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Physical Activity, Psychological Well-Being, and Academic Performance in Adolescents: An Integrative Review of School-Based Evidence

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Abstract
This integrative review explored how physical activity relates to psychological well-being and academic performance among adolescents, drawing on evidence from school-based settings. Adolescence is a formative period marked by rapid physical, cognitive, and emotional development, making young people particularly sensitive to lifestyle factors that shape both mental health and learning. The review synthesized quantitative, qualitative, and mixed-methods studies published between 2010 and 2021 that examined structured and unstructured physical activity initiatives in primary and secondary schools. Across the literature, regular participation in moderate-to-vigorous physical activity was consistently linked to better psychological well-being. Adolescents who were more physically active reported lower levels of anxiety, depression, and stress, alongside higher self-esteem, improved emotional regulation, and stronger feelings of social connectedness. Importantly, these psychological benefits often helped explain why physical activity was associated with better academic functioning. Rather than influencing grades directly, physical activity appeared to support learning by improving mental health, focus, and readiness to engage in schoolwork. School-based approaches such as enhanced physical education lessons, active classrooms, extracurricular sports, and movement-integrated learning were associated with gains in attention, classroom behavior, cognitive functioning, and executive skills. While findings on standardized academic achievement were mixed, many studies reported indirect academic benefits, including increased motivation, better concentration, improved attendance, and greater classroom engagement. These factors are essential for sustained learning, even when test scores do not change immediately. The review also highlighted that outcomes varied depending on context. Gender, socioeconomic background, school resources, and program design influenced how strongly students benefited from physical activity initiatives. Several methodological challenges were noted, including inconsistent measurement tools, short intervention periods, and limited long-term follow-up. Overall, the evidence supports embedding physical activity into everyday school culture as a practical and cost-effective way to promote adolescent mental well-being and support academic success. The review emphasizes the need for inclusive, well-designed school-based physical activity policies that recognize mental health as a central educational priority.

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1. Introduction

Adolescence is widely recognized as a critical developmental stage characterized by rapid physical growth, cognitive maturation, and profound psychological and social transitions. During this period, individuals develop lifelong habits, identity orientations, and learning patterns that significantly shape their health, well-being, and future productivity. Schools play a central role in this developmental process, as they provide structured environments where adolescents spend a substantial portion of their time engaging in learning, social interaction, and organized physical activity. Consequently, the school setting has become an important focal point for examining how lifestyle behaviors intersect with mental health and educational outcomes (Poitras, *et*

al., 2016, Smedegaard, *et al*., 2016).

In recent decades, there has been growing global concern about declining levels of physical activity among adolescents, largely attributed to increased academic pressures, sedentary lifestyles, digital media consumption, and reduced opportunities for active play within and outside school environments. Evidence suggests that many adolescents fail to meet recommended physical activity guidelines, raising alarms about potential consequences for both physical and mental health. This decline is particularly concerning given the established role of regular physical activity in supporting healthy growth, emotional regulation, stress management, and social development during adolescence (Centeio, *et al*., 2020, Ozer, *et al*., 2020).

Psychological well-being has emerged as a central determinant of adolescents' overall functioning and academic success. Issues such as anxiety, depression, stress, low self-esteem, and social withdrawal are increasingly reported among school-aged populations, often manifesting as reduced motivation, poor concentration, behavioral challenges, and disengagement from learning. Within school contexts, psychological well-being is not only an outcome of educational experiences but also a key mechanism through which students are able to engage effectively with academic tasks, peers, and teachers (Akanji & Ajayi, 2022, Francis Onotole, *et al*., 2022).

Academic performance remains a core objective of educational systems and a major concern for educators, parents, and policymakers. While traditional approaches to improving academic outcomes have focused primarily on instructional quality and curriculum design, there is increasing recognition that learning does not occur in isolation from students' physical and psychological states. Emerging evidence suggests that physical activity may influence academic performance both directly, through neurocognitive and attentional processes, and indirectly, by enhancing psychological well-being, classroom behavior, and school engagement (Greenspan, *et al*., 2019, Vaquero-Solís, *et al*., 2020).

Against this backdrop, an integrative review of school-based evidence is necessary to consolidate current knowledge on the interconnected relationships between physical activity, psychological well-being, and academic performance in adolescents. By synthesizing findings across disciplines and study designs, such a review can provide a more holistic understanding of how school-based physical activity initiatives contribute to adolescents' mental health and learning outcomes, while also identifying gaps to inform future research, policy development, and educational practice (Awe, 2021, Halliday, 2021, Isa, 2021, Jimoh & Owolabi, 2021).

2. Methodology

This study used an integrative review design to bring together school-based evidence on how physical activity relates to psychological well-being and academic performance in adolescents. An integrative approach was chosen because it allows findings from quantitative, qualitative, and mixed-methods studies to be considered together, offering a richer and more holistic understanding of the complex links between movement, mental health, and learning during adolescence. The review followed established integrative review principles and was informed by PRISMA guidance to strengthen transparency, rigor, and reproducibility.

A broad literature search was carried out across major electronic databases, including Google Scholar, Scopus, PubMed, ERIC, and Web of Science, alongside relevant education and health journals. To ensure comprehensive coverage, reference lists of key articles and journals in human kinetics, physical education, psychology, and adolescent health were also manually searched. Search terms combined variations of physical activity, school-based exercise, psychological well-being, mental health, academic performance, adolescents, and secondary school students, with adjustments made for different database requirements. Only studies published in English were included.

Clear eligibility criteria guided study selection. Included studies focused on school-aged adolescents, examined physical activity or physical education within school settings, and reported outcomes related to psychological well-being, mental health, emotional functioning, or academic performance. Both cross-sectional and intervention studies were eligible. Studies centered on clinical populations, university students, non-school settings, or unrelated outcomes were excluded, as were opinion pieces and articles without empirical data.

Titles and abstracts were first screened for relevance, followed by full-text review. Data were extracted using a structured matrix capturing study design, participant characteristics, types of physical activity, psychological and academic outcomes, and key findings. Methodological quality was considered descriptively, focusing on clarity, measurement validity, and analytical rigor. The synthesis adopted a narrative and thematic approach, comparing patterns across studies and highlighting proposed mechanisms such as improved self-esteem, emotional regulation, cognitive functioning, and school engagement. Emphasis was placed on implications for school practice, curriculum design, and adolescent development within human kinetics and physical education contexts.

