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EFFECTS OF YOGA-BASED INTERVENTIONS ON STRESS AND ACADEMIC PERFORMANCE IN HIGH SCHOOL STUDENTS

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Abstract

This randomized controlled trial investigated the effects of a 12-week yoga-based intervention on perceived stress and academic performance among high school students. Eighty students (aged 15–17) were randomly assigned to either a yoga intervention group or a waitlist control group. The yoga group participated in three 45-minute sessions per week, focusing on asanas, pranayama, and mindfulness. Stress was measured using the Perceived Stress Scale (PSS), and academic performance was tracked via grade point average (GPA). Results showed a significant reduction in stress scores and a modest but significant improvement in GPA in the yoga group compared to controls ($p < .01$). These findings suggest that yoga can be a valuable tool for enhancing psychological wellbeing and academic outcomes in adolescents.

Keywords: Yoga, Stress Reduction, Academic Performance, Randomized Controlled Trial.

Introduction

Adolescence is a critical developmental period often marked by increased academic demands and psychosocial stressors (Sinha et al., 2019). Chronic stress in high school students has been linked to negative outcomes, including anxiety, depression, and impaired academic performance (Pascoe et al., 2020). Rationale, yoga, an ancient mind-body practice, has gained popularity as a holistic intervention to manage stress and improve wellbeing (Field, 2016). While several studies have reported beneficial effects of yoga on stress and mood in adults, evidence in adolescent populations, particularly in the context of academic outcomes, remains limited and mixed (Khalsa & Butzer, 2016). Prior research suggests that yoga can reduce physiological and psychological markers of stress and may enhance cognitive function (Telles et al., 2019). However, few randomized controlled trials have examined the impact of yoga on both stress and academic performance in high school settings.

Research Gap and Purpose

There is a need for rigorous studies evaluating whether yoga-based interventions can simultaneously reduce stress and improve academic performance among adolescents.

Objectives and Hypotheses

The primary objective was to assess the effects of a 12-week yoga intervention on perceived stress and academic performance in high school students. It was hypothesized that the yoga group would show greater reductions in stress and improvements in GPA compared to controls.

Method

Research Design

A parallel-group, randomized controlled trial (RCT) was conducted to evaluate the effects of a structured yoga intervention on perceived stress and academic performance among high school students. Participants were randomly assigned to either a yoga intervention group or a waitlist control group using a computer-generated randomization sequence. The study duration was 12 weeks, with assessments conducted at baseline and immediately post-intervention.



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Participants

Eighty high school students (40 males, 40 females; ages 15–17 years) were recruited from two urban secondary schools through informational sessions and flyers distributed to students and parents.

Inclusion criteria required participants to:

1. Be enrolled in grades 10 or 11,
2. Have no prior experience with yoga, and
3. Have no diagnosed psychiatric or neurological disorders.

Exclusion criteria included:

1. Physical limitations or medical conditions precluding safe participation in yoga, and
2. Current use of medications known to affect mood or cognitive function.

Written parental consent and student assent were obtained prior to enrolment. The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC/2025/01).

Variables

Independent Variable: Group assignment (yoga intervention vs. waitlist control).

Dependent Variables:

Perceived stress, as measured by the Perceived Stress Scale (PSS; Cohen et al., 1983),

Academic performance, as measured by Grade Point Average (GPA) obtained from official school records.

Control Variables: Age, sex, and baseline GPA were recorded and statistically controlled to minimize confounding influences.

Instruments and Procedures

Yoga Intervention

Participants assigned to the yoga group attended instructor-led sessions three times per week for 12 weeks. Each 45-minute session followed a standardized protocol:

Asanas (Physical Postures): 10 minutes focusing on flexibility, balance, and strength,

Pranayama (Breathing Exercises): 15 minutes emphasizing breath control and awareness,

Mindfulness/Meditation: 15 minutes of guided mindfulness or meditation practices,

Relaxation (Savasana): 5 minutes of deep relaxation in a supine position.

