

Self-reported sleep parameters among secondary school teenagers in middle-belt Nigeria

EO Sanya, PM Kolo, OO Desalu, OA Bolarinwa¹, PO Ajiboye², MF Tunde-Ayinmode²

Departments of Medicine, ¹Epidemiology and Community Health and ²Behavioural Sciences, University of Ilorin, Ilorin, Nigeria

Abstract

Background: Available evidences seem to suggest increasing trend in sleep deficit among teenagers worldwide, and there is limited information on this among Nigerian teenagers. This study was carried out to determine the basic sleep schedule and sleep duration among schooling teenagers in Ilorin, Nigeria.

Methods: This is a descriptive cross-sectional study conducted among 20 selected public secondary schools in Ilorin, Nigeria. A multistage sampling technique was used to randomly select participating schools.

Result: A total of 1033 students participated in the study; of these 47.3% were males and 51.7% females. Students mean age (standard deviation) was 15.3 ± 1.6 years with a range of 12–19 years. Majority (76.2%) of participants co-share bed with at least one person and some (23.8%) slept alone in bed. The three leading reasons given for going to bed were: Tiredness - 31.1%, completion of house assignment - 20.5%, and parental directive - 12.4%. 10% of teenagers do make regular phone calls at night and 5.5% surf internet and use computers at night. Regular habits of daytime sleepiness were reported by 8.2% of study participants. Students' mean sleep duration during school days was 9.33 ± 2.29 h compared to 10.09 ± 1.32 h at weekend ($P < 0.05$). The duration of night time sleep was adequate (>9 h) in 41% of students; borderline (8–9 h) in 44.3% while 13.3% of the students had insufficient nighttime sleep duration (<8 h) $P < 0.05$.

Conclusion: A substantial number of students had borderline nighttime sleep duration and so had potentials to transit into the problematic insufficient range. To prevent this, there is a need to educate schooling teenagers on the dangers associated with prolonged sleep insufficiency.

Key words: Bedtime, schooling, sleep duration, teenagers, wake-up-time

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Introduction

A teenager is a person between the ages of 12 and 19^[1] and this stage is the transitional period between childhood and adulthood.^[2] During this period, there is a shift in sleep/wake pattern that is related to alteration in intrinsic and extrinsic developmental changes. Evidences from several studies seem to suggest a high prevalence of sleep insufficiency among teenagers.^[3,4] The loss of sleep in adolescence may not be related to their reduced need for sleep, but rather it arises from changes in biological, psychological and sociocultural factors. The psychosocial changes in teenagers include

school and extracurricular activities like sports, drama, jobs, use of mobile phones and computers, nightclubs as well as use of alcohol.^[3,4] The biologic factors include rapid change in hormonal level necessary for the development into adulthood.^[5] One of the such hormones is melatonin that is secreted by the pineal gland. Melatonin functions to regulate sleep/wake circle through initiation of sleep when the eyes are exposed to darkness.^[6,7] During puberty, there is a delay in melatonin release from the pineal gland, and this might be associated with a shift in teenager's circadian rhythm.^[6]

Address for correspondence:

Dr. EO Sanya,
Department of Medicine, Neurology Unit, University of Ilorin,
P O Box 5314 Ilorin, Kwara State, Nigeria.
E-mail: emanuelosanya@yahoo.com

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This change in circadian rhythms results in late onset of sleep and delayed wake-up-time (WUT)^[7,8] which contrasts the demand for early school rising. Evidences from several studies seem to suggest that teenagers presently sleep less than what is required for their age.^[8,9] Unfortunately, many parents and teenagers themselves do not seem to appreciate the enormity of this problem.^[10] Part of the effects of chronic sleep insufficiency includes hindrances to learning, negative effects on behavior and attainment of social competence and poor quality of life.^[12,4] There is also increased risks of human error-related accidents in chronic sleep deficiency.^[11-13]

Presently, there is limited information on sleep habit of schooling teenagers in Africa, especially in the sub-Saharan region. In a recent meta-analytic review on global sleep pattern, nothing was written on African teenagers and their sleep habit, and the main reason adduced for this was paucity of data on the topic from the region.^[14] This, therefore, necessitated this study to determine sleep habits among a cross section of secondary school teenagers.