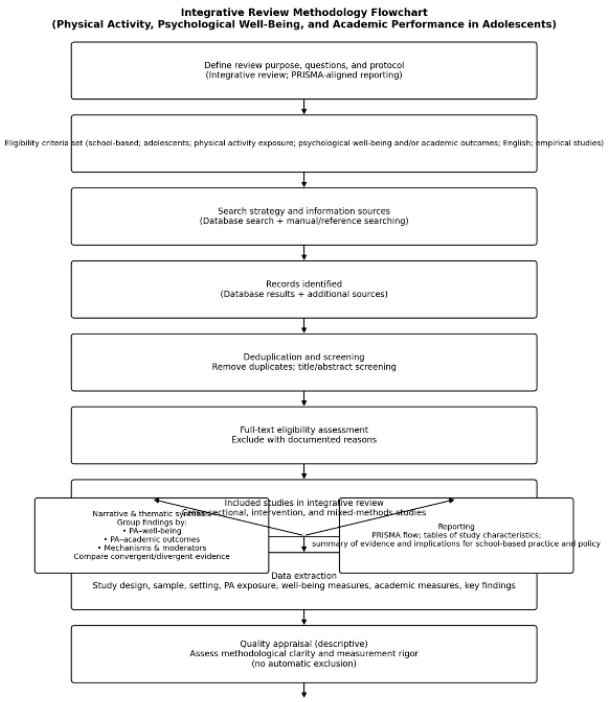

Fig 1: Flowchart of the study methodology

3. Conceptual and Theoretical Perspectives

This study adopted a cross-sectional convergent mixed-methods design to generate empirical evidence on how cultural and religious contexts shape the perceived and measured effectiveness of school-based sexuality education in Edo State, Nigeria. The approach combined quantitative surveys and school-level indicators with qualitative interviews, focus group discussions, classroom observations, and policy/document review, enabling triangulation of findings and explanation of statistical patterns through lived experiences and gatekeeping processes. The study setting comprised public secondary schools and surrounding communities across selected Local Government Areas (LGAs) in Edo State. A multi-stage sampling procedure was applied: three LGAs were purposively selected to reflect sociocultural diversity (urban/peri-urban/rural), after which twelve public secondary schools were randomly selected from official lists. Eligible participants included in-school adolescents (senior secondary classes), sexuality education teachers, school administrators, parents, religious leaders, and education/health policymakers involved in adolescent programming. Using an a priori recruitment target of 520 eligible participants, informed consent/assent procedures were implemented, resulting in an enrolled sample of 472.

Quantitative data were collected using structured questionnaires administered to students (n=320) and teachers (n=68), alongside school record abstraction from all participating schools (n=12). Student measures captured sexuality education exposure, content recall, knowledge and misconceptions, perceived relevance, self-efficacy for protective decision-making, and perceived classroom safety for asking questions. Teacher measures assessed instructional confidence, topic avoidance, perceived community approval, religious/cultural alignment concerns, and delivery fidelity. School records and program logs were reviewed to identify timetable allocation, curriculum coverage, teacher training history, and availability of approved teaching materials. Tools were pilot-tested in a comparable non-study school to improve clarity and cultural sensitivity, with reliability checks applied to multi-item scales. Qualitative data were collected through student focus group discussions (8 groups; n=64), key informant interviews with teachers (n=12) and principals (n=12), and interviews with parents (n=16), religious leaders (n=8), and policymakers/health officers (n=6). Classroom observations (n=24 sessions) documented pedagogical style, learner participation, gender dynamics, and instances of topic omission or moral framing.

Data management followed privacy-by-design principles, including de-identification, secure storage, restricted access, and removal of direct identifiers prior to analysis. Quantitative analysis used descriptive statistics and multivariable regression to examine associations between cultural/religious constraint indicators (e.g., perceived community opposition, religious doctrine concerns, parental gatekeeping) and effectiveness outcomes (knowledge scores, perceived usefulness, engagement, and reported access to accurate information). Where helpful for interpretability, a decision-tree classification model was used to identify the strongest predictors of high vs. low perceived effectiveness. Qualitative analysis employed reflexive thematic analysis, coding for cultural norms, religious doctrine influences, gender expectations, family/community gatekeeping, teacher moral positioning, and institutional constraints affecting delivery. Policy/document analysis synthesized national and state guidance, school rules, and community-level norms shaping implementation. Integration occurred through a convergence matrix and joint displays, comparing quantitative results with qualitative themes to explain areas of agreement, divergence, and context-specific mechanisms. Trustworthiness was strengthened through triangulation across data sources, audit trails, peer debriefing, and limited member checking (n=10), while quantitative rigor was supported via tool piloting, fieldworker training, and consistency checks. Figure 2 shows conceptual model of the systematic review presented by Demetriou & Höner, 2012.

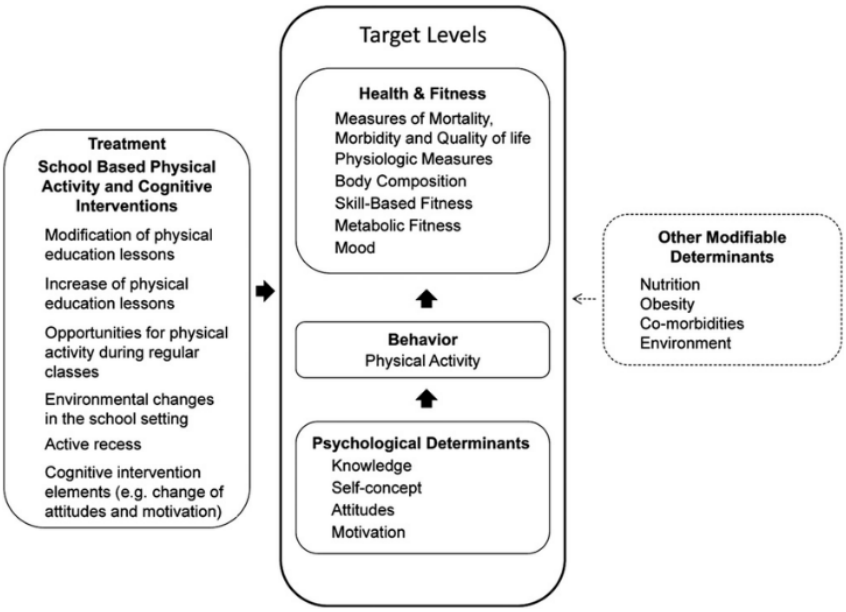

Fig 2: Conceptual model of the systematic review (Demetriou & Höner, 2012).

Bringing these theories together highlights an important idea: psychological well-being often sits in the middle of the relationship between physical activity and academic performance. In other words, physical activity does not always improve grades directly, but it can strengthen the mental and emotional conditions that make learning easier and more productive. When adolescents are physically active, they are more likely to experience better mood, lower stress,

and improved emotional regulation. These changes matter in school because students who feel calmer, more confident, and less overwhelmed are better able to concentrate, participate in lessons, and persist when academic work becomes difficult. This mediation perspective helps explain why school-based studies sometimes report modest or mixed effects of physical activity on standardized test scores, yet consistently find benefits through improved attention, classroom behavior, and engagement factors that support learning every day (Chung, Kim, & Lee, 2018; Keogh *et al*., 2018).