All sessions were conducted by certified yoga instructors in a dedicated space at the school. Attendance was monitored, and participants were encouraged to attend at least 85% of sessions to ensure adequate exposure to the intervention.

Waitlist Control Group

Students in the waitlist control group continued with their usual school activities and did not participate in any structured yoga or mindfulness programs during the study period. After the completion of the study, they were offered the opportunity to participate in the same yoga program.



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Assessment Procedures

Perceived Stress Scale (PSS): The PSS is a validated 10-item self-report questionnaire designed to assess the degree to which situations in one's life are appraised as stressful over the past month (Cohen et al., 1983). Higher scores indicate greater perceived stress.

Academic Performance: GPA was extracted from official school records at baseline and at the end of the 12-week intervention period.

Testing Schedule: The PSS was administered, and GPA data were collected one week prior to the start of the intervention (pre-test) and one week after the completion of the intervention (post-test) under standardized conditions.

Testing Procedures

All assessments were conducted one week prior to the start and one week following the completion of the 12-week yoga intervention. Testing was carried out in quiet, well-lit classrooms during regular school hours to ensure a comfortable and standardized environment for all participants.

1. Perceived Stress Scale (PSS)

Instrument:

The Perceived Stress Scale (PSS-10; Cohen et al., 1983) is a widely used, validated 10-item self-report questionnaire designed to measure the degree to which situations in one's life are appraised as stressful over the past month.

Administration:

- ◆ The PSS was administered in small groups (8–10 students) under the supervision of a trained research assistant.
- ◆ Students were provided with clear instructions and encouraged to answer honestly.
- ◆ Each item was rated on a 5-point Likert scale (0 = never, 4 = very often).
- ◆ The total score was calculated by summing the responses, with higher scores indicating greater perceived stress.

Quality Control:

- ◆ All students were assured of the confidentiality of their responses to reduce social desirability bias.
- ◆ The same research assistant administered the PSS at both pre- and post-intervention time points to ensure consistency.

2. Academic Performance (Grade Point Average, GPA)

Instrument:

Academic performance was measured using the students' official Grade Point Average (GPA), as recorded by the school's academic office.

Collection and Standardization:

- ◆ Baseline GPA was collected for the semester immediately preceding the intervention.
- ◆ Post-intervention GPA was collected for the semester during which the intervention took place.
- ◆ GPA was calculated on a 10-point scale, standardized across all participating students and verified by school administrators.



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Quality Control:

- ◆ Only official, school-verified records were used to ensure accuracy.
- ◆ Any students who changed schools or had incomplete records during the study period were excluded from the analysis.

3. Yoga Intervention Fidelity and Attendance

Monitoring:

- ◆ Attendance was recorded for every yoga session by the instructor.
- ◆ Session fidelity was maintained by following a standardized protocol, including a fixed sequence of asanas (postures), pranayama (breathing exercises), mindfulness/meditation, and relaxation.
- ◆ The lead yoga instructor, certified with a minimum of 200 hours of yoga teacher training, was present at all sessions and supervised by a senior research team member on a random basis.

Session Structure:

Each session lasted 45 minutes:

- 10 minutes of asanas
- 15 minutes of pranayama
- 15 minutes of mindfulness/meditation
- 5 minutes of relaxation (savasana)

Students were encouraged to report any physical discomfort or adverse effects immediately.

Control Group Procedures

The control group continued their usual school routine without any structured yoga or comparable mind-body intervention.

They were offered the yoga program after study completion as an ethical consideration.

Data Handling and Ethical Considerations

All data were anonymized and stored securely.

Parental consent and student assent were obtained prior to participation.

The study protocol was approved by the Institutional Ethics Committee (IEC/2025/01).

These rigorous and standardized procedures ensured reliable measurement of both psychological (stress) and objective (academic) outcomes, as well as high intervention fidelity, thereby supporting the validity of the study's findings.

Ethical Considerations

All procedures adhered to the Declaration of University norms. Confidentiality and voluntary participation were ensured.