Methods

This is a descriptive cross-sectional study among 20 selected public secondary schools in Ilorin, Kwara state in the north central zone of Nigeria. A multistage sampling technique was used to randomly select public schools from the school administrative zone lists obtained from Kwara state ministry of education. This was followed by simple random selection of 4 schools from each of the 5 zones. This resulted in a total of 20 secondary schools. At the school level, stratified random sampling was used to obtain 10 students from each of the 6 grade levels making a total of 60 students per school.

All students daily came to school from home and gave consent to participate in the study. Each of the school principals gave permission for the study. The supervising state ministry education gave approval to carry out this study in the secondary schools. The survey questionnaire was designed from previous similar studies,^[15,16] and it was aimed at capturing basic sleep parameters. The questions contained were related to both demographic data and sleep parameters. The study assessed sleep habits on different parameters e.g., total duration of sleep in a day, time for bed, sleep latency, nocturnal awakenings (weekly and daily frequency, duration, reasons), WUT, time to leave the bed and daytime (school time) napping habits. The duration of the night time sleep was calculated as the difference between bedtime (BT) and WUT.

Statistics

Collected data were analyzed using SPSS computer software (IBM, USA version 16). Simple tables of the results were generated. Student's *t*-test was used to compare the mean value of continuous variables. Chi-square test was

used to compare the relationship between discrete variables. A significant *P* - value was set at <0.05.

Results

Demographic characteristics

A total of 1200 questionnaires was distributed out of which 1033 were returned filled given 86.1% response rate. Five hundred and forty-three of the students were females (52.6%) and 489 males (47.3%). Their age ranged between 12 and 19 years with a mean (standard deviation) of 15.3 ± 1.6 years. The teenagers were subdivided into three groups based on their age: Early teens (12–14 years) – 44.7%, middle teens (15–16 years) – 35.8% and late teens (17–19) – 19.5%. Close to 23.8% respondents indicated to sleep alone in the bedroom and 71.8% practice co-sleeping (share room - 40%) and (12.8% share bed). 67 students (6.5%) smoked cigarette and 64 students (6.2%) took alcohol. Table 1 shows background characteristics of students.

Students' sleeping habits

The leading reasons students gave for going to bed at night were: Tiredness - 31.1%, completion of house

Table 1: Demographic and factors that could influence sleep

Variable	Number (1033)	Percentage
Gender		
Male	490	47.3
Female	543	52.6
Age group (years)		
12-14 (young teens)	462	44.7
15-16 (middle teens)	370	35.8
17-19 (older teens)	201	19.5
Sleeping condition		
Alone in room/bed	246	23.8
Co-sleeping (share bed/room)	737	71.2
Reason for going to bed		
Tiredness	321	31.1
Completion of homework	212	20.5
Parental instruction	128	12.4
Nothing on TV	124	12.0
Siblings in bed	100	9.7
After dinner	81	7.8
Others	67	6.5
Some adolescent habits (multiple responses)		
Use of electronic devices	164	15.3
Night phone call	104	10.1
Night use of computer/internet	57	5.5
Regular exercise	236	22.8
Daytime naps	87	8.2
Sleeping aids (pills/music)	202	19.6
Smoking	67	6.5
Alcohol	71	6.9
Other	55	5.3

assignment - 20.5%, parental instructions - 12.4% and nothing on television - 12.0%, others reasons are in Table 1. 163 respondents (15.3%) used electronic devices late into the night; of these 104 (10.1%) admitted to making phone calls and 57 students (5.5%) are busy with the internet. 87 students (8.2%) admitted to having regular daytime naps at least once per week. Some teenagers - 202 (19.2%) habitually need night time sleeping aids (medications and music). The participants' responses to questions on sleep-related habits are shown in Table 2. The mean night time sleep duration was within the adequate range (>9 h) in 42.3% of teenagers. Close to 44.4% of the students had nighttime sleep duration within the borderline range (8–9 h), and this was the problematic range (<8 h) in 13.4% of teenage students. Figure 1 shows a night time sleep duration in this cross section of teenagers. The mean BT was