Social learning theory adds another useful layer by showing how school-based physical activity shapes development through relationships and shared experiences. In sports, physical education, and active group tasks, adolescents learn by watching others, receiving feedback, and responding to social rewards such as encouragement, recognition, and team acceptance. These settings help students build cooperation, leadership, communication, and conflict-management skills. Such social competencies are closely tied to psychological well-being because they strengthen peer support and reduce feelings of isolation. They also carry over into classroom life, where collaboration, group work, and positive peer relationships influence motivation and willingness to engage (Pradhan, Wynter, & Fisher, 2015; Yakubu & Salisu, 2018). When physical activity environments are inclusive and supportive, they can increase students' sense of belonging and connection to school two factors strongly linked with academic motivation, persistence, and long-term retention. Figure 3 shows child and adolescent mental health and psychosocial well-being: A conceptual framework for research and evidence generation and use presented by Sharma, *et al*., 2022.

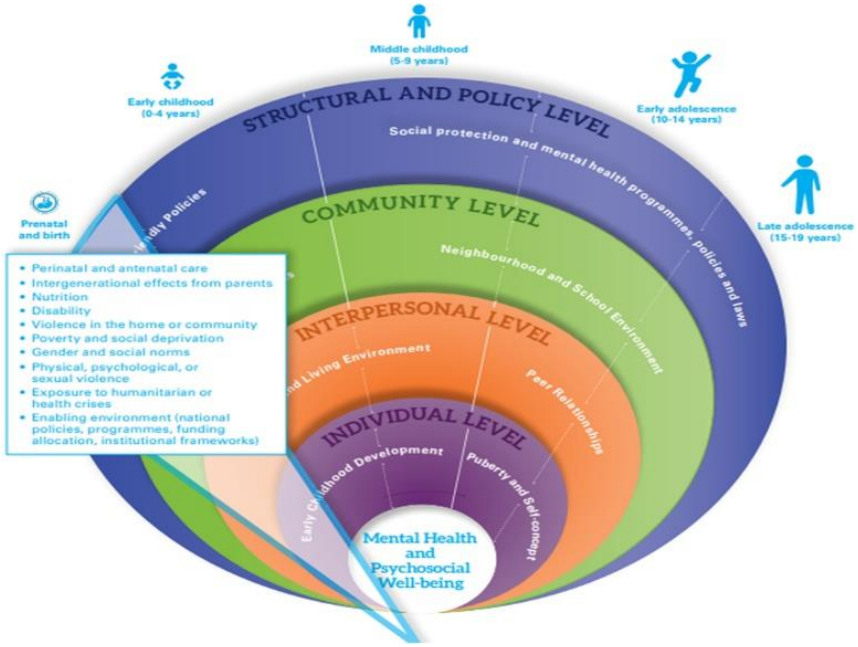

Fig 3: Child and adolescent mental health and psychosocial well-being: A conceptual framework for research and evidence generation and use (Sharma, *et al*., 2022)

Understanding the effectiveness of school-based sexuality education in contexts such as Edo State, Nigeria requires careful engagement with theoretical perspectives that explain how culture, religion, and education interact to shape knowledge, attitudes, and behavior. Sexuality education does not occur in a social vacuum; rather, it is embedded within systems of meaning, moral regulation, and behavioral expectations that influence how sexual knowledge is produced, transmitted, and received. Sociocultural theory, moral regulation frameworks, and health behavior models offer complementary lenses for examining how cultural and religious influences operate within secondary school settings and how these influences affect the outcomes of sexuality education initiatives.

Sociocultural theory provides a foundational perspective for understanding sexuality education as a socially mediated learning process. Rooted in the work of Vygotsky, this theory emphasizes that learning occurs through social interaction and is shaped by cultural tools, language, values, and norms. In the context of Edo State, sexuality education is mediated by deeply ingrained cultural and religious norms that define what is appropriate to teach and discuss with adolescents. Teachers, as cultural agents, transmit not only formal curriculum content but also implicit values and expectations regarding sexuality, gender, and morality (Ajayi & Akanji, 2021, Ejibenam, *et al*., 2021, Osabuohien, Omotara & Watti, 2021). From a sociocultural standpoint, the effectiveness of sexuality education depends on how well educational content aligns with or negotiates these shared meanings. When curricula conflict sharply with dominant cultural or religious values, teachers and students may resist or reinterpret content, limiting learning outcomes. Conversely, when sexuality education is framed using culturally resonant concepts such as responsibility, respect, and future-oriented aspirations, it is more likely to be internalized by learners.

Language and discourse play a particularly important role in sociocultural mediation. In Edo State, euphemisms, metaphors, and moral narratives are often used to discuss sexuality indirectly, reflecting broader cultural discomfort with explicit sexual language. Sociocultural theory helps explain how such discursive practices shape classroom interactions and constrain open dialogue. Students learn not only from what is taught but from what is left unsaid, internalizing norms of silence or shame around sexuality.

This theoretical lens highlights the importance of pedagogical approaches that acknowledge cultural communication styles while gradually expanding space for critical reflection and dialogue (Akanji & Ajayi, 2022, Francis Onotole, *et al*., 2022).

Moral regulation frameworks further illuminate how sexuality education is governed by systems of moral control rooted in religion, tradition, and social institutions. These frameworks conceptualize sexuality as a domain subject to regulation through norms, rules, and sanctions designed to maintain social order. In Edo State, moral regulation is evident in the strong emphasis placed on sexual purity, abstinence, and conformity to gender norms. Religious doctrines and community expectations function as regulatory mechanisms that define acceptable sexual behavior and legitimize interventions aimed at controlling adolescent sexuality. School-based sexuality education, within this framework, is often expected to reinforce moral standards rather than challenge them (Alli, *et al*., 2025, Isa & Adeyemo, 2025, Odozor, *et al*., 2025, Oni & Iloeje, 2025).

Applying moral regulation theory to sexuality education reveals why resistance to comprehensive approaches is common in Edo State. Educational content perceived as undermining moral authority such as discussions of contraception or sexual diversity may be viewed as threats to established social order. Teachers and school administrators, operating within these regulatory systems, may engage in self-surveillance and self-censorship to avoid moral transgression. Students, in turn, learn to regulate their own behavior and expressions of curiosity in line with moral expectations (Awe, 2021, Halliday, 2021, Isa, 2021, Jimoh & Owolabi, 2021). This framework helps explain the persistence of abstinence-focused and fear-based approaches despite evidence of their limited effectiveness. It also highlights the gendered nature of moral regulation, whereby girls' sexuality is more closely monitored and sanctioned, reinforcing unequal power relations and shaping differential educational experiences.

4. Physical Activity Patterns and School-Based Interventions

Physical activity patterns among adolescents in school are shaped by a mix of structured and unstructured opportunities, and these experiences can meaningfully influence both psychological well-being and academic performance. Because adolescence often comes with heavier academic demands and reduced free play outside school, the school environment becomes one of the most reliable spaces where young people can still move regularly. For that reason, it is important to understand not only *whether* adolescents are active in school, but *how* activity is provided, who can access it, and what the experience feels like for students across different backgrounds (Mugendawala & Muijs, 2020; Salifu *et al*., 2019).