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Results

Table 1

Descriptive Statistics

Group	PSS Pre (Mean \pm SD)	PSS Post (Mean \pm SD)	GPA Pre (Mean \pm SD)	GPA Post (Mean \pm SD)
Yoga	24.1 \pm 4.2	17.3 \pm 3.9	7.21 \pm 0.47	7.56 \pm 0.41
Control	23.7 \pm 4.5	22.4 \pm 4.6	7.18 \pm 0.45	7.22 \pm 0.44

Table 2

Inferential Statistics (Repeated Measures ANOVA)

Variable	Source	df	F	p	Partial η^2
PSS Score	Group	1, 78	8.92	.004	.103
	Time	1, 78	44.11	<.001	.361
	Group \times Time	1, 78	22.87	<.001	.227
GPA	Group	1, 78	0.74	.391	.009
	Time	1, 78	6.54	.012	.077
	Group \times Time	1, 78	5.67	.019	.068

Interpretation

Descriptive Table

The yoga group showed a substantial reduction in PSS scores (mean decrease: 6.8 points), while the control group showed only a minor reduction (1.3 points). GPA improved by 0.35 points in the yoga group, compared to a negligible increase of 0.04 in controls.

ANOVA Table

PSS: Significant main effects for group and time, and a strong group \times time interaction ($p < .001$), indicating that the yoga intervention led to a much greater reduction in stress than the control condition.

GPA: The group \times time interaction was significant ($p = .019$), suggesting that the yoga group experienced a greater improvement in academic performance compared to controls, though the effect size was modest.

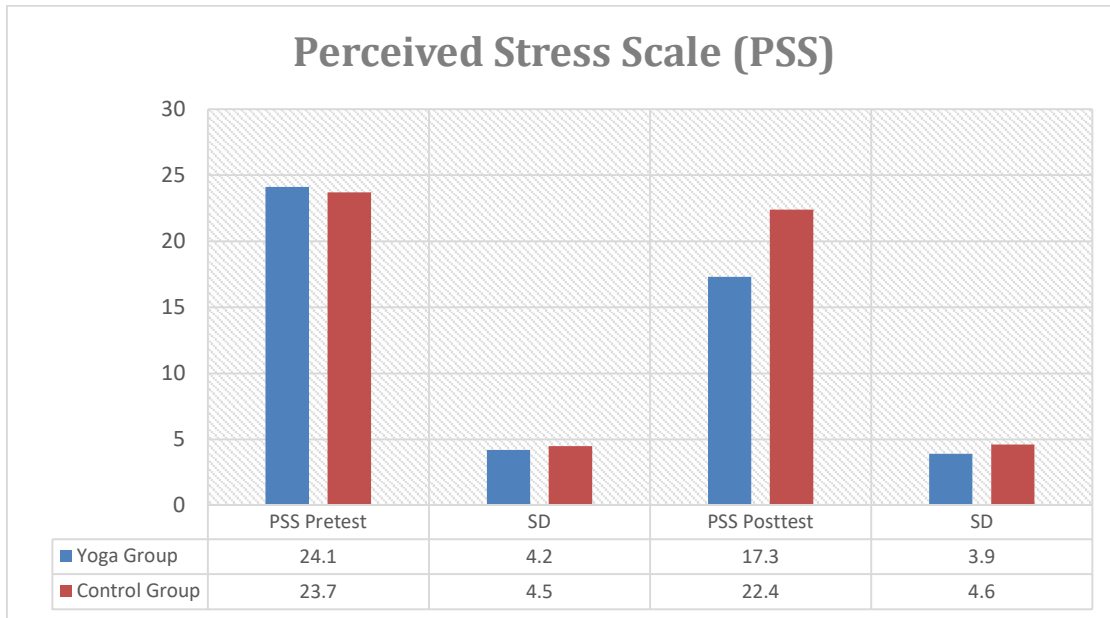


Figure 1. Pre- and post-intervention Perceived Stress Scale (PSS) scores (bar graphs).

