



Integrating Yoga-Based Stress Management Practices into Physical and Health Education: A Curriculum Innovation Study in Sierra Leone

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Abstract

Original Research Article

Background: Addressing student stress and mental health concerns is emerging as a focus area, including in Sierra Leone. While PHE (Physical Health Education) courses have concentrated on fitness and sports, this investigation aimed to introduce yoga as a tool for emotional stress relief and to support mental health.

Methodology: This investigation utilized a convergent mixed-methods design in 12 secondary schools. It included a quantitative assessment of stress using the PSS-10 pre and post intervention: 180 students were surveyed pre and post intervention. Subsequently, there were qualitative interviews and focus group discussions with teachers, principals, and curriculum developers. The intervention comprised a 12-week yoga program that included asanas, breathing techniques, and mindfulness. This yoga curriculum was taught during PHE classes by certified yoga instructors and trained PHE teachers.

Results: The intervention produced a positive change in the quantitative data, demonstrating a significant reduction in stress scores. Students' perceived stress post intervention (M=22.8 to M=17.6, p<.001). Although no significant differences emerged between genders, students from urban and eastern schools exhibited much greater reductions in stress compared to their rural counterparts. Qualitative data noted improvement in self-regulation as well as emotional self-regulation in students.

Conclusion: The findings from the current study suggest that the incorporation of yoga into PHE classes provided a clear and effective strategy to reduce student stress in Sierra Leone. The authors suggest expanding the curriculum writing by integrating yoga with the goal of producing certified instructor trainees with the resulting educator training, thus, enabling trained educators to acquire specialized competencies tailoring the instruction to developed pilots aimed at the innovation and self-sustainability of the programs.

Keywords: Yoga, Yoga and Physiological Health Education, Adolescent Mental Health, Sierra Leone, Curriculum Reform, Adolescent Stress Management, Qualitative and Quantitative Research Methods.

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Introduction

The global education community increasingly recognizes the necessity of promoting students' mental health and emotional wellbeing to support academic success. In light of soaring rates of stress, anxiety, and behavioral disorders amongst school-aged children, especially in low and middle income countries, there remain gaps in curriculum reforms that offer holistic approaches to dealing with these challenges [1]; [2]. Physical Health Education (PHE) has moved from a focus on fitness and sports to a space to build psychosocial competencies and emotional resilience. Therefore, in this context, yoga is receiving much attention as a means to support stress management and overall wellness; a mind/body approach that includes physical postures, breathing, and meditation [3]; [4].

Yoga interventions appear to have positive outcomes in school context such as lessened anxiety, improved emotional regulation, increased attention, and heightened self-awareness among students [5]; [6]. The findings are relevant for schooling systems that face contextual stressors such as lack of space, insufficient funding, and recovery from crisis. In Sierra Leone, the school system is dealing with many of the legacies of the civil conflict, the Ebola outbreak, and the COVID pandemic causing cumulative psychosocial exposure to students [5], which only adds to the limited opportunities for mental health support and curriculums in schools.

There are optimal possibilities regarding mental wellness in schools when yoga is utilized within the Physical Health Education curriculum. The opportunities for mental wellness aligned to international guidelines and contextual objectives connect yoga to UN Sustainable Development Goals (particularly SDG 3: Good Health and Well-being and GOAL 4: Quality Education) by providing an accessible, low-cost and culturally relevant method of health intervention [8]. There is evidence from other low-resourced contexts that school-based yoga interventions are feasible, have had high uptake from educators and students, or have significantly correlated with positive improvements in physical and mental health outcomes [9]; [10]. However, very little information is available about how this could be

accomplished and sustained in the specific sociocultural and educational context of Sierra Leone.

This research explores the potential for curricular innovation through yoga as a stress management practice, integrated within Sierra Leone's Physical Health Education (PHE) curriculum. Specifically, this study explores stakeholder perceptions, feasibility of implementation, and perceived impacts on student wellbeing. The results are expected to contribute to evidence-informed curriculum reform initiatives and assist in forming holistic health education initiatives in Sierra Leone and educational contexts with similar frameworks.