Structured physical activity especially through formal physical education (PE) typically forms the backbone of movement opportunities in schools. In principle, PE is designed to build motor skills, fitness, health knowledge, and positive attitudes toward lifelong activity. When PE is well planned and well taught, it can reliably expose students to moderate-to-vigorous activity in a supervised setting, while also promoting confidence, self-esteem, and emotional regulation. These psychological benefits often show up in the classroom too, through improved attention, calmer behavior, and better readiness to learn. Importantly, the strongest benefits tend to occur when PE prioritizes participation, enjoyment, and skill mastery rather than focusing narrowly on competition or high-performing students (Akpan *et al*., 2017; Oni *et al*., 2018; Isa, 2020; Hayes & Bulat, 2017; Kiberu, Mars, & Scott, 2017). In practice, however, PE quality can vary widely depending on curriculum standards, the time allocated on the timetable, teacher preparation, available equipment, and whether assessment emphasizes growth and inclusion or only performance outcomes.

Beyond compulsory PE, extracurricular sports and organized school activity programs offer additional structured opportunities that can be especially influential during adolescence. These include interscholastic teams, intramural competitions, after-school fitness sessions, and sport or activity clubs. Because these programs often involve higher intensity activity and sustained peer interaction, they are frequently linked to reduced anxiety and depressive symptoms, stronger friendships, and a greater sense of belonging within the school community. Academically, adolescents who participate in extracurricular sports often show higher attendance, stronger motivation, and greater engagement with school routines. These gains are not only driven by physical activity itself, but also by the supportive relationships, discipline, goal setting, and identity development that can emerge through team membership and coach–student mentorship (Akuma, 2017; Nketsia, Saloviita, & Gyimah, 2016). At the same time, access is not always equitable. Costs, time commitments, gender norms, limited facilities, and competing household responsibilities can restrict participation often affecting students from lower-income families most strongly.

Unstructured activity opportunities such as movement during breaks, informal games, and active use of free periods also contribute to adolescents' overall activity patterns, even though they are more commonly emphasized in younger age groups. When secondary schools provide safe spaces, flexible routines, and a culture that supports movement, adolescents can still benefit from short, informal activity that they choose for themselves. This type of activity supports autonomy, social connection, and stress relief, especially because it removes the pressure of evaluation and performance that sometimes comes with organized sport. Even brief movement breaks can help students reset emotionally, improve mood, and return to class with better focus and self-control (Burgers, 2017; Harerimana & Mtshali, 2018). However, unstructured activity depends heavily on school infrastructure and policies: availability of open spaces, supervision practices, safety rules, and whether staff view movement during academic time as supportive or disruptive. Figure 4 shows evidence-based beneficial effects of yoga in school children presented by Das, *et al*., 2016

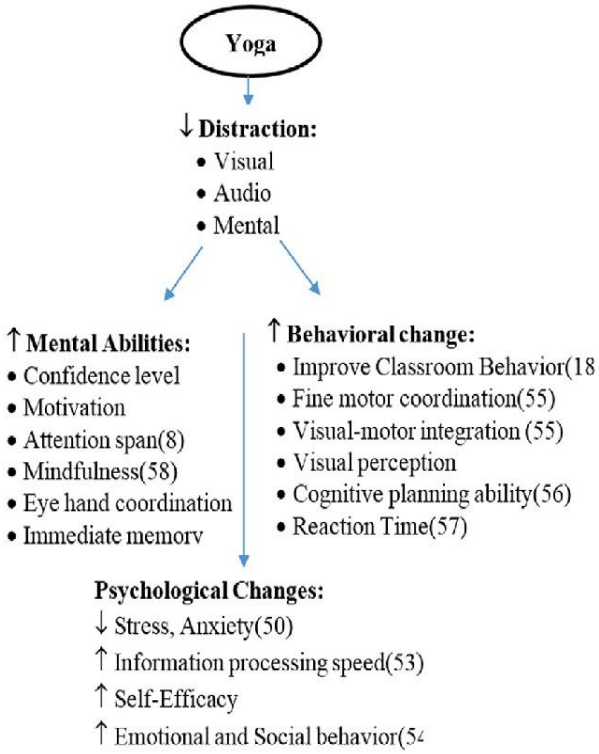

Fig 4: Evidence-based beneficial effects of yoga in school children (Das, *et al*., 2016).

Active classrooms and movement-integrated teaching approaches are increasingly recognized as practical school-based interventions for embedding physical activity directly into academic instruction. These approaches include short activity breaks, physically active lessons, standing or flexible seating arrangements, and instructional tasks that incorporate movement to reinforce curricular content. Available evidence suggests that active classrooms can increase students' overall daily physical activity without reducing instructional time, making them attractive options for schools facing tight schedules and academic accountability pressures (Ajayi & Akanji, 2022; Leonard & Emmanuel, 2022). Beyond physical activity gains, movement-integrated learning has been linked with improvements in attention, on-task behavior, working memory, and overall engagement, especially during cognitively demanding lessons where fatigue and distractibility often rise. Psychologically, active classrooms may help reduce restlessness, mental fatigue, and stress while contributing to a more positive classroom climate and improved classroom management, as teachers often report smoother participation and fewer behavioral disruptions when movement is integrated deliberately (Gallicchio, Cooke & Ring, 2017; Jing, 2016). However, despite the promise of these strategies, implementation barriers persist, including limited teacher training, curriculum constraints, assessment alignment concerns, and fears about losing classroom control during active instruction.

Movement-based learning extends beyond short breaks and can be conceptualized as a pedagogy that deliberately links bodily movement with cognitive processing. In practice, this includes kinesthetic learning tasks, role-play activities, simulations, interactive demonstrations, and physically engaged problem-solving exercises. Neuroeducational perspectives support the idea that learning can be strengthened when cognitive tasks are paired with movement because this combination activates multiple neural pathways and may reinforce encoding and memory consolidation. For adolescents, who often experience reduced motivation and heightened stress as academic demands intensify, movement-integrated lessons can promote enjoyment and intrinsic motivation, thereby strengthening positive attitudes toward learning and sustained academic engagement. These approaches have also been shown to support deeper conceptual understanding in subjects where spatial reasoning, sequencing, and experiential engagement are important, suggesting that movement can serve not only as a behavioral outlet but also as an instructional resource that enhances comprehension (Alexander, 2018; Husband, 2018). When implemented thoughtfully, movement-based learning therefore aligns physical, cognitive, and emotional dimensions of schooling, supporting both academic development and psychological well-being.

Across both structured and unstructured school-based interventions, participation and outcomes are shaped by contextual factors such as gender, age, cultural expectations, school leadership support, and available resources. Adolescents' physical activity participation often declines as academic demands increase and schools allocate less curricular priority to movement, underscoring the need for intentional policies that protect opportunities for physical activity throughout the school day. Evidence suggests that schools adopting a whole-school approach combining quality PE, extracurricular sport and recreation, active classrooms, and supportive school environments tend to achieve more consistent benefits for psychological well-being and academic-related behaviors than schools relying on isolated interventions (Baker, 2019; Predoiu *et al*., 2020). This whole-school orientation is important because it normalizes movement as part of school culture rather than treating physical activity as an "add-on" that competes with learning time. It also expands access by providing multiple pathways for students with different interests, confidence levels, and physical abilities to participate meaningfully.

