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Yoga-based intervention and its impact on behavior and psychological well-being in elementary students: A quasi-experimental study

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Abstract

Adolescence is a crucial developmental stage marked by rapid physical, emotional, and cognitive changes. Increasing academic demand, social expectations, and lifestyle changes contribute to behavioral and mental health challenges among elementary students. Interventions based on holistic yoga practice have emerged as a reliable approach to improving psychological well-being. To evaluate the impact of a structured yoga intervention on behavioral patterns and mental health among school students, a quasi-experimental pre-post study with a control group design was conducted among 80 elementary students in a school setting. Participants were divided into an experimental (n = 40) and a control group (n = 40). The experimental group underwent a structured yoga program for 16 weeks, while the control group followed routine activities. Behavioral parameters were assessed using a validated 5-point scale questionnaire across 5 domains, including inattention, hyperactivity, aggression, learning problems, and peer relationships. Statistical analysis was performed using paired and independent t-tests. The experimental group showed significant improvement across all behavioral domains following the yoga intervention. Inattention, hyperactivity, aggression, learning problems, and peer relationship issues all significantly decreased (p < 0.01). Inattention reduced from 3.8 ± 0.6 to 2.4 ± 0.5, and hyperactivity from 3.6 ± 0.5 to 2.3 ± 0.4. Post-intervention, the experimental group performed significantly better than the control group across all domains, confirming the effectiveness of yoga in improving behavioral outcomes and overall functioning. Yoga intervention significantly enhances behavioral outcomes and mental well-being among elementary students, suggesting its integration into the curriculum.

1 Introduction

Yoga is an art and science of consciousness that leads to the full potential of mankind and to the union of the individual's consciousness with the universal (Sinha, 2022). It also leads to achieving the highest goal of life, i.e., Moksha. Yoga combines physical movement with a mindful focus on self-awareness, breath, and energy. It has also improved the psychological and physiological disciplines.

Adolescence is a crucial developmental stage characterized by rapid physical, cognitive, and emotional changes (Uktamovna, 2025). During this period, children experience increased academic demands, social pressures, and physiological transformations that can significantly impact their mental health and behavioral patterns (Steinberg, 2014). Mental health problems among children and adolescents are a growing concern worldwide, with estimates suggesting that 10–20% of youth experience mental health disorders, many of which remain undiagnosed and untreated (WHO, 2021; Khunti et al., 2023; Kerekes et al., 2024; Patra et al., 2024). Behavioral problems such as hyperactivity, inattention, aggression, and poor peer relationships are particularly prevalent in school-aged children and can negatively influence academic performance, social interactions, and overall quality of life (Barkley and Poillion, 1994). Multiple factors contribute to behavioral and mental health challenges in children.

Academic pressure, excessive screen time, lack of physical activity, disrupted sleep, and familial stressors are recognized as key contributors to emotional and behavioral disturbances (Twenge and Campbell, 2018). Additionally, socio-environmental factors, including peer dynamics, and socioeconomic status, play significant roles in shaping children's psychosocial development (Evans and Kim, 2013). Early intervention is therefore crucial to promote healthy behavioral patterns and mental well-being, preventing the escalation of psychological difficulties into adolescence and adulthood.

Yoga, an ancient mind-body practice from India, combines physical postures (asanas) with breathing exercises (pranayama), and meditation to enhance physical, mental, and emotional well-being (Telles and Singh, 2013). Recent research has increasingly recognized yoga as an intervention capable of reducing stress, improving emotional regulation, and enhancing cognitive functioning in children and adolescents (Khalsa, 2013; Khunti et al., 2023; Kerekes et al., 2024; Patra et al., 2024). Yoga practice promotes relaxation by modulating autonomic nervous system activity, reducing cortisol levels, and increasing parasympathetic tones, which together facilitate improved attention, emotional stability, and social functioning (Field, 2011). Yoga encourages mindfulness, self-awareness, and empathy, supporting social behaviors and better peer relationships in school settings (Butzer et al., 2015). School-based yoga interventions have gained attention for their feasibility and holistic benefits. Incorporating yoga into school curriculum provides children with structured opportunities to engage in physical activity while also supporting psychosocial and emotional development (Jha et al., 2025). Studies have reported that school-based yoga programs improve attention, reduce anxiety, mitigate aggressive tendencies, and enhance learning outcomes among students (Mendelson et al., 2010). Despite growing evidence, there remains a need for rigorously designed studies examining the impact of yoga interventions on a range of behavioral parameters and mental health outcomes among school-aged children, particularly in the context of Indian educational settings where academic pressure and cultural expectations may influence stress levels and behavior.