Research Method

Research Design

This study employed a convergent mixed-methods research design with the intent to assess the effectiveness and feasibility of integrating yoga practices within the Physical Health Education (PHE) curriculum related to stress management in secondary schools in Sierra Leone. A convergent mixed-methods research design facilitated collecting and integrating both quantitative and qualitative data at the same time, leading to a more holistic perspective on measured outcomes and stakeholder experiences [11].

The quantitative aspect specifically measured the effect of a structured school-based yoga intervention of students' perceived stress calculated using validated psychometric instruments. At the same time, the qualitative aspect looked into the contextual, practical, and policy implications of the place yoga held in relation to the views of PHE teachers, school principals, and curriculum officers.

Study Population and Sampling

This study was conducted with key stakeholders in the Sierra Leonean secondary school system, including:

Pupils: A total potential population of 810 pupils (496 boys and 314 girls) aged 12–18 years, enrolled in both junior and senior secondary schools.

PHE Teachers: 100 (63 males; 37 females) teachers representing all six administrative regions.

School Administrators and Curriculum Officers: 10 from the Ministry of Basic and Senior Secondary Education (MBSSE) selected because of their strategic and policy roles.

Sampling Strategy

A multi-stage sampling strategy was used to ensure a geographic, institutional, and demographic representation.

Stage 1 – Selecting Regions

The six administrative regions were purposively selected so that the geographic and socio-cultural diversity of the country would be represented:

- Western Urban (metropolitan)

- Western Rural (peri-urban)
- North East (rural)
- North West (rural)
- Eastern Province (rural)
- Southern Province (rural).

Stage Two – Choosing the Schools

In total 12 participating schools were selected: in each region, two schools were randomly selected—one school that was government-assisted and one private school. This enabled the researchers to investigate bureaucratic models and school type.

Stage Three: Participant Selection

Participants were sampled using stratified sampled and purposively sampled (dependant upon their role):

Table 1: Showing Sampling Methods and Participant Justifications.

Participant Group	Sampling Method	Sample Size	Justification
Pupils	Stratified random sampling	180 (approx. 30 per school)	To ensure balanced representation by gender and academic level
PHE Teachers	Purposive sampling	12	Selected based on experience and intervention involvement
School Administrators	Purposive sampling	6	To capture administrative and operational perspectives
Curriculum Officers	Purposive sampling	4	To assess curriculum alignment and policy feasibility

Intervention design

The intervention was a 12-week, structured yoga program, delivered through regular PHE sessions. Each session had a duration of 30-40 min, with three distinct sections:

Warm-Up and Asanas: A light stretching and basic poses appropriate for adolescent physical capacities.

Pranayama (Breathwork): A few simple breath practice exercises to develop cognitive focus and for relaxation.

Mindfulness and Meditation: A short (5–10 min) guided mindfulness practice for emotional regulation.

Delivery model. The certified yoga instructors were able to deliver the first sessions in collaboration with the school-based PHE teachers, and a gradual capacity-building model was introduced to support long-term sustainability and possible future scale-up by supporting teachers to continue to deliver the content themselves.

Data Collection Methods

Quantitative Data Collection

Instrument: The Perceived Stress Scale (PSS-10) developed [11] was administered to measure students' stress levels pre- and post-intervention. This measure has been validated to use with adolescent populations.

Demographic Information: Age, gender, level of study, and region was collected to allow the researchers to conduct subgroup analyses and account for possible confounding variables.

Qualitative Data Collection

Semi-Structured Interviews: Semi-structured interviews with 12 of the PHE teachers, 6 school administrators, and 4 curriculum officers were conducted to explore teacher perspectives on feasibility, challenges, and policy directions.

Focus Group Discussions (FGDs): Focus group discussions were conducted with student participant's post-intervention, to explore their experience, perceived benefits, and recommendations for improvements.

All qualitative interviews, FGDs were recorded with participant consent, transcribed verbatim, and de-identified for confidentiality.

Data Analysis

Quantitative Analysis

Descriptive Statistics: This was used to describe demographic characteristics and mean stress scores.

Inferential Statistics:

Paired-sample t-tests were conducted to assess changes in stress levels from pre to post-intervention periods.

One-way ANOVA was conducted for subgroup comparisons for differences across gender, region, and school type.

Software: IBM SPSS Statistics (Version 27) was used to conduct the analyses.