Overall, integrative evidence indicates that no single physical

activity strategy is sufficient to address the complex relationships among physical activity, mental health, and academic performance in adolescence. Rather, schools benefit from offering a diverse, inclusive mix of structured opportunities (which build skills, routine, and fitness) alongside unstructured and movement-integrated options (which support autonomy, flexibility, enjoyment, and stress relief). Structured programs can provide consistency and progressive development, while active classrooms and informal activity opportunities can help students manage psychological strain and maintain cognitive readiness across the day (Ogunyankinnu *et al*., 2022; Onibokun *et al*., 2022). When combined, these intervention patterns are more likely to strengthen psychological well-being, enhance cognitive functioning, and promote positive academic behaviors such as persistence, participation, and attentional control. Strengthening school-based physical activity provision is therefore best understood as a strategic investment in adolescents' holistic development supporting educational goals while also improving long-term health trajectories through accessible and sustainable approaches embedded within everyday school routines.

5. Physical Activity and Psychological Well-Being in Adolescents

Physical activity plays a critical role in shaping psychological well-being during adolescence, a developmental stage marked by heightened emotional sensitivity, shifting peer relationships, and increasing exposure to academic and social pressures. Because adolescents spend much of their time in school, school-based physical activity becomes a particularly accessible and scalable mechanism for mental health promotion. A growing body of evidence associates regular physical activity participation with reduced psychological distress and improved well-being outcomes, including better stress management, stronger emotional control, enhanced self-esteem, and improved social functioning (Hernández-Mendo *et al*., 2020; Maher, 2020). These benefits are especially significant in light of the rising burden of adolescent mental health problems and the expanding recognition of schools as key sites for preventive and promotive interventions. Physical activity in this sense functions not only as a health behavior, but also as a psychosocial resource that supports adaptive development in a period of vulnerability and rapid change.

Stress reduction is one of the most consistently documented psychological benefits of adolescent physical activity. School environments routinely expose students to performance demands, high-stakes examinations, peer comparison, tight schedules, and disciplinary expectations, all of which can produce sustained stress when coping resources are limited. Physical activity buffers these pressures through both physiological and psychological pathways. Physiologically, moderate-to-vigorous activity stimulates endorphin release and helps regulate stress-related hormones, supporting relaxation and mood stabilization (Brinthaupt & Pennington, 2019; Vezzosi, 2017). Psychologically, physical activity offers a constructive outlet for tension and creates opportunities for temporary detachment from stressors, allowing adolescents to "reset" emotionally and cognitively. Evidence from school contexts suggests that adolescents who participate in regular PE, sports, or structured activity breaks report lower perceived stress and improved emotional balance than those who are less active. Even short movement bouts during the school day can yield immediate reductions in mental fatigue and perceived stress, reinforcing the value of integrating activity into routine school practice (Ajayi & Akanji, 2022; Isa, 2022).

Physical activity also supports emotional regulation, a core developmental task of adolescence. During this period, young people are still refining the cognitive and social skills needed to manage strong emotions, tolerate frustration, and respond flexibly to setbacks. Research indicates that engagement in physical activity can strengthen adolescents' capacity to manage negative affect, recover from emotional distress, and use more adaptive coping strategies when facing challenges (Fasina, 2019; Mekonnen, Animaw & Seyum, 2018). Structured activities such as team sports, organized games, and guided exercise routines often require adolescents to navigate competition, cooperation, pressure, success, and failure experiences that function as repeated "practice opportunities" for emotional learning. Over time, these experiences can strengthen impulse control, frustration tolerance, and resilience. School-based programs that increase regular physical activity have also been associated with reductions in anxiety and depressive symptoms, alongside improvements in emotional stability and resilience, suggesting that physical activity can serve as a protective factor for psychological adjustment during adolescence (Akomea-Agyin & Asante, 2019; Awe, 2017; Osabuohien, 2019).

Self-esteem and self-concept represent additional pathways through which physical activity contributes to adolescent mental health. Adolescents are often highly sensitive to social evaluation and comparative performance, which can intensify insecurity, particularly in demanding school environments. Physical activity provides alternative domains for competence development, mastery experiences, and positive self-evaluation, which can strengthen both global and domain-specific self-esteem. Evidence suggests that adolescents who engage regularly in physical activity tend to report higher overall self-esteem, stronger physical self-worth, and increased perceived competence (Abayomi *et al*., 2020; Ibrahim *et al*., 2019). These effects are more likely when activity contexts emphasize inclusion, skill development, and personal improvement rather than narrow performance ranking. In school settings, positive PE and extracurricular experiences can therefore counterbalance academic struggles, broaden adolescents' sense of identity, and reinforce a more holistic perception of self-worth. Stronger self-esteem then supports motivation, persistence, and healthier engagement with school life, creating reinforcing cycles that benefit both well-being and learning.

Social well-being is another important psychological outcome linked to physical activity participation. Adolescence is a period in which peer acceptance and belonging become central to emotional health, and social difficulties can increase vulnerability to stress, loneliness, and low mood. Physical activity in school settings creates both structured and informal opportunities for social interaction, shared experiences, and supportive peer bonding. Team sports, group exercises, and cooperative games promote communication, collective problem-solving, and mutual support while also offering settings where friendships and social identities are formed. Empirical studies indicate that adolescents who engage in physical activity with peers often report stronger social connections, reduced loneliness, and an increased sense of belonging in school communities

(Adedoyin, 2017; Pathak *et al.*, 2017). These benefits can be especially meaningful for students who feel marginalized in traditional academic spaces, because physical activity contexts may provide alternative routes to participation, recognition, and social inclusion.

At the same time, the mental health effects of physical activity depend heavily on the quality and context of participation. Voluntary, enjoyable, and autonomy-supportive experiences tend to produce stronger psychological benefits than compulsory or overly competitive programs. Adolescents are more likely to gain well-being outcomes when physical activity feels safe, meaningful, socially supportive, and aligned with their interests. Conversely, experiences marked by exclusion, fear of judgment, excessive performance pressure, or harsh coaching can undermine motivation and reduce the psychological value of participation. This highlights the importance of designing school-based activity programs that are inclusive, developmentally appropriate, and sensitive to diverse abilities, body confidence levels, and cultural expectations (Munthali *et al*., 2018; Okolosi, 2020). In this sense, "more activity" is not always sufficient; the social-emotional climate of physical activity spaces is a key determinant of whether participation translates into improved well-being.

Psychological well-being also appears to function as a mechanism linking physical activity to broader educational outcomes. When stress is reduced, emotional regulation improves, self-esteem is strengthened, and social belonging increases, adolescents become better positioned to engage cognitively and behaviorally in learning. Improved mental health supports attention, persistence, classroom participation, and positive teacher–student interactions, all of which influence academic engagement even when test-score effects are inconsistent. School-based evidence suggests that physically active adolescents often display fewer behavioral difficulties, stronger emotional stability, and more positive attitudes toward school, indicating that physical activity may shape school success indirectly through enhanced psychosocial functioning (Jimoh, 2016; Suleiman *et al*., 2018). This mediating relationship is particularly important in contexts where academic achievement is undermined not only by instructional limitations but also by stress, emotional distress, and low engagement.