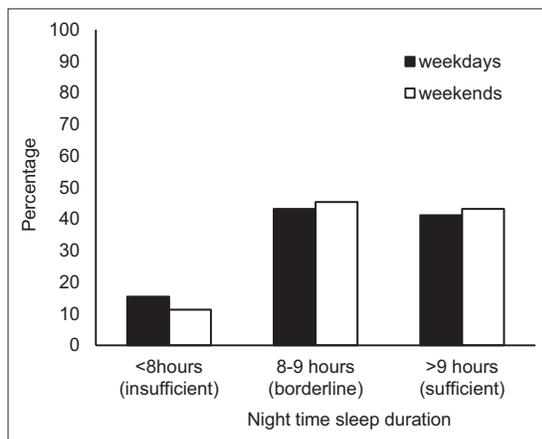


Figure 1: Sleep duration of teenagers during school days and weekend

Table 2: Sleep duration in teenagers

Questions	Weekdays (h)	Weekend (h)	P
BT	21.53±1.34	22.08±2.09	0.03
Getup	7.02±1.43	7.37±2.04	0.001
Sleep duration	9.33±2.29	10.09±2.32	0.002

BT=Bedtime

Table 3: Sleep parameters among the three subdivisions of teenagers

Group	Early teenagers (12-14 years)	Middle teenagers (15-16 years)	Late teenagers (17-19 years)	P
Weekdays				
BT	21.4±1.27	21.53±1.34	21.59±1.44	0.1
Wake-up-time	6.41±1.23	6.48±1.24	7.54±1.32	0.5
Sleep duration	9.30±2.31	10.28±2.18	9.39±2.28	0.01
Weekend				
BT	22.04±1.5	22.22±2.01	21.48±2.35	0.4
Wake-up-time	7.4±2.01	7.4±2.15	7.3±2.18	0.8
Sleep duration	10.17±2.47	10.58±2.18	10.23±2.17	0.05

BT=Bedtime

significantly delayed at weekends with value of 22.04 ± 1.5 h compared to 21.41 ± 2.7 h during school days ($P < 0.001$). Similarly, WUT was delayed at weekends (7.37 ± 2.04 h) compared to the value (9.33 ± 2.29 h) during school days ($P < 0.001$).

Compared to the younger and middle teenagers, the older teenagers went to bed much later both during school days and at weekends. The mean BT was 21.4 ± 1.27 h in early teenagers, 21.53 ± 1.34 h in the middle teenagers and 21.59 ± 1.44 h in the late teens and the difference did not attain any statistical significance ($P > 0.05$). Although, WUT in older teenagers was delayed (7.02 ± 1.56 h) compared to 6.81 ± 1.4 h and 6.74 ± 1.4 h, in middle and early teenagers, respectively, the difference was equally not statistically significant ($P > 0.5$). The mean nighttime sleep duration was significantly shorter in the older teens (9.30 ± 2.31 h) compared to the mean values in the middle teens (9.39 ± 2.28 h) and younger (10.28 ± 2.18 h) teenagers during school days ($P = 0.01$). However, at weekends there was no significant difference in nighttime sleep duration between the three groups ($P > 0.05$). This is shown in Table 3. Student's gender did not influence their various sleep parameters. There was no significant difference in mean BT between females (21.33 ± 1.37 h) and males (21.36 ± 1.40 h). The mean WUT of female students was earlier (6.56 ± 1.30 h) than the males (7.11 ± 1.31 h) but the difference was not significant ($P > 0.05$).

