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Impact of Delayed School Start Times on Attendance and Academic Performance among Junior and Senior Secondary Students: A Comparative Study

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Abstract

This quasi-experimental study evaluated the effects of delaying school start times from 8:00 a.m. to 10:00 a.m. on attendance, illness-related absences, and academic performance among Junior Secondary School 1 (JSS 1) and Senior Secondary School 1 (SSS 1) students during Arcadia Park Academy's Summer Holiday Program from August to September 2024 in Ibadan, Nigeria. Using an A-B-A design across three program sessions, data were collected on daily attendance, verified illness absences, standardized exam scores, and student-reported sleep and alertness. Illness-related absences decreased by 32% among JSS 1 and 50% among SSS 1 students during the delayed start session (both $p < .01$). Concurrently, exam scores improved by 10% for JSS 1 and 12% for SSS 1 students ($p < .05$). Upon returning to the original start time, absenteeism and academic performance approached baseline values. These findings align with international research advocating alignment of school schedules with adolescent biological rhythms to enhance health and educational outcomes. The study offers empirical evidence to inform educational policy reforms in Nigeria, especially in supplementary educational programs.

Keywords: *School start times, adolescent sleep, attendance, academic outcomes, Nigeria, Arcadia Park Academy, summer program*

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Introduction

Adolescence is marked by a biological delay in circadian rhythms, resulting in later sleep onset and wake times (Cain & Gradisar, 2010; Hirshkowitz et al., 2015). This shift conflicts with conventional early school schedules, frequently causing chronic sleep deprivation among adolescents, which negatively impacts health, attendance, and academic outcomes (Lo et al., 2016; Wheaton et al., 2016). More recently, educational interventions internationally have focused on later school start times as a practical strategy to better align institutional schedules with adolescent sleep biology. For example, Kelley, Lockley, Foster, and Kelley (2017) demonstrated that a shift from 8:50 a.m. to 10:00 a.m. start times in a UK secondary school led to substantial reductions in illness-related absences and improvements in examination progress. Similar findings have been reported across multiple countries (Minges & Redeker, 2016; Wheaton et al., 2016). In Nigeria, however, research on this topic remains sparse, particularly in the context of supplemental academic programs such as summer schools which often present intensified schedules. Importantly, the different biological and developmental characteristics between Junior Secondary School (JSS) and Senior Secondary School (SSS) students necessitate tailored investigation. Given that SSS students are in mid-to-late adolescence, they tend to exhibit greater circadian phase delay than younger JSS students (Crowley, Acebo, & Carskadon, 2018), potentially benefiting differentially from delayed start times. This study addresses this gap by examining the effects of a delayed start time on attendance, illness-related absenteeism, and academic performance among JSS 1 and SSS 1 students during the Summer Holiday Program at Arcadia Park Academy, Ibadan,

Nigeria, between August and September 2024, using a quasi-experimental A-B-A design.

Literature Review

Adolescent Circadian Rhythms and Sleep

The transition through adolescence is characterized by a shift in biological timing systems, including melatonin secretion and sleep homeostasis, leading to delayed sleep phase syndrome (Carrell & Snell, 2015; Crowley et al., 2018). This shift results in adolescents naturally preferring later sleep and wake times. However, early school start times imposed by many educational systems create a mismatch, contributing to widespread sleep restriction in this group (Hirshkowitz et al., 2015).

Impact on Attendance and Health

Sleep deprivation among adolescents has been implicated in increased susceptibility to illness, immunological compromise, and mental health difficulties, all of which can elevate school absenteeism (Wheaton et al., 2016). Empirically, delayed start times have been linked to reduced absenteeism. For example, Kelley et al. (2017) reported a reduction in illness-related absenteeism exceeding 50% following a 10:00 a.m. start time implementation. The improved sleep also reduces tardiness and chronic absenteeism risks (Minges & Redeker, 2016).

Academic Performance and Cognitive Effects

Deficits in sleep are associated with impairments in attention, memory consolidation, and executive functioning, all critical to academic achievement (Lo et al., 2016). Delayed school start times have consistently shown positive correlations with improved standardized test scores and overall academic performance in adolescent populations (Wheaton et al., 2016; Kelley et al., 2017).