Despite strong evidence, important gaps remain in understanding long-term and differential impacts. Many studies are cross-sectional or short-term, limiting the ability to draw firm conclusions about sustained mental health effects across adolescence. In addition, participation and outcomes are moderated by factors such as gender, socioeconomic status, cultural norms, and access to safe and supportive activity opportunities. Adolescents in disadvantaged contexts may face barriers such as limited facilities, time constraints linked to household responsibilities, financial barriers to extracurricular sports, or unsafe environments that constrain activity. These inequities underscore the need for context-sensitive, low-cost, and inclusive school-based approaches that expand access and reduce participation gaps (Chukwurah, Nwadiani & Ngwoke, 2018; Momoh, 2017). Without intentional equity-focused strategies, the adolescents who may benefit most from physical activity's mental health effects can remain least able to participate.

Overall, the literature underscores physical activity as a foundational contributor to adolescents' psychological well-being within school settings. By reducing stress, strengthening emotional regulation, enhancing self-esteem, and fostering social connectedness, physical activity supports healthier emotional development during a critical life stage. These benefits extend beyond individual mental health by shaping engagement, behavior, and readiness to learn, reinforcing the value of physical activity as part of whole-school well-being and development strategies. An integrative perspective therefore positions school-based physical activity not merely as a component of physical health education, but as a central pillar of adolescent mental health promotion and educational flourishing (Ogunyankinnu *et al*., 2022; Oyeyemi, 2022).

6. Psychological Well-Being as a Mediating Factor in Academic Performance

Psychological well-being occupies a central position in explaining how physical activity translates into academic performance during adolescence. Rather than influencing learning outcomes only through direct physiological effects, physical activity is increasingly understood to shape academic performance through changes in students' mental and emotional states. In school settings, improvements in psychological well-being affect how adolescents think, feel, and behave in learning environments, thereby mediating the relationship between physical activity participation and academic outcomes. Integrative evidence suggests that enhanced psychological well-being supports cognitive functioning, academic motivation, classroom engagement, and productive learning behaviors factors that collectively underpin effective learning in adolescence (Adebayo, 2018; Deemuai & Nwankwo, 2018). This mediating role is particularly relevant during adolescence because emotional stability, self-beliefs, and social belonging strongly shape learning trajectories at this stage.

Cognitive functioning is one of the most important domains through which psychological well-being influences academic performance. Adolescents with positive mental health are better able to allocate cognitive resources efficiently, including attention, working memory, and executive control. Psychological distress such as chronic stress, anxiety, or depressive symptoms has consistently been associated with reduced concentration, impaired memory consolidation, lowered processing speed, and weaker cognitive flexibility. In contrast, emotionally balanced adolescents demonstrate stronger attentional regulation and more adaptive cognitive control, both of which are critical for sustaining learning during complex classroom tasks (Abdulraheem & Ibraheem, 2019; Okebukola, 2017). Physical activity contributes to these cognitive advantages indirectly by reducing mental fatigue and alleviating psychological distress, thereby improving cognitive readiness for learning. School-based findings frequently indicate that adolescents who engage in regular physical activity show fewer symptoms of mental fatigue and improved classroom focus, reinforcing the proposition that psychological well-being operates as a key pathway linking movement exposure to academic-relevant cognition.

Motivation provides a second mechanism through which psychological well-being mediates academic outcomes. Motivation in adolescence is closely shaped by emotional experiences, self-perceptions, and perceived competence, meaning that mental health influences both the intensity and

quality of adolescents' academic effort. Adolescents with stronger psychological well-being are more likely to report higher intrinsic motivation, stronger persistence, and a more positive approach to academic tasks. Physical activity supports motivational processes by strengthening self-esteem, self-efficacy, and feelings of accomplishment, which can generalize beyond physical contexts into academic beliefs about competence and effort (Abubakar, 2020; Ekuri & Akameze, 2016). When adolescents experience enjoyment and mastery in physical activity contexts, they may be more likely to develop adaptive motivational orientations, such as willingness to invest effort, tolerance for difficulty, and confidence in overcoming challenges. School-based intervention evidence indicates that students with better psychological well-being tend to show increased goal orientation, reduced avoidance behaviors, and stronger academic motivation, highlighting mental health as a mediating pathway between physical activity and improved academic engagement.

Student engagement represents a more proximal link between psychological well-being and academic performance, encompassing behavioral, emotional, and cognitive investment in learning. Adolescents who feel psychologically stable, socially connected, and emotionally supported are more likely to participate actively in classroom tasks, sustain attention, and invest effort in learning. Psychological well-being strengthens emotional engagement by fostering positive attitudes toward school and reducing boredom, anxiety, alienation, and negative classroom emotions that undermine participation. Physical activity contributes to this engagement by improving mood, reducing stress, and strengthening social bonds factors that can create a more receptive psychological state for learning (Abayomi *et al*., 2020; Esan & Adewunmi, 2018). As a result, physically active adolescents frequently demonstrate higher participation rates, better time-on-task, and improved attentional persistence, with psychological well-being mediating these associations through reduced distress and increased emotional readiness to learn.

Academic behaviors provide additional evidence of psychological well-being as a mediator linking physical activity to academic outcomes. Behaviors such as attendance, homework completion, classroom conduct, punctuality, and study persistence are strongly influenced by adolescents' emotional functioning and stress regulation. Mental health difficulties can present as absenteeism, disruptive behaviors, withdrawal, reduced task completion, or inconsistent participation, all of which undermine academic progress. Conversely, adolescents with stronger psychological well-being tend to display adaptive learning behaviors, including better self-discipline, improved cooperation, and greater persistence during academic challenges (Ajayi & Akanji, 2022; Isa, 2022). Enhanced emotional regulation supports constructive responses to feedback, better frustration tolerance, and improved coping with academic pressure. Physical activity interventions that improve well-being have also been associated with fewer behavioral problems, improved classroom discipline, and stronger attendance patterns, indicating that mental health functions as an intermediary that shapes day-to-day behaviors essential for sustained learning (Emmers, Baeyens & Petry, 2020; Reina *et al*., 2019).

The mediating role of psychological well-being also helps explain why direct links between physical activity and standardized academic achievement can appear inconsistent. Academic performance is influenced by multiple interacting factors teaching quality, assessment formats, socioeconomic conditions, learning resources, and individual learning differences meaning that physical activity alone may not produce immediate measurable gains in test scores. Psychological well-being operates as an intermediary that shapes how students engage with learning opportunities, respond to instruction, and sustain motivation over time. In this way, a physically active adolescent may not instantly show higher standardized scores, but may demonstrate improved concentration, stronger motivation, better conduct, and more consistent engagement factors that gradually accumulate into long-term academic gains (Addimando, 2019; Yada & Savolainen, 2017). Longitudinal evidence suggests that these indirect pathways are particularly relevant during adolescence because emotional stability and motivational beliefs influence whether students remain engaged or disengage from school over time.