Mental health among school students refers to their emotional, psychological, and social well-being that influences how they think, feel, and behave in daily life (Khunti et al., 2023). It plays a vital role in their ability to cope with academic demand, build relationships, and handle challenges effectively. Good mental health enables students to stay focused, confident, and emotionally stable, which supports better academic performance and overall development (Murphy et al., 2014). However, many students face issues such as stress, anxiety, depression, and emotional instability due to academic competition, peer pressure, family expectations, and social media influence (Khunti et al., 2023). Maintaining positive mental health is essential for their holistic growth and well-being. Behavioral patterns play a significant role in shaping the mental health of school students, as daily actions and interactions can either support or harm emotional well-being (National Academies of Sciences, 2019). Positive behavioral patterns such as discipline, active participation in class, healthy peer relationships, and effective communication help students build confidence, reduce stress, and develop emotional stability. These behaviors promote a sense of belonging and achievement, which strengthens overall mental health. On the other hand, negative behavioral patterns like aggression, social withdrawal, poor concentration, impulsivity, and defiance can increase psychological stress and emotional imbalance (Osman et al., 2019). Such behaviors may lead to academic difficulties, conflicts with peers and teachers, and feelings of failure or low self-esteem. Over time, these negative experiences can contribute to anxiety, depression, and reduced overall well-being.

Therefore, this study evaluates the impact of a structured yoga intervention on mental health and behavioral patterns among elementary school students. Utilizing a pre-test and post-test control group design, this research examines changes in attention, hyperactivity, aggression, learning problems, and peer relationship scores after a 16-week yoga program. The anticipated findings aim to provide evidence supporting the integration of yoga as a feasible and comprehensive approach to enhancing mental health and behavioral well-being in educational settings. This research is expected to inform the development of school-based health promotion strategies that foster the psychological, social, and academic growth of children.

2 Materials and methods

2.1 Study design

This study adopted a quasi-experimental pre-test and post-test control group design to assess the impact of a yoga intervention on behavioral change and psychological well-being among elementary school students. The study was conducted in a co-educational school in West Bengal, India, and included Grade V students aged 10–11 years as the study population. A total of 80 students were selected through purposive sampling and divided into two groups: an experimental group (n = 40) and a control group (n = 40). The inclusion criteria were students aged 10–11 years, with regular school attendance, and whose parents or legal guardians provided informed consent. All participants in the experimental group needed to safely perform yoga practice. Students who were unable to perform the yoga practice were excluded from the study.

2.2 Intervention

The experimental group participated in a structured 16-week yoga intervention program conducted five days per week, with each session lasting 30 minutes. The program comprised a combination of yogic practices, including asanas (Tadasana, Vrikshasana, Bhujangasana, Balasana, Paschimottanasana, and Setu Bandhasana), pranayama techniques (Nadi Shodhana and Bhramari), mudras (Chin Mudra and Apan Vayu Mudra), along with guided meditation and relaxation exercises. These sessions were designed to promote physical, mental, and emotional well-being among the participants. In contrast, the control group did not receive any intervention and continued with their regular school routine throughout the study period.

2.3 Data collection

Data were collected using a structured 5-point behavioral rating scale questionnaire designed to assess key domains, including inattention, hyperactivity, aggression, learning problems, and peer relationships (**Table 1**). Each item was rated on a five-point scale (1 = Never, 2 = Almost never, 3 = Sometimes, 4 = Fairly often, and 5 = Very often), with higher scores indicating greater levels of behavioral problems among the participants.

2.4 Statistical analysis

Statistical analysis was performed using Microsoft Excel 2013. Descriptive statistics, including mean, standard deviation, and standard error, were calculated to summarize the data, and the results were presented in tabular form. Comparisons were made with standardized reference values (control experiments) where applicable. Inferential analysis was conducted using Pearson's correlation coefficient and the t-test to examine relationships and differences between variables and groups. A p-value of ≤ 0.01 was considered statistically significant at a 99% confidence interval.

3 Results

3.1 Effect of yoga intervention on behavioral scores

The experimental group showed significant improvement in all behavioral domains after the yoga intervention (**Table 2**). Inattention scores reduced from 3.8 ± 0.6 to 2.4 ± 0.5 (t = 8.21, p < 0.01), and hyperactivity from 3.6 ± 0.5 to 2.3 ± 0.4 (t = 7.95, p < 0.01). Aggression scores decreased from 3.2 ± 0.7 to 2.1 ± 0.6 (t = 6.43, p < 0.01), while learning problems reduced from 3.5 ± 0.6 to 2.5 ± 0.5 (t = 5.87, p < 0.01). Peer relationship also improved significantly, declining from 3.3 ± 0.5 to 2.2 ± 0.4 (t = 6.12, p < 0.01). Since lower scores indicate reduced behavioral problems, these findings suggest a marked overall improvement across all assessed domains following the yoga intervention, indicating its effectiveness in enhancing behavioral outcomes among elementary school students.