Discussion

Although, there may be inter-individual sleep variation amongst teenagers, their optimum nighttime sleep requirement is 9 h and above.^[14,16] Night time sleep duration <8 h is regarded as insufficient for a teenager,^[15] while period between 8 and 9 h falls within the borderline range.^[14,16] The result of this study is consistent with those of earlier ones, and it showed that within a 7 day cycle, sleep pattern amongst schooling teenagers vary between school days and weekends.^[2,5,14] Our result showed that the night time mean sleep duration at weekends (9.33 ± 2.29 h) was significantly shorter than at weekends (10.09 ± 2.32 h). Overall, sleep duration was adequate for close to half of the students, while it was inadequate and fell within the problematic range for one-tenth of the teenagers.

School schedule (starting and closing time) is a sociocultural factor that influence sleep need of schooling teenagers. In Nigeria, for example, most school start-time in secondary schools is 08.00 h. Therefore, a student who desires to get to school early need to get up from bed not later than 06.30 h to have adequate time for preparation. A teenager that wants to have optimal night time sleep must get to bed before 21.30 h. Any student who gets to bed later

than 22.30 h can only have borderline sleep. In this study, the mean BT was 21.58 ± 2.12 h and mean WUT was 7.02 ± 1.50 h. This connotes that majority of this cross section of Nigerian schooling teenagers have sleep duration well above the problematic range. Noticeable from this report is that the number of students with insufficient sleep decreased significantly at the weekend. This is an indication that the students used their weekend to make up for their sleep deficit, which is consistent with what had been earlier reported.^[2,17] Most secondary schools in Nigeria close between 15.30 and 17.30 h similar to what obtains in Europe and North America. Invariably most secondary school students in Nigeria ought to have sufficient time to carry out given household chores and still be able to do their take home school assignments.^[14,17] However, reports from China and Korea school has it school close time in secondary school could be as late as 20.30 h for students who attend evening classes.^[18,19] This has been adduced to be the reason why sleep insufficiency could be as high as 60% among Asian teenagers.^[14,18,19] Early school start-time will result in early rising if the pupil is to get to school on time while late closing time will no doubt delay BT and invariably reduce time for adequate nighttime sleep.

Another interesting observation in this study is that students' BT varies with their age. The older teen had much later BT and delayed WUT than the younger teens. One plausible reason for this observation is the increased volume of class work and school-take-home assignment that is much for senior students. This could have influenced their BT, WUT and nighttime sleep duration during school days.^[12] There was no significant difference in sleep duration among the three subgroups at weekends when they were free to sleep based on their sleep need. This observation agrees with earlier reports that have demonstrated that optimum sleep need of teenagers is the same regardless of their puberty stage.^[4] One important factor that could have influenced why younger teenagers went to bed early is parental directive. In this study most of the few students that went to bed, based on parental directives where the younger students. Deduction from this observation was that BT is probably determined by parents in the early teens, however as they grow older it becomes self-determined. There are inconsistencies among studies on the influence of gender on sleep pattern among earlier studies. The finding of this study is that gender did not influence sleep habits among this cross section of Nigerian teenagers.

The use of electronic communication gadgets is one extrinsic factor that has been reported to influence sleep among teenagers.^[20,21] A number of students in this study have the habit of making phone calls late at night and also do engage themselves in internet surfing when they were supposed to be in bed and this corroborates finding of earlier

studies.^[22] The advancement in technology and increase availability of electronic communication devices globally have made the use of mobile phones, text messaging, e-mails and social media possible for most teenagers in big towns and modern societies. It also has made it possible for students to be in constant contact with peers after the close of school and even late at nights. The resultant effect is a negative impact on teenagers' sleep parameters and hygiene.^[14] The type of electronic gadgets teenagers used varied by gender; boys tend to be are engaged with computers and internet surfing, and girls use mobile phones more.^[9]

Conclusion

This cross-sectional observatory study has shown that substantial numbers of students have a borderline sleep duration. There is a tendency for these students to have their sleep duration transit into the problematic range if their unhygienic sleep habit is left unchecked. As some of these teenagers already have obvious sleep deficit, which is most marked during school days. Available evidences have associated sleep insufficiency with impaired cognitive function and psychological problem. Therefore, students need proper education on the hazards associated with improper use of electronic and social media and other communication gadgets late and also need to be guided on the need to cultivate good sleep hygiene.