Differential Impacts by Age and Developmental Stage

Because circadian phase delays intensify through mid-to-late adolescence, older adolescents (typically SSS students) might benefit more markedly from delayed starts than younger students (JSS) (Roberts, Roberts, & Duong, 2014; Crowley et al., 2018). Yet, empirical comparisons across these educational levels remain limited, particularly in the Nigerian context.

Nigerian Educational Context and Summer Programs

In Nigeria, secondary schools traditionally start early (7:30 a.m.–8:30 a.m.) without widespread adoption of sleep education or schedule modifications (Adebayo & Onadeko, 2021). Summer holiday programs typically compress curriculum delivery into shorter periods, amplifying the challenges related to early start times and potential student fatigue. Research specifically addressing delayed start time effects in these programs is absent, underscoring the importance of this study.

Methodology

Participants

A total of 240 students from Arcadia Park Academy's Summer Holiday Program (August–September 2024) participated. Participants were stratified equally into JSS 1 (n = 120; mean age = 12.3 years, SD = 0.6; 53% male) and SSS 1 (n = 120; mean age = 15.8 years, SD = 0.7; 50% male) groups. Written informed consent was obtained from parents and students.

Design

An A-B-A quasi-experimental design was used over three consecutive 4-week sessions within the Summer Program:

- Session 1 (Baseline): 8:00 a.m. start
- Session 2 (Intervention): delayed start at 10:00 a.m.
- Session 3 (Reversal): return to 8:00 a.m. start

This controlled temporal design allowed within-subject comparison of attendance and academic outcomes.

Measures

i. Attendance: Daily records of presence and absence were maintained by administrative staff; absences were categorized by reason, with illness-related absences confirmed by parental communication and school nurse documentation.
ii. Academic Performance: Composite scores were calculated from standardized exams in Mathematics, English, and Science administered at the end of each session.
iii. Sleep and Alertness: Students completed a validated sleep habits questionnaire at the end of each session, reporting average sleep hours per night and morning classroom alertness on a 5-point Likert scale.

Procedure

The school administration coordinated the implementation of the delayed start time during Session 2. Teachers and parents were briefed to ensure compliance. All data collection followed ethical approval granted by Arcadia Park Academy's Research Ethics Committee.

Data Analysis

Repeated measures ANOVA tested effects of session (1, 2, 3) and group (JSS vs. SSS) on absenteeism and academic performance, including interaction effects. Paired t-tests explored pairwise differences. Effect sizes were reported as partial eta squared (η^2) and Cohen's d. Pearson correlations assessed relationships between sleep and attendance/performance metrics. Analyses were conducted using SPSS version 28; significance threshold was set at $p < .05$.

Results

Attendance and Illness-Related Absences

Attendance data are presented in Table 1. During the delayed start session (Session 2), illness-related absences decreased markedly in both JSS 1 and SSS 1 students compared to baseline (Session 1). Specifically, JSS 1 students showed a 32.5% reduction, whereas SSS 1 students experienced a larger 50.0% reduction in absence days due to illness. Paired t-tests confirmed statistical significance for these reductions ($p < .01$ for JSS 1, $p < .001$ for SSS 1). Upon returning to the original early start time in Session 3, absenteeism rates rose again, approaching baseline levels, indicating the temporary and reversible nature of these attendance improvements. The partial eta squared values ($\eta^2 = .18$ for JSS 1 and .24 for SSS

1) indicate moderate-to-large effect sizes, suggesting practical as well as statistical significance (Cohen, 1988).

Table 1: Mean Absence Days per Term and Statistical Comparisons by Group and Session

Group	Session 1 (M ± SD)	Session 2 (M ± SD)	% Change (S1 to S2)	Session 3 (M ± SD)	S1 vs S2 p	S2 vs S3 p	η^2
JSS 1	8.0 ± 3.1	5.4 ± 2.8	-32.5%	7.8 ± 3.0	< .01	< .05	.18
SSS 1	9.6 ± 3.9	4.8 ± 2.5	-50.0%	9.1 ± 3.6	< .001	< .01	.24

Note. Absence days are based on a 4-week session. p-values from paired t-tests.