Social and emotional aspects of psychological well-being further reinforce its mediating role in academic performance. Adolescents with stronger social well-being and a sense of belonging are more likely to align with school expectations, feel emotionally safe in classrooms, and remain connected to academic goals. Physical activity often provides a context for peer bonding, teamwork, and supportive adult–student interactions, thereby strengthening school connectedness and emotional security. These social-emotional benefits can reduce disengagement and dropout risk, especially among students facing academic or psychosocial vulnerabilities. School-based studies frequently report that improved social well-being through physical activity participation is associated with more positive academic attitudes, stronger school attachment, and sustained engagement, confirming the importance of belonging and peer support in academic trajectories (Muwonge, Zavuga & Kabenge, 2015; Wilhelmsen & Sørensen, 2017).

Even with substantial support for psychological well-being as a mediator, limitations within the literature require attention. Many studies rely on self-reported measures of mental health and engagement, which may introduce bias and reduce precision in estimating effects. Differences across intervention designs, durations, intensity levels, and outcome measures also complicate comparisons across contexts. More longitudinal and experimental research is needed to clarify causal pathways, determine which components of psychological well-being are most influential, and identify the threshold conditions under which physical activity yields the strongest academic benefits. Additionally, variations across gender, cultural settings, and socioeconomic groups underscore that context matters for both participation and outcomes, reinforcing the need for inclusive and tailored approaches in school-based physical activity programming (O'Brien *et al*., 2020; Vaz *et al*., 2015).

Overall, the evidence positions psychological well-being as a crucial mechanism linking physical activity to academic performance among adolescents. By shaping cognitive functioning, motivation, engagement, and academic behaviors, psychological well-being influences how students experience and respond to school demands. Physical activity contributes to these processes not merely through physical health improvements, but by fostering emotional stability, social connectedness, and motivational strength that support effective learning. Recognizing psychological well-being as

a mediator encourages a more holistic educational approach in which physical activity is intentionally integrated into school structures as part of a broader strategy to promote mental health, sustained engagement, and long-term academic success for adolescents (Adeleke & Baidoo, 2022; Isa, 2022; Oyeyemi, 2022).

7. Academic Performance Outcomes and Contextual Moderators

Academic performance is a multifaceted outcome shaped by interacting cognitive, behavioral, psychological, and contextual influences, making it a complex but important endpoint for examining how physical activity and psychological well-being relate to learning among adolescents. School-based evidence increasingly suggests that physical activity influences academic performance through both direct and indirect pathways, with the most consistent effects observed in proximal learning-related outcomes such as attention, classroom behavior, and engagement rather than standardized achievement scores alone. These relationships are rarely uniform across settings because contextual moderators including gender, socioeconomic status, school environment, and program design shape both the strength and sustainability of academic outcomes (Hutzler *et al*., 2019; Nketsia, 2017). As a result, understanding academic performance in this literature requires attention not only to "whether" physical activity matters, but also to "how," "for whom," and "under what conditions" it matters within real school contexts.

Evidence linking physical activity to academic achievement, typically assessed via grades or standardized tests, remains mixed yet generally tilts toward small-to-moderate positive associations. Many school-based studies report that adolescents who engage in regular physical activity demonstrate modest improvements in performance, with effects sometimes more evident in mathematics and language-related subjects. These gains are often interpreted through indirect mechanisms, including improved cognitive functioning, enhanced psychological well-being, and better learning-related behaviors among physically active students. At the same time, other studies find no significant direct effects, reinforcing that academic achievement is shaped by a wide constellation of determinants such as instructional quality, home learning conditions, and socioeconomic constraints that may dilute or mask the contribution of physical activity (Onukwugha *et al*., 2020; van Zijl Drive & Cape, 2017). Importantly, the evidence does not support the assumption that time devoted to physical activity harms academic outcomes; rather, many interventions show that incorporating activity into the school day does not compromise achievement and may strengthen long-term learning through indirect pathways.

Attention and concentration are among the most consistent academic-related outcomes associated with physical activity participation. Adolescents who engage in regular physical activity often demonstrate improved attentional control, reduced distractibility, and a greater capacity to sustain focus during classroom instruction. These effects are frequently observed following moderate-to-vigorous activity sessions or movement-integrated classroom practices, suggesting that physical activity can improve immediate readiness to learn by reducing mental fatigue and increasing cognitive alertness. Psychological well-being intersects strongly with this pathway, since lower stress and anxiety improve adolescents' ability to allocate cognitive resources effectively to learning tasks. Thus, attention operates as a key proximal outcome linking physical activity to broader academic functioning, even when standardized test gains are not immediately detectable (Adogu, 2015; Oluwaseyi, 2019). In practical terms, improved attention may translate into better comprehension, stronger task persistence, and higher quality participation in daily learning activities.

Classroom behavior represents another domain where physical activity shows robust and relatively consistent effects. School-based studies frequently indicate that physically active adolescents exhibit fewer disruptive behaviors, improved self-regulation, and stronger adherence to classroom norms. Physical activity supports behavioral regulation by enhancing emotional control, reducing impulsivity, and providing constructive outlets for restlessness and excess energy, particularly within high-demand school routines. Interventions that incorporate active breaks, movement-integrated lessons, or extracurricular sports often report improvements in time-on-task, peer cooperation, and teacher–student interactions. These behavioral changes contribute to a more supportive learning environment, benefiting not only individual students but also classroom climate and instructional flow as a whole (Adenrele, 2015; Kadijat, 2015). In this sense, physical activity can function as a behavioral support strategy that strengthens classroom conditions needed for learning.

Moderating factors help explain why academic outcomes vary across students and settings. Gender differences, for example, have been reported as an important moderator in the relationship between physical activity and academic-related outcomes. While both male and female adolescents benefit psychologically and academically, the pattern of benefits may differ in magnitude and form. Some findings suggest that male students may display more pronounced attentional and behavioral improvements following physical activity, potentially because movement-based regulation directly counteracts higher baseline levels of restlessness or externalizing behavior. Female students may experience stronger psychological gains such as reduced stress and improved self-esteem, which can indirectly support academic engagement through motivation, confidence, and emotional stability. These differences highlight the need for program designs that are sensitive to gendered preferences, barriers, and participation patterns to maximize benefits across populations (Kunnuji, 2018; Shiffman *et al*., 2018).

Socioeconomic status (SES) is another critical moderator shaping both participation and outcomes. Adolescents in lower SES contexts may face greater barriers to physical activity due to limited school infrastructure, fewer extracurricular opportunities, financial constraints, safety concerns, or competing responsibilities outside school. Yet school-based physical activity programs can serve as an equalizing mechanism by providing structured opportunities for movement regardless of external resources. Evidence suggests that adolescents from disadvantaged backgrounds may experience particularly meaningful benefits in behavior, engagement, and stress regulation, because such programs can provide safe spaces, social support, and emotional relief within otherwise constrained environments. However, inequities in program quality, staffing, and facility availability across schools can also reinforce existing educational disparities if funding and policy support are uneven (Kunnuji *et al*., 2017; Mukoro, 2017). This

underscores that physical activity interventions are not automatically equitable; they must be designed and resourced to reduce, rather than reproduce, structural gaps.