Table 1. *Questionnaire used in the survey and its associated domains.*

No.	Questionnaire / Statements	Domain
1	Does not maintain a good attention level when doing any task.	Inattention
2	Possesses impatient and restless behavior.	Hyperactivity
3	Shows restless movements when instructed to sit patiently.	Hyperactivity
4	Faces difficulty in reading and writing.	Learning problems
5	Is short-tempered and gets angry frequently for trivial reasons.	Aggression
6	Cannot maintain good relationships with others for a long time.	Peer relationship
7	Cannot sit in one place patiently when instructed to do so.	Hyperactivity
8	Make silly mistakes in studies due to lack of concentration.	Inattention
9	Cannot understand what he or she is currently studying.	Learning problems
10	Makes spelling mistakes when instructed to write something.	Learning problems
11	Makes mistakes even in very simple mathematical problems.	Learning problems
12	Frequently interrupts others to express his or her own thoughts.	Hyperactivity
13	Argues in most situations.	Aggression
14	Does not follow instructions given by elders.	Aggression
15	Does not behave friendly manner with same-aged children.	Peer relationship
16	Does not maintain good concentration and focus on studies or play.	Inattention
17	Does not like to play with any friend.	Peer relationship
18	Behaves inappropriately with people of different ages.	Aggression
19	Attention easily shifts away from the current task.	Inattention
20	Does not the ability to develop good friendships with same-aged children.	Peer relationship

3.2 Post-intervention comparison between groups

Post-intervention comparison revealed significantly better outcomes in the experimental group compared to the control group across all behavioral domains (**Table 3**). Inattention scores were significantly lower in the experimental group (2.4 ± 0.5) compared to the control group (3.7 ± 0.6; t = 9.01, $p < 0.01$), as were hyperactivity scores (2.3 ± 0.4 vs. 3.5 ± 0.5; t = 8.76, $p < 0.01$). Similarly, aggression scores were reduced in the experimental group (2.1 ± 0.6 vs. 3.1 ± 0.7; t = 6.98, $p < 0.01$), along with learning problems (2.5 ± 0.5 vs. 3.4 ± 0.6; t = 6.21, $p < 0.01$), and peer relationship (2.2 ± 0.4 vs. 3.2 ± 0.5; t = 7.14, $p < 0.01$). These findings confirm that the yoga intervention was effective in improving behavioral outcomes among elementary school students.

Table 2. *Pre- and post-intervention behavioral scores in the experimental group.*

Domain	Pre-test (mean ± SD)	Post-test (mean ± SD)	t-value	*p*-value
Inattention	3.8 ± 0.6	2.4 ± 0.5	8.21	<0.01
Hyperactivity	3.6 ± 0.5	2.3 ± 0.4	7.95	<0.01
Aggression	3.2 ± 0.7	2.1 ± 0.6	6.43	<0.01
Learning problems	3.5 ± 0.6	2.5 ± 0.5	5.87	<0.01
Peer relations	3.3 ± 0.5	2.2 ± 0.4	6.12	<0.01

Table 3. *Post-intervention comparison between experimental and control groups.*

Domain	Experimental (mean ± SD)	Control (mean ± SD)	t-value	*p*-value
Inattention	2.4 ± 0.5	3.7 ± 0.6	9.01	<0.01
Hyperactivity	2.3 ± 0.4	3.5 ± 0.5	8.76	<0.01
Aggression	2.1 ± 0.6	3.1 ± 0.7	6.98	<0.01
Learning problems	2.5 ± 0.5	3.4 ± 0.6	6.21	<0.01
Peer relations	2.2 ± 0.4	3.2 ± 0.5	7.14	<0.01

4 Discussion

Yoga, as a holistic mind-body practice, has been increasingly recognized for its potential contributions to physical, psychological, and social well-being (Sumner et al., 2025). In the present study, yoga was conceptualized not only as a physical intervention but also as a practice grounded in principles such as mindfulness, compassion, and interconnectedness, which may enhance individual resilience and social cohesion (Kishida et al., 2018). From a theoretical perspective, yoga is understood as a multidimensional system in which the physical, psychological, and emotional domains are interrelated, so that changes in one domain may influence overall health outcomes. In addition, yoga emphasizes individualized practice, recognizing that responses to intervention may vary according to personal needs and capacities. Central to this framework is the notion of self-regulation and self-empowerment, wherein individuals actively engage in their own health and healing processes. Furthermore, previous literature highlights the role of mental states in health outcomes, suggesting that positive psychological states may facilitate recovery and well-being, whereas negative states may impede it (Woodyard, 2011).

