

1.0 INTRODUCTION

Adolescent academic performance serves as a critical indicator of education and overall success (Arnaiz-Sánchez et al., 2020a). Comprehensive educational attainment encompasses crafting learning objectives, adapting learning strategies, and acquiring academic skills for improved academic outcomes (York et al., 2015). The formative adolescent years are crucial for determining higher education prospects, which can significantly contribute to a country's skilled human resources, knowledge capital, and socio-economic growth (Hanushek & Woessmann, 2012). Optimal and consistent academic achievements not only enhance educational excellence but also create opportunities for better career options, improved health, and greater life satisfaction (Marciniak et al., 2022). Conversely, low academic performance increases the risk of under-qualification, school dropout, unemployment, diminished self-esteem, compromised health, and lower socio-economic status (Lahtinen et al., 2020).

In light of this, it is imperative to understand the reasons for the heightened incidence of school dropout during adolescence. Notably, the incidence of school dropout during adolescence exceeds that observed in pre-adolescence schooling years. The primary reason has been attributed to poor academic performance. In addition, psychosocial stressors, early employment, grade retention, unsystematic learning strategies, and below-average intelligence are other significant contributors (Dupéré et al., 2018; Hughes et al., 2017; Sekiya & Ashida, 2017; Wood et al., 2017). The multifaceted determinants surrounding adolescent academic achievement emphasize its critical importance, with far-reaching implications for both education and life outcomes. Moreover, high rates of school dropout have been linked to a range of life course challenges, including involvement in negative socio-ecological systems, low subjective well-being, poor attention, delinquent behaviors, and a low socio-economic status (Gubbels et al., 2019; Szabó et

al., 2024). Given the intricate relationship among low academic performance, school dropout rates, and these negative outcomes, it is essential to investigate the contributing factors to low academic performance. Additionally, exploring intervention strategies capable of addressing these challenges is crucial, especially during this significant phase of growth and learning.

1.1 CHALLENGES OF ADOLESCENTS AND PREVALENCE

The transitional phase of adolescence is marked by significant health and behavioral challenges, potentially leading to enduring cognitive and behavioral deficits (Burns et al., 2019; Fuhrmann et al., 2022) (Burns et al., 2019; Fuhrmann et al., 2021). These challenges exacerbate difficulties in academic performance among adolescents (Cárdenas et al., 2022). Academic performance is influenced by various factors, both distal and proximal. Distal predictors include the contextual parameters of the teaching-learning environment and the social-physical milieu in which students develop, while proximal predictors involve transformations in physical, physiological, and mental dimensions (Blakemore, 2019; Williams & Howard, 2020).

The confluence of these factors during early adolescence is intricately linked to personal development and academic outcomes (Nina Hongell-Ekholm & Fagerlund, 2024; Suutela et al., 2022). Negative experiences during this transition can yield lasting adverse effects on adolescents (Maurya & Maurya, 2023), impacting their health, emotional well-being, and academic performance (Bundy et al., 2018; Yeager et al., 2022).

Adolescents constitute approximately one-sixth (16%) of the global population, with only two-thirds attending school. Over 600 million adolescents worldwide lack the minimum proficiency in numeracy and reading skills (UNESCO, 2016; UNICEF, 2022). In India, the number of adolescents is 253 million, contributing to the country's diverse demography. Among them, 50

million lack elementary academic skills in literacy and numeracy (NEP, 2020; NHM, 2020). The reported school dropouts in India amount to 47 million, primarily attributed to a lack of interest in education due to low academic performance, repeated failures, and non-involvement of parents (Sridevi & Nagpal, 2020; Paul et al., 2021).

The pursuit of foundational literacy and numeracy skills among adolescent students is a paramount objective for policymakers and educators (Kumar & Behera, 2022). This emphasis is critical as these skills form the bedrock of further educational attainment and personal development. The directives of the New Education Policy (NEP, 2020) specifically aim to enhance the quality of education at both the primary and secondary levels, signalling a significant shift towards more comprehensive and inclusive educational reforms. These reforms are designed to address various systemic issues that have historically impeded educational equity and quality.

However, a significant gap in educational equity remains, as many adolescents still lack access to quality education in India, particularly in underserved and rural areas. This disparity necessitates innovative and targeted intervention strategies. The need to bridge this gap drives educators and researchers to explore new avenues and methodologies for intervention. These strategies must be designed to make the learning process more accessible, engaging, and affordable for all students.

1.2 ADDRESSING CHALLENGES THROUGH SCHOOL-BASED INTERVENTIONS

Implementing school-based interventions is crucial because schools serve as a primary environment where adolescents spend a significant portion of their time, making them an ideal setting for addressing the multifaceted challenges of this developmental stage. Effective school-

based interventions can mitigate the negative impacts of both distal and proximal factors, support academic performance, and promote overall well-being.