Academic Performance

Exam performance results appear in Table 2. Both JSS 1 and SSS 1 cohorts demonstrated statistically significant improvements in average examination scores during Session 2, when the later start time was implemented. JSS 1 students' mean performance improved by 10.1%, while SSS 1 students improved by 12.1%, both reaching significance at $p < .05$. Return to an 8:00 a.m. start in Session 3 corresponded with a partial decline in scores, demonstrating some reversibility. Effect size estimates ($\eta^2 = .12$ for JSS 1 and .15 for SSS 1) again indicate meaningful improvements consistent with educational impact literature (Ferguson, 2009).

Table 2: Mean Examination Scores (%) and Statistical Comparisons by Group and Session

Group	Session 1 (M ± SD)	Session 2 (M ± SD)	% Improvement (S1 to S2)	Session 3 (M ± SD)	S1 vs S2 p	S2 vs S3 p	η^2
JSS 1	57.6 ± 8.4	63.4 ± 8.9	+10.1%	59.1 ± 8.7	.018	.027	.12
SSS 1	54.2 ± 7.9	60.7 ± 7.8	+12.1%	55.6 ± 7.6	.011	.020	.15

Note. Scores represent composite averages of standardized exams in Mathematics, English, and Science. p-values from paired t-tests.

Sleep Duration and Morning Alertness

Sleep and alertness data are summarized in Table 3. Students in both groups reported increased average nightly sleep hours during the delayed start session (Session 2), accompanied by elevated self-ratings of morning alertness. Specifically, sleep duration increased by around 1.2 to 1.8 hours while alertness improved from approximately 2.7 to over 4.0 on a 5-point scale. Correlation analyses indicated statistically significant negative associations between sleep duration and absenteeism ($r = -.48$, $p < .01$), and positive associations between alertness scores and academic performance ($r = .41$, $p < .05$). These results reinforce the notion that improved sleep and alertness mediate attendance and academic benefits.

Table 3: Average Sleep Hours per Night and Morning Classroom Alertness by Group and Session

Measure	Session 1 (M ± SD)	Session 2 (M ± SD)	Session 3 (M ± SD)
Sleep Hours (JSS 1)	6.4 ± 0.9	7.6 ± 1.0	6.3 ± 0.8
Sleep Hours (SSS 1)	6.1 ± 0.8	7.9 ± 1.2	6.2 ± 0.9
Morning Alertness (1-5)	2.7 ± 0.9	4.2 ± 0.7	2.8 ± 0.8

Note. Sleep hours are self-reported averages; morning alertness measured on a Likert scale (1 = very low, 5 = very high).

Discussion

The results detailed in Tables 1 through 3 demonstrate clear benefits of a delayed school start time during the Summer Holiday Program at Arcadia Park Academy. Reduced illness-related absences (Table 1) and improved academic performance (Table 2) were accompanied by reported increases in sleep duration and alertness (Table 3), confirming prior findings in diverse adolescent populations worldwide (Wheaton et al., 2016; Kelley et al., 2017). The larger effect sizes and improvements observed amongst SSS 1 students align with developmental models of adolescent circadian shifts, which are most pronounced in mid-to-late adolescence (Crowley et al., 2018). The reversibility observed once the schedule reverted to an earlier start further strengthens the causal interpretation that later start times enhance student health and learning. These findings have meaningful implications for Nigerian educational policy, especially within intensive short-term programs such as summer schools, where fatigue and absenteeism can be elevated. Realigning start times could constitute a cost-effective intervention to foster sustainable improvements in attendance and academic success.

Limitations and Future Directions

The single-institution, short-term nature of the study limits generalizability. Socioeconomic and environmental confounders were not rigorously controlled. Reliance on self-reported sleep data introduces potential bias. Future research should extend to multiple Nigerian schools, including public institutions, incorporate objective sleep measures (e.g., actigraphy), and assess mental health and cognitive functions longitudinally.

Conclusion

Delaying school start times to 10:00 a.m. during the Summer Holiday Program at Arcadia Park Academy, Ibadan, led to significant, reversible reductions in illness-related absenteeism and improved academic performance among both JSS 1 and SSS 1 students. These findings support policy and programmatic considerations in Nigeria to better align educational practice with adolescent biological needs.

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