The present study demonstrated that a structured yoga intervention significantly improved behavioral outcomes among school-aged children (**Fig. 1**). Specifically, there were relationship problems. These results are consistent with prior research indicating that yoga-based interventions can enhance attentional control, emotional regulation, and behavioral functioning in children and adolescents (Shanker and Pradhan, 2023). The observed improvements in inattention and hyperactivity may be attributed to enhanced self-regulatory capacity and strengthened executive functioning associated with regular yoga practice, including improved sustained attention and cognitive control processes (Razza et al., 2015; Wilkin et al., 2024).

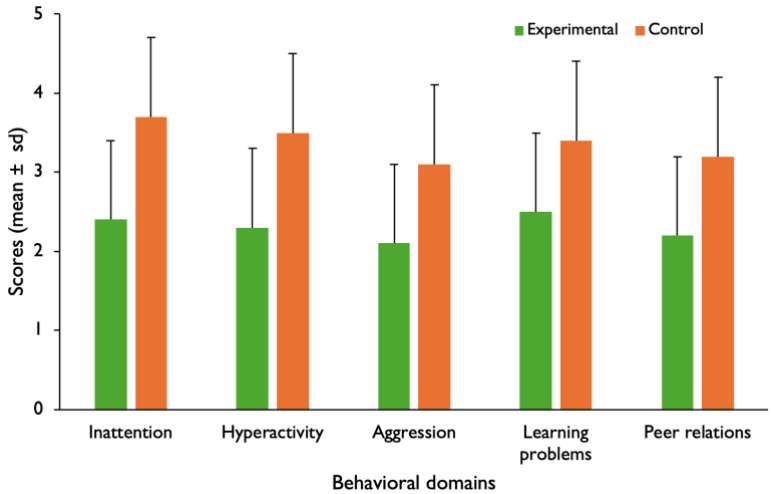

Figure 1. *Post-intervention comparison scores (mean and standard deviation) between groups.*

Reductions in aggression and behavioral difficulties further suggest that yoga may improve emotional regulation and reduce stress reactivity. This effect may be explained by yoga's influence on autonomic nervous system balance and its capacity to reduce physiological arousal, thereby promoting calmer behavioral responses under stress (Steinberg, 2014). In addition, improvements in peer relationship functioning suggest that yoga practice may foster social-emotional competencies such as empathy, mindfulness, and interpersonal awareness, which in turn contribute to more adaptive peer interactions and reduced interpersonal conflict in school environments (Telles and Singh, 2013).

The significant reduction in learning-related difficulties observed in the present study suggests that yoga may also have beneficial effects on cognitive functioning, particularly attention span, memory, and information processing. Mind-body interventions such as yoga have been shown to strengthen executive functions and self-control, which are essential for academic engagement and classroom behavior (Twenge and Campbell, 2018). These findings are further supported by broader evidence indicating that yoga and related contemplative practices can enhance cognitive performance and behavioral regulation by improving attentional and emotional control mechanisms (WHO, 2021).

Overall, the results of this study are consistent with existing systematic reviews and randomized controlled trials that support yoga as an effective and feasible intervention for improving psychological, behavioral, and cognitive outcomes in children and adolescents (Yang et al., 2025). While the present findings are promising, further research with larger sample sizes and longitudinal designs is required to determine the long-term sustainability of these effects and to support the development of standardized intervention protocols.

5 Conclusion

The 16-week school-based yoga intervention resulted in significant improvements in behavioral functioning, inattention, emotional regulation, learning abilities, and peer relationships among students. These findings indicate that yoga is a feasible and effective intervention for enhancing mental health and overall well-being in school-aged children, supporting its potential integration into routine school curricula. Furthermore, the results highlight the interrelationship between behavioral patterns and mental health in children. Adaptive behaviors such as discipline, cooperation, and active classroom engagement are associated with emotional stability and confidence, whereas maladaptive behaviors, including aggression, social withdrawal, and inattention, may contribute to increased stress, anxiety, and emotional imbalance in school settings.

6 Ethical statements

All participants provided informed consent through their parents or legal guardians. Only the collected responses were used in this study, all personal information was kept confidential and anonymized to ensure privacy.

7 Conflict of interest

The author declares no conflict of interest related to this study.

8 Data availability statement

The data can be made available upon reasonable request from the corresponding author.

9 Author contributions

P. Sar: Conceptualization, formal analysis, investigation, methodology, writing – original draft, and writing – review & editing. The final version of this paper was proofread and approved by the author for publication.

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