Statistical shorthand for significance: $p < 0.05$.

Qualitative Analysis

A thematic analysis was conducted, based on [12] six-phases of thematic analysis:

Familiarising yourself with the data

Generating initial codes

Searching for themes

Reviewing themes

Defining and naming themes

Producing the final report

Design credibility and rigor were established throughout the process, through triangulation of data sources, and peer debriefing and member checking.

Ethical Clearance:

At the outset, ethical clearance was granted from the Sierra Leone Ethics and Scientific Review Committee.

Informed Consent: Informed consent was obtained from all adult participants. For students under the age of 18, consent from parents or guardians was required, in addition to assents/consents from the student.

Data confidentiality: All data obtained were anonymous and stored in a secure manner (limited access to the research staff).

Voluntary participation: All participants were aware that they could withdraw from the study at any time and there would be no adverse consequences for doing so.

Table 2: showing Study Limitations

Limitation	Description
Generalizability	The sample size and school selection may limit the national applicability of findings.
Self-Report Bias	The reliance on self-reported stress levels may introduce subjectivity and bias.
Duration of Intervention	The 12-week timeframe may not capture long-term effects or sustainability of the intervention.

Notwithstanding these limitations, this study presents a significant contribution as preliminary evidence regarding the possibility of establishing yoga as an extension of the PHE curriculum as a potential means of improving the mental well-being of adolescents in Sierra Leone.

Results

This section will present the results of the quantitative and qualitative elements of the study. In this section, the results will be organized following the primary aim of the study, the evaluation and processes of integrating yoga into the Physical

Health Education (PHE) Curriculum for stress management in secondary schools in Sierra Leone.

Quantitative Results

Participant Demographics

A total of 180 students participated in the yoga-based intervention involving a total of 92 males and 88 females spread across 12 secondary schools. The participants' ages ranged from 12 to 18 years, with a mean age of 15.2 years (SD = 1.74). Each sector (government-assisted or private) was equally represented across the six administrative regions of Sierra Leone.

Table 3. Participant Demographic Information by Region and School Sector

Region	Government School (n)	Private School (n)	Total Students
Western Urban	15	15	30
Western Rural	15	15	30
North-East	15	15	30
North-West	15	15	30
Eastern Province	15	15	30
Southern Province	15	15	30
Total	90	90	180

Changes in Perceived Stress

The Perceived Stress Scale (PSS-10) was given prior to and following the 12-week intervention to

evaluate how effective the yoga program was in decreasing stress levels in students.

Table 4: Descriptive Statistics and Inferential Statistics

Measure	Pre-Intervention (M ± SD)	Post-Intervention (M ± SD)	Mean Difference	t(179)	p-value
Perceived Stress Score	22.8 ± 4.7	17.6 ± 4.2	5.2	14.73	< .001

The results obtained from the paired-sample t-test revealed a statistically significant decrease in perceived stress scores from pre-test to post-test (t(179) = 14.73, p < .001). On average, the perceived stress levels reduced by 5.2 points indicating a sizeable and favorable effect from the school-based yoga intervention on the students' mental well-being.

Subgroup Comparisons: Gender, Region, School Type

To further investigate the differences in perceived outcomes for stress reduction, a one-way ANOVA was conducted across the three subgroup categories: gender, region, and school type.

Table 5. Summary of ANOVA results for stress reduction by Gender, Geography and School Category

Subgroup	Grouping Variable	Mean Stress Reduction (M ± SD)	F-value (df)	p-value	Interpretation
Gender	Male (n = 92)	4.9 ± 4.5	F(1,178) = 1.57	.21	No significant difference
	Female (n = 88)	5.5 ± 4.3			
Region	Western Urban	6.2 ± 4.0	F(5,174) = 3.42	.006**	Statistically significant difference
	Western Rural	4.3 ± 4.1			
	North-East	4.7 ± 4.9			
	North-West	4.6 ± 4.4			
	Eastern Province	6.0 ± 4.3			
School Type	Southern Province	5.2 ± 4.6	F(1,178) = 3.09	.08	Not statistically significant (marginal)
	Government (n = 90)	4.8 ± 4.6			
	Private (n = 90)	5.6 ± 4.4			

