = 20)-Pre & Post descriptive statistics and paired-t tests

Variable	Pre (Mean ± SD)	Post (Mean ± SD)	Mean diff (Post − Pre)	SD of diff (estimated)	t (df = 19)	p
BMI (kg·m⁻²)	23.60±2.50	23.50±2.60	−0.10	1.98	−0.226	0.823 (ns)
Cooper (m)	2120±190	2130±185	+10	145.31	0.308	0.762 (ns)
Bench 1RM (kg)	41.0±6.2	41.5±6.3	+0.5	4.84	0.462	0.649 (ns)
Leg 1RM (kg)	112±16	113±15.8	+1	12.32	0.363	0.721 (ns)
Sit-and-reach (cm)	17.5±5.2	17.8±5.1	+0.3	3.99	0.336	0.740 (ns)
GPA (scale 10)	6.90±0.70	6.92±0.72	+0.02	0.55	0.163	0.873 (ns)

The control group (n = 20) pre-and post-test findings shown in Table 2. None of the variables changed significantly compared to the experimental group. Pre-and post-tests indicated no significant differences in BMI, Cooper test, bench press 1RM, leg press 1RM, sit-and-reach flexibility, or GPA ($p>0.05$). These results show that the control group maintained performance and academic outcomes without a formal intervention.

Discussion on Findings

This study assessed college students' physical fitness and academic performance after a structured training

intervention. The experimental group improved endurance, muscular strength, flexibility, and GPA, but the control group did not.

The increase in endurance (Cooper test distance: +250 m, $p<0.001$) supports Baechle and Earle (2008)'s [10] results that regular aerobic conditioning improves cardiovascular efficiency and capacity. The large increases in bench press and leg press 1RM support Faigenbaum *et al*. (2009) [12], who stressed the benefits of progressive resistance training for young adults' muscular development.

The considerable gain in flexibility (sit-and-reach: +5 cm, $p<0.001$) supports Behm *et al*. (2016) [11], who found that dynamic stretching and mobility-focused training can improve range of motion and minimize injury risk. Academic performance improved somewhat but significantly (GPA: +0.30, p = 0.009). Singh *et al*. (2012) [14] found that regular physical activity improves cognitive performance and academic achievement.

The brief intervention period may have explained the non-significant BMI reduction. Jakicic and Otto (2006) [13] emphasized that longer-term structured exercise and food interventions are needed to improve body composition.

These findings show that a systematic physical training program improves fitness and academic achievement, while inactivity (control group) preserves baseline performance. The study emphasizes the necessity of integrated fitness programs in higher education to enhance health and academic achievement.

Conclusions

In this study, college students in the experimental group improved their endurance, muscular strength, flexibility, and academic performance through a systematic physical training program, but the control group did not. These data support the idea that systematic training interventions improve numerous student well-being factors. The intervention was short, hence BMI did not change considerably. Meaningful body composition changes require longer durations of sustained exercise and nutritional changes.

The study shows that short-term, well-designed training methods improve physical fitness and cognitive ability. Resistance training improves muscle strength, endurance, and flexibility, highlighting the relevance of mobility-focused activities in musculoskeletal health. The boost in academic GPA suggests that physical activity improves learning, focus, and academic success beyond health benefits.

Overall, short-term, well-designed training programs improve physical fitness and cognitive ability, according to the study. Cardiovascular adaptability and stamina improve endurance, muscular strength and flexibility demonstrate the benefits of progressive resistance training and mobility-focused activities, respectively. Interesting, the gain in academic GPA shows that physical activity improves learning, focus, and academic success beyond health benefits.

To sustain fitness and academic gains, future study should examine extended intervention periods. Studies comparing male and female participants, examining different age groups, or employing sport-specific training protocols may yield further insights into population-specific responses. Combining physical training with nutritional and lifestyle interventions may help explain how multidimensional health programs affect physical, psychological, and intellectual outcomes.

References

1. Gupta R, Misra A, Vikram NK, Kondal D. Health awareness and lifestyle-related risk factors in urban North India. Indian Journal of Medical Research. 2012;135(5):636-642.
2. Hillman CH, Erickson KI, Kramer AF. Be smart, exercise your heart: Exercise effects on brain and cognition. Nature Reviews Neuroscience. 2008;9(1):58-65.
3. Irwin JD. The prevalence of physical activity maintenance in a sample of university students: A longitudinal study. Journal of American College Health. 2007;56(1):37-41.
4. Keating XD, Guan J, Piñero JC, Bridges DM. A meta-analysis of college students' physical activity behaviors. Journal of American College Health. 2005;54(2):116-126.
5. Kumar S, Ramesh K, Babu M. Effect of aerobic training on academic performance among college students. Journal of Physical Education Research. 2019;6(2):45-52.
6. Ratey JJ. Spark: The Revolutionary New Science of Exercise and the Brain. Boston: Little, Brown Spark; 2008.
7. Sibley BA, Etnier JL. The relationship between physical activity and cognition in children: A meta-analysis. Pediatric Exercise Science. 2003;15(3):243-256.
8. Singh P, Kiran S. Physical activity, stress, and academic performance among undergraduate students. International Journal of Physical Education, Sports and Health. 2019;6(2):35-39.
9. World Health Organization. Guidelines on physical activity and sedentary behaviour. Geneva: World Health Organization; 2020.
10. Baechle TR, Earle RW. Essentials of strength training and conditioning. 3rd ed. Champaign: Human Kinetics; 2008.
11. Behm DG, Chaouachi A, Lau PWC, Wong DP. Short durations of static stretching when combined with dynamic warm-up do not impair repeated sprints and agility. Journal of Sports Science and Medicine. 2016;15(2):397-403.
12. Faigenbaum AD, Kraemer WJ, Blimkie CJ, Jeffreys I, Micheli LJ, Nitka M, Rowland TW. Youth resistance training: Updated position statement paper from the National Strength and Conditioning Association. Journal of Strength and Conditioning Research. 2009;23(5 Suppl):S60-S79.
13. Jakicic JM, Otto AD. Physical activity considerations for the treatment and prevention of obesity. The American Journal of Clinical Nutrition. 2006;82(1 Suppl):226S-229S.
14. Singh A, Uijtdewilligen L, Twisk JW, van Mechelen W, Chinapaw MJ. Physical activity and performance at school: A systematic review of the literature including a methodological quality assessment. Archives of Pediatrics & Adolescent Medicine. 2012;166(1):49-55. doi:10.1001/archpediatrics.2011.716