Previous researchers have investigated various school-based intervention modalities aimed at retaining students through learner support, community-based interventions, education system reforms, and the influence of the family environment on adolescents' academic achievement (Sampa et al., 2021; Zhao & Zhao, 2022). The involvement of stakeholders and the provision of support, including funding for school fees and supplies, have demonstrated evidence of reducing school dropouts and improving academic performance. A meta-analysis by Mertens et al. (2020) highlighted interventions focusing on problem-solving using active learning approaches. Additionally, the study identified interventions aimed at improving emotion regulation and cognitive coping through self-control methods, group discussions, and insight-building procedures. Innovative approaches, such as classroom standing desk interventions, have also been investigated to assess their impact on cognitive function and academic performance in adolescents (Silva et al., 2022). Research by Cale et al. (2020) on the benefits of physical activity for mental health and by Solberg et al. (2021) on its impact on academic performance provides promising directions for future research.

1.3 NEED FOR COMPREHENSIVE INTERVENTION STRATEGIES

Evidence-based interventions such as cognitive-behavioral therapy (Eneogu et al., 2023), mindfulness-based school interventions (Phan et al., 2022), and supportive counseling interventions (Steen et al., 2022) have demonstrated effectiveness in addressing physical and emotional health issues in association with academic outcomes among adolescents. Additionally, encouraging healthy lifestyle habits like regular physical activity, balanced nutrition, and sufficient

sleep is crucial for overall well-being. Similarly, enhancing academic skills and promoting effective learning can be achieved through targeted interventions such as study skills training (Darling-Hammond et al., 2020), metacognitive strategies (Bao et al., 2024), and executive function training (Gunzenhauser & Nückles, 2021). Integrating technology-enhanced learning tools and personalized approaches can optimize academic outcomes (Valverde-Berrocoso et al., 2022).

However, these interventions may encounter challenges due to individual response variability, adherence issues, and disparities in mental health resource access. Moreover, environmental factors, socioeconomic status, and cultural influences can impede lifestyle changes. For example, adolescents from low-income families may lack access to healthy food options or safe places for physical activity. Additionally, these interventions require adequate resources and specialized teacher training, which may be difficult for schools with limited funding. Equitable access to technology also remains a significant challenge, particularly in underserved communities, potentially worsening educational inequalities.

Therefore, it is evident that addressing the multifaceted challenges faced by adolescents demands a comprehensive, cost-effective, and holistic approach. Drawing from previous interventions and their limitations, which often focused narrowly on stand-alone issues, a multifaceted and integrated approach is essential. An innovative interventional approach should integrate physical fitness enhancement, mental health support, lifestyle education, and academic skill training. The strategy for effective learning should incorporate methods that develop receptivity, critical thinking, inquisitiveness, self-efficacy, and a lifelong learning attitude. By doing so, a more supportive and comprehensive framework can be created to promote adolescent development and academic success.

1.5 PRESENT STUDY: ADDRESSING LIMITATIONS AND BUILDING A CASE

Despite extensive efforts to improve adolescent academic outcomes through various interventions, challenges persist, and outcomes remain mixed or inconclusive (Coddling et al., 2019; Fishstrom et al., 2022; Niebaum & Munakata, 2023; Tuero et al., 2022). While some interventions show promise in enhancing academic performance, they often overlook the holistic needs of adolescents, focusing narrowly on academic factors and neglecting the broader scope of adolescent development.

To address these limitations, there is a pressing need for research that adopts a comprehensive and integrated approach to adolescent development and academic success. Such an approach should acknowledge the multifaceted nature of adolescent challenges and explore interventions that not only improve academic outcomes but also promote overall well-being, including physical, cognitive, and emotional health.

The proposed study seeks to fill this gap by investigating the impact of a holistic intervention - integrating hatha yoga and jnana yoga - on various factors associated with academic performance. By incorporating elements of both physical and mental well-being, this intervention aims to reduce performance anxiety, emotional and behavioral problems, alleviate psychological burdens, enhance physical health, and facilitate the learning process for effective learning among adolescents.

Moreover, the study aims to overcome previous research limitations by enhancing research design, sample size, protocol implementation, and reporting. This includes random student allocation based on academic scores, optimal sample size determination, employing an expert-developed protocol based on ancient resources, and ensuring implementation fidelity. Additionally,

the study will consider adverse effects, feasibility, subjective and objective findings, input from teachers and school management for a comprehensive evaluation.

Ultimately, the findings of this study are expected to contribute significantly to the evidence base regarding the impact of holistic interventions on adolescent academic outcomes. By addressing the limitations of previous research and adopting a comprehensive approach to adolescent development, this study aims to inform future interventions and policies aimed at promoting academic success and overall well-being among adolescents.