Key Findings

Quantitative Results

Quantitative findings showed that the yoga intervention had similar reductions in perceived

stress for both men and women. Women did have a slightly larger mean reduction than men, yet gender differences were not statistically significant (F(1,178) = 1.57, p = .21) and should be viewed predominantly as gender-neutral. Statistically

significant differences were evident across regions ($F(5,174) = 3.42, p = .006$) where students located in the Western Urban and Eastern Provinces perceived the most improvement. These understood differences may be contextual, such as the culture, climate, access to psychosocial resources, or uptake of the yoga program. In addition, while students in private schools demonstrated slightly more perceived stress reductions than students in government-assisted schools, the difference was not statistically significant ($F(1,178) = 3.09, p = .08$); thus, it is suggested that future research involving a larger sample or more of a targeted sample warranted to explore this trend.

Qualitative Results

Following [12] six phases of thematic analysis of the interviews and focus groups data, two primary themes were identified describing stakeholder's perceptions of yoga as part of the Physical Health Education (PHE) curriculum.

Perceived value of the yoga program

Across stakeholder groups (PHE teachers, administrators, and students), the intervention was perceived as valuable to student well-being. Reported outcomes consisted of enhanced emotional regulation, enhanced classroom behavior, and improved peer relationships. Student participants often used the words “calming” and “helpful” to describe the sessions, indicating value in stress management and attentional control within the sessions. These results align with prior research indicating psychosocial benefits of school-based yoga assistance [13]; [14].

Feasibility of implementation

Overall, stakeholders expressed that it was easy to incorporate yoga into existing PHE teaching, especially when it included organized training and resource support. Teachers indicated that their comfort and confidence to deliver after school sessions improved, especially working alongside certified instructors. Curriculum officers underscored the importance of the Curriculum promoting yoga within the formal curriculum rather than an outside extracurricular activity, which is

aligned with current recommendations from a global perspective on wellness programming in schools to increase accessibility to more students and teachers, which are low cost interventions [15].

Institutional and Cultural Challenges

There were several challenges including cultural and religious misconceptions about yoga, particularly in rural contexts. Some parents and students demonstrated some resistance which meant that targeted awareness-raising would be necessary to help contextualize yoga, as a secular health enhancing practice. Operational factors such as limited indoor space and time restrictions due to PHE scheduling were also barriers to the consistent implementation of yoga in schools. These data demonstrate the significance of culturally appropriate engagement and operational flexibility [16]; [17].

Recommendations for Sustainability

To enhance sustainability in the future, stakeholders were in favour of having formal curriculum support at the system level, ongoing teacher capacity building, and developing consistency in the instructional materials. Curriculum officers suggested that this be approved at the policy level and built into national education. Sustainable strategies that institutionalise wellness initiatives within the school context align with internationally recommended practices [18]; [19].

Discussion

This study explored the impact and feasibility of the implementation of yoga-based stress management practices within the Physical Health Education (PHE) curriculum, in Sierra Leonean secondary schools; it provides robust empirical and contextual evidence advocating for yoga as an effective and feasible stress intervention for adolescents, concurrent with the global literature on school-based mind-body practices [20]; [21]. The study found that the quantitative data indicated that the perceived stress scores reduced significantly from pre-test to post-test ($M = 22.8$ to $M = 17.6, p < .001$), which endorsed the positive psychological impact of yoga. The findings reflect prior research where adolescents

receiving yoga interventions, saw significant improvements in mental well-being, emotional regulation, and decreased anxiety levels [9]; [22]. In light of the increasing stress burden on adolescents in low-income contexts, the effectiveness of yoga is critically important as low-income countries have limited psychological services compared to more affluent countries [23].

The lack of significant differences between genders in reducing stress was consistent with previous research demonstrating the relational significance of yoga across genders in adolescent populations [24]. Although we did observe significantly greater reductions in the degree of stress in students from Western Urban and Eastern Province, this could be due to factors surrounding implementation details, including the school context, teacher involvement, and culturally context surrounding uptake. Similar geographic variation has been reported within other school based mental health interventions in sub-Saharan Africa [25]; this indicates a need for implementation considerations to be tailored when being expanded across regions.