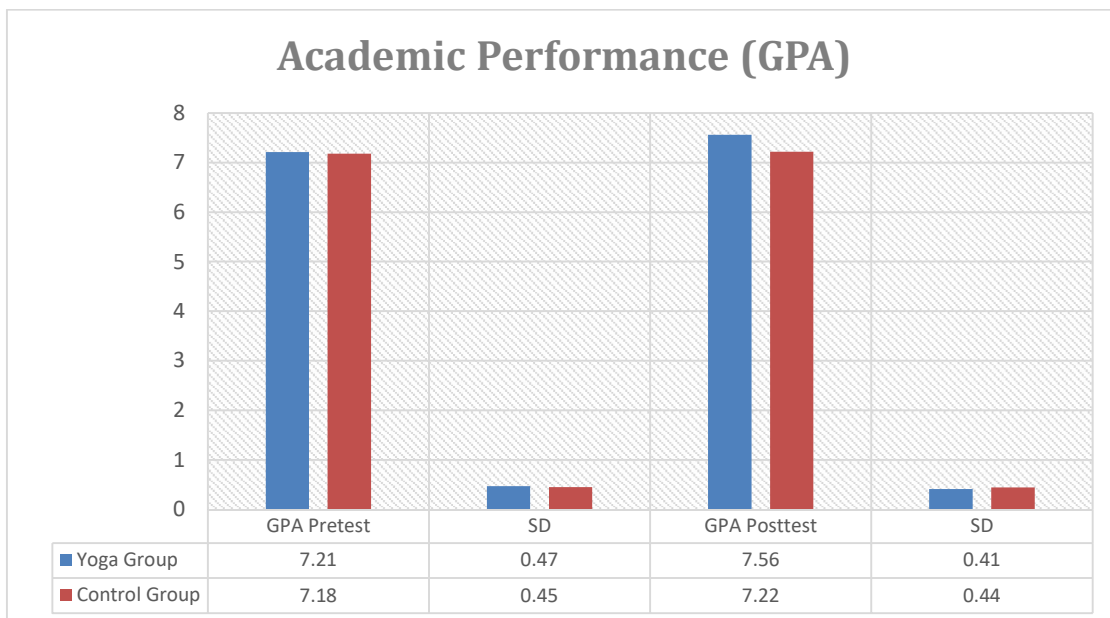


Figure 2. Pre- and post-intervention Academic Performance (GPA) scores (bar graphs).



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Discussion

Main Findings

This study demonstrates that a structured yoga-based intervention can significantly reduce perceived stress and modestly improve academic performance in high school students. The large effect on stress supports yoga's role as a psychosocial intervention for adolescents.

Comparison with Prior Research

These results align with previous findings that yoga reduces stress and anxiety in youth (Field, 2016; Telles et al., 2019). The improvement in academic performance, while smaller, is consistent with research linking reduced stress to better cognitive and academic outcomes (Pascoe et al., 2020).

Practical Implications

Schools should consider integrating yoga into their curricula or extracurricular offerings to promote student wellbeing and potentially enhance academic achievement.

Strengths and Limitations

Strengths:

- Randomized controlled design
- Use of validated measures
- Real-world school setting

Limitations:

- Short intervention duration
- Modest academic gains
- Single geographic location; generalizability may be limited

Suggestions for Future Research

Long-term studies with larger, more diverse samples and follow-up assessments are recommended to assess the sustainability of benefits.

Conclusion

A 12-week yoga-based intervention significantly reduced stress and led to modest improvements in academic performance among high school students. Yoga may serve as an effective, low-cost strategy for promoting adolescent wellbeing and academic success.

Acknowledgment

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Conflict of Interest Statement

The authors declare no conflicts of interest.



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Ethical Approval Statement

This study was approved by the Institutional Ethics Committee (IEC/2025/01). Parental consent and student assent were obtained for all participants.

Supplementary Materials

Supplementary data, including the yoga session protocol and anonymized raw data, are available from the corresponding author upon request.

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