The school environment itself strongly moderates whether physical activity translates into academic benefits. Leadership commitment, school culture, scheduling flexibility, infrastructure, and teacher attitudes toward movement all shape participation levels and program implementation quality. Schools that adopt a whole-school approach embedding physical activity into policies, routines, and curriculum planning tend to show more consistent benefits for learning-related outcomes than schools that rely on short-term or isolated initiatives. Supportive environments that normalize movement, provide adequate spaces, and encourage teacher buy-in create conditions in which psychological well-being and learning are more likely to improve concurrently (Awe, Akpan & Adekoya, 2017; Osabuohien, 2017). Conversely, schools with rigid timetables, limited space, or strong cultural emphasis on sedentary instruction may struggle to sustain implementation, even when students might benefit.

Program design remains a decisive moderator influencing academic outcomes. Evidence suggests that intervention quality including intensity, duration, inclusivity, and instructional alignment determines whether physical activity produces meaningful effects. Programs emphasizing enjoyment, autonomy, and skill development are more likely to strengthen psychological well-being and sustained engagement, thereby supporting learning outcomes over time. Movement-integrated teaching approaches that connect activity directly to academic content frequently produce stronger gains in attention and classroom behavior than standalone physical activity sessions because they reinforce both cognitive and behavioral engagement during instruction. Moreover, sustained programs implemented consistently over longer periods tend to yield more reliable academic-related improvements than sporadic or short-lived interventions (Akpan, Awe & Idowu, 2019; Ogundipe *et al*., 2019). These findings highlight that implementation fidelity and pedagogical integration matter as much as the presence of physical activity itself.

Cultural and contextual relevance further shapes program effectiveness, particularly in diverse school settings. Adolescents are more likely to participate meaningfully and sustain involvement when physical activity programs reflect culturally familiar practices, align with community norms, and connect to students' lived realities. Culturally responsive interventions can strengthen participation, social cohesion, and psychological safety, which then support academic engagement through increased belonging and reduced alienation. This is especially important where one-size-fits-all programming may exclude certain students or conflict with local expectations about gender, propriety, or schooling priorities (Awe & Akpan, 2017; Isa, 2019). Designing programs with cultural responsiveness therefore becomes part of ensuring both effectiveness and equity.

Overall, school-based evidence indicates that physical activity is positively linked to several dimensions of academic performance, most consistently attention, classroom behavior, and engagement. Direct effects on academic achievement are more variable, reflecting the complexity of learning outcomes and the influence of broader educational and socioeconomic conditions. Nevertheless, indirect benefits mediated through psychological well-being and supported by favorable contextual factors are repeatedly observed. Moderators such as gender, SES, school environment, and program design shape these relationships, emphasizing the need for tailored, inclusive, and context-sensitive approaches. When these moderating conditions are recognized and addressed, schools are better positioned to leverage physical activity as a strategic tool for promoting academic success alongside holistic adolescent development (Ajayi & Akanji, 2021; Ejibenam *et al*., 2021; Osabuohien, Omotara & Watti, 2021).

8. Conclusion and Implications for Policy and Practice

This integrative review synthesizes school-based evidence on the interrelated pathways linking physical activity, psychological well-being, and academic performance in adolescents, emphasizing the value of a holistic approach to education and youth development. Across diverse study contexts and methodological approaches, the evidence consistently indicates that physical activity contributes meaningfully to adolescents' psychological well-being, with recurrent benefits for stress reduction, emotional regulation, self-esteem, and social connectedness. These psychological gains are not merely peripheral outcomes; rather, they function as central mechanisms through which physical activity supports learning. In particular, improved psychological well-being mediates the relationship between physical activity and academic-related outcomes by shaping attention, motivation, engagement, and classroom behavior. Although direct associations between physical activity and standardized academic achievement remain mixed, the reviewed studies strongly suggest that physically active adolescents are more psychologically and behaviorally prepared to engage effectively in learning, thereby creating conditions for sustained academic progress over time.

The review also highlights that school-based physical activity opportunities including physical education, extracurricular sports, active classrooms, and movement-integrated learning are most effective when embedded within comprehensive and supportive school environments. A whole-school approach that normalizes movement, protects time for activity, and aligns physical activity provision with broader educational and well-being goals tends to produce more consistent outcomes than isolated or short-term interventions. Importantly, the magnitude and equity of these outcomes are shaped by contextual moderators such as gender, socioeconomic status, school culture, leadership commitment, and program design features such as inclusivity, duration, and instructional alignment. Schools that demonstrate strong leadership support, allocate adequate resources, and implement student-centered pedagogies are more likely to realize both mental health and academic benefits. Conversely, limited access to facilities, rigid curricula that prioritize sedentary instruction, and inequitable distribution of resources can constrain the impact of physical activity interventions, with particularly negative implications for adolescents from disadvantaged backgrounds who may have fewer opportunities for movement outside school.

Despite the expanding evidence base, notable research gaps remain. A substantial portion of the literature relies on cross-sectional designs or short-term interventions, which limits conclusions about causality and the sustainability of observed benefits across adolescent developmental trajectories. In addition, there is considerable variability in measurement, particularly regarding psychological well-being constructs

and academic outcomes. Some studies use broad self-report measures, while others focus on narrow indicators such as single-subject grades or test scores, making direct comparison across findings difficult. Future research would benefit from longitudinal and experimental designs that clarify temporal ordering and causal mechanisms, as well as standardized, multidimensional outcome frameworks that capture both psychological well-being and academic functioning comprehensively. Greater inclusion of underrepresented populations and culturally diverse contexts is also needed, alongside more precise analysis of which types, intensities, and delivery modes of school-based physical activity are most effective for different groups of adolescents.

From a policy and practice standpoint, the synthesis supports positioning physical activity as a core educational priority rather than an optional or peripheral school activity. Educational stakeholders should implement policies that protect and expand time for quality physical education, strengthen equitable access to extracurricular sport and recreational activity, and encourage movement-integrated teaching approaches across subjects. Teacher training and professional development are especially important, as teachers require practical strategies for incorporating movement into classroom routines in ways that enhance learning, support inclusion, and maintain instructional coherence. At the school level, adopting a whole-school physical activity framework supported by leadership, adequate infrastructure, safe spaces, and community partnerships can foster environments that promote psychological well-being, strengthen engagement, and reduce barriers to participation.

Ultimately, integrating physical activity into school systems represents a cost-effective and scalable strategy for addressing growing concerns about adolescent mental health and educational outcomes. By recognizing physical activity as both a catalyst for psychological well-being and a foundation for effective learning, schools can more effectively support adolescents' holistic development and strengthen the conditions needed for sustained academic success. This integrative perspective reinforces the need for coordinated action across education, public health, and policy sectors to ensure that all adolescents regardless of gender, socioeconomic status, or school context have meaningful opportunities to thrive physically, psychologically, and academically within the school environment.

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