References

1. NIH. Take charge of your health: A guide for teenagers. NIH publication. No 09-4328. 08/2008. Available from: www.win.niddk.nih.gov. [Last accessed on 2014 Jul 18].
2. Moore M, Meltzer LJ. The sleepy teenager: Causes and consequences of sleepiness in teens. *Paediatr Respir Rev* 2008;9:114-21.
3. Carskadon MA. *Teenager Sleep Patterns: Biological, Social and Psychological Influences*. New York: Cambridge University; 2002.
4. Pagel JF, Forister N, Kwiatkowski C. Adolescent sleep disturbance and school performance: The confounding variable of socioeconomic status. *J Clin Sleep Med* 2007;3:19-23.
5. Carskadon MA, Harvey K, Duke P, Anders TF, Litt IF, Dement WC. Pubertal changes in daytime sleepiness 1980. *Sleep* 2002;25:453-60.
6. Arendt J, Skene DJ. Melatonin as a chronobiotic. *Sleep Med Rev* 2005;9:25-39.
7. Reiter RJ. Pineal melatonin: Cell biology of its synthesis and of its physiological interactions. *Endocr Rev* 1991;12:151-80.
8. Carskadon MA, Vieira C, Acebo C. Association between puberty and delayed phase preference. *Sleep* 1993;16:258-62.
9. National Sleep Foundation. *2006 Sleep in America Poll*. Washington, DC: WBA Market Research; 2006.
10. Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. *Child Dev* 1998;69:875-87.
11. Levy D, Gray-Donald K, Leech J, Zvagulis I, Pless IB. Sleep patterns and problems in adolescents. *J Adolesc Health Care* 1986;7:386-9.
12. Alhola P, Polo-Kantola P. Sleep deprivation: Impact on cognitive performance. *Neuropsychiatr Dis Treat* 2007;3:553-67.
13. Kramer M. Sleep loss in resident physicians: The cause of medical errors? *Front Neurol* 2010;1:128.
14. Gradisar M, Gardner G, Dohnt H. Recent worldwide sleep patterns and problems during adolescence: A review and meta-analysis of age, region, and sleep. *Sleep Med* 2011;12:110-8.
15. Carskadon MA, Acebo C, Richardson GS, Tate BA, Seifer R. An approach

- to studying circadian rhythms of adolescent humans. *J Biol Rhythms* 1997;12:278-89.
16. Iglowstein I, Jenni OG, Molinari L, Largo RH. Sleep duration from infancy to adolescence: reference values and generational trends. *Pediatrics* 2003;111:302-7.
 17. Gupta R, Bhatia MS, Chhabra V, Sharma S, Dahiya D, Semalti K, *et al.* Sleep patterns of urban school-going adolescents. *Indian Pediatr* 2008;45:183-9.
 18. Liu X, Liu L, Owens JA, Kaplan DL. Sleep patterns and sleep problems among schoolchildren in the United States and China. *Pediatrics* 2005;115:241-9.
 19. Yang CK, Kim JK, Patel SR, Lee JH. Age-related changes in sleep/wake patterns among Korean teenagers. *Pediatrics* 2005;115:250-6.
 20. Punamäki RL, Wallenius M, Nygård CH, Saarni L, Rimpelä A. Use of information and communication technology (ICT) and perceived health in adolescence: The role of sleeping habits and waking-time tiredness. *J Adolesc* 2007;30:569-85.
 21. Shochat T. Impact of lifestyle and technology developments on sleep. *Nat Sci Sleep* 2012;4:19-31.
 22. Chung KF, Cheung MM. Sleep-wake patterns and sleep disturbance among Hong Kong Chinese adolescents. *Sleep* 2008;31:185-94.

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