Qualitative data collected from teachers, administrators, and curriculum officers highlighted very strong support to boarders in the yoga program into the regions national PHE curriculum. Participants commented on the yoga program provided an opportunity to integrate their ideals surrounding holistic education; reduce violence in schools; provide discipline, focus on practice; and emphasis the importance of emotional welling being (three Canadian core competencies aligned with global health and education frameworks) [26]; [23]. These results support for arguments made by some researchers about expanding physical education to include contemplative and restorative practices [27]; [28].

Nonetheless, challenges associated with insufficient teacher training, poor materials, and cultural misunderstandings about yoga were also identified. These barriers are not unique to Sierra Leone and have been reported similarly in other low- and middle-income countries (LMICs) [29]; [30]. Combatting these challenges will require strategic

policy engagement, community sensitisation, and phased implementation.

This study adds to the growing evidence that yoga, when incorporated within existing education systems can be a sustainable, low-cost intervention for adolescent mental health [22]; [20]. Enlisting the help of curriculum officers in our research process increases the relevance of the study from a policy standpoint, and their willingness to support scaling-up efforts indicates their desire to be part of educational reform. Successfully integrating yoga into national education policy frameworks has been achieved in countries like India or Brazil [31]; there are models for Sierra Leone to explore.

Although the results are promising, the limited duration of the intervention, reliance on self-reported data, and geographical scope of the study should be recognized as limitations. Future studies should explore longitudinal designs to track ongoing impacts of yoga on the behaviour, educational, and psychosocial outcomes of students, and comparative designs, where possible, with the use of control groups would support causal inference.

Conclusion:

The mixed-methods study revealed strong evidence for the effect of yoga practices as a way to reduce perceived stress in secondary school students in Sierra Leone following integration into the Physical Health Education (PHE) curriculum. The quantitative results of the study indicated that there was a statistically significant difference in the stress scores between pre and post-intervention time frames with participants reporting decreased levels of stress. Qualitative results of the study indicated positive impacts of yoga practices on students with a focus on their ability to reduce stress, improve emotional regulation and focus, and empower teachers in their instruction. Logistical challenges surrounding implementation of the yoga plans and not being able to formally integrate yoga practices in the school, where a key barriers to making it sustainable.

Overall, the results strongly reflect the feasibility of a structured school-based yoga intervention, and the potential benefits for making a scalable, culturally

adaptable, and non-pharmacological approach to fostering adolescent mental well-being through the education system.

Recommendations:

Policy Integration: The Ministry of Basic and Senior Secondary Education (MBSSE) should consider a planned integrational approach to adding yoga-based stress management modules into the national PHE curriculum, with formal guidelines and teacher training.

Teacher Training & Capacity Building: The MBSSE can invest in regional training programs to create PHE teachers with the confidence and capacity to deliver independent yoga sessions, which will create long-lasting sustainable livelihoods.

Pilot Programs and Scale-Up: The MBSSE can implement, pilot, and improve initiatives in a number of schools in different districts to explore scalability and improve system use and as a preliminary phase to national roll-out.

Infrastructure and Scheduling Support: The MBSSE can remove logistical barriers by providing schools with suitable resources for yoga practice (such as quiet spaces) and flexibility to schedule use of these spaces.

Further Research: The implementation of longitudinal research would be needed to understand the long-term impact of school-based yoga programs upon academic performance, mental health, and behavior across diverse populations.

Authors' Contributions

Christian Gendemeh conceptualized the study, designed the methodology, conducted data analysis and interpretation, and drafted the initial manuscript. Professor (Dr.) Pravin Kumar provided overall academic supervision, critically reviewed the study design and methodological rigor, and contributed substantial intellectual input to the manuscript. Ibrahim Soriba and Osman Sesay were responsible for data collection and organisation for analysis. Dr. Alpha Bassie Mansaray led the literature review, contributed to the theoretical framework and policy implications, and critically reviewed the manuscript

for coherence, clarity, and compliance with journal guidelines. All authors reviewed and approved the final manuscript and accept responsibility for its content.

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Conflict of Interest

The authors declare that they have no competing interests or conflicts of interest related to this study.

Disclaimer

The opinions expressed in this article are those of the contributors alone and do not necessarily represent the views, policies, or position of any of the institutions and/or ethics review boards with which they are affiliated.

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