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Clinical and sociodemographic factors associated with oral health knowledge, attitude, and practices of adolescents in Nigeria

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Abstract

Objectives: The institution of appropriate oral health promotion programs targeted at adolescents in schools in developing countries requires baseline information on their oral health knowledge, attitude, and practices as well as associated factors influencing it, which are unknown. This study assessed clinical and sociodemographic factors associated with oral health knowledge, attitude, and practices of adolescents in Ibadan, Nigeria.

Methods: Two-thousand and ninety-seven students aged 12–18 years were recruited from 30 randomly selected secondary schools in a cross-sectional study conducted in Ibadan, Nigeria. Data were obtained through a questionnaire on oral health knowledge, attitude, and practices, and sociodemographic characteristics. Oral examination was conducted to assess the clinical oral condition of the adolescents. Data were analyzed with SPSS. The higher the percentage scores, the better the oral health knowledge, attitude, and practices, and overall awareness of oral health.

Results: The oral health knowledge score ranged from 0% to 60%; mean oral health knowledge score was 15.1% (±6.6%). The oral health attitude score ranged from 0% to 91.3%; mean oral health attitude score was 44.5% (±14.3%). The oral health practices score ranged from 0% to 88.9%, and mean oral health practices score was 42.5% (±13.8%). The mean oral health knowledge, attitude, and practices score was 43.8% (±11.4%). A total of 1537 (73.3%) participants had unhealthy periodontium and 98 (4.7%) had dental caries. Students who were 12–15 years (odds ratio = 1.7, 95% confidence interval = 1.4–2.0, $p < 0.001$), females (odds ratio = 1.2, 95% confidence interval = 1.0–1.5, $p = 0.024$), offspring of skilled workers (odds ratio = 1.5, 95% confidence interval = 1.1–2.0, $p = 0.010$), previously educated about oral health (odds ratio = 1.3, 95% confidence interval = 1.0–1.7, $p = 0.023$), consulted the dentist (odds ratio = 1.9, 95% confidence interval = 1.2–3.1, $p = 0.009$), or had unhealthy periodontal condition (odds ratio = 1.2, 95% confidence interval = 1.0–1.5, $p = 0.042$) were more likely to have higher oral health knowledge, attitude, and practices scores or awareness than others.

Conclusion: Better knowledge, attitude, and practices score was associated with younger age group, higher occupational class, previous oral health education, dental consultation, and having unhealthy periodontal condition.

Keywords

Adolescents, awareness, knowledge, knowledge, attitude, and practices, oral health, school

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Introduction

Adolescents in developing countries live with high unmet dental needs, which significantly affect their quality of life.[1–4] The daily activities reported to have been impaired among the domains of oral health-related quality of life include eating, speaking, maintaining social contact, and schoolwork.[1–4] Worrisome is the fact that adolescence is a crucial period in human development, linking childhood to adulthood. As

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such, absenteeism from school as well as impairment of other daily performances, especially as a result of oral diseases, is of great significance. This is because, these unmet dental needs result largely from poor periodontal health and dental caries, which are largely preventable.[5]

Prevention of these common diseases can be addressed through promoting awareness of causes and prevention of common oral diseases.[5,6] One way of achieving this is by promoting oral health among a sizable number of adolescents in the schools.[5,6] However, this has not been the case in many developing countries, as little attention is accorded to school oral health. Furthermore, adolescents are largely absent from the oral health promotion plans in many developing countries. It, therefore, becomes imperative to investigate the level of awareness of oral health as well as associated factors in a bid to accommodate this age group in the planning of oral health promotion in schools. More so, the importance of oral health awareness in maintaining good oral health has been documented.[7]

In addition, inequalities in health and oral health occur globally.[8–11] This coupled with high cost of dental treatment[12] constitutes a stumbling block to access of dental care by adolescents from the lower social classes with unmet dental needs, which is typical of in-school adolescents in the public sector in most developing countries. Thus, the prevention of oral diseases and promotion of oral health among adolescents in schools is very important in developing countries. In the planning process, assessing level of oral health awareness among adolescents and factors associated with it becomes pertinent. This study, therefore, assessed the clinical and non-clinical factors associated with level of oral health awareness of adolescents in a developing country.

Methods

Study design

This cross-sectional study was conducted from April 2018 to July 2018. The study was conducted among students in the senior school classes I and II (Grades 10 and 11) in randomly selected secondary schools in Ibadan. Ibadan is the largest city in West Africa and the capital city of Oyo State, Nigeria. The sample size for the study was calculated with Kish Leslie formula for cross-sectional study.[13] A sample size of 1594 was estimated based on a power of 80%, prevalence rate of knowledge of importance of the teeth among adolescents in schools of 21%[14] and a degree of error of 2%. The result was inflated by 20% to account for non-response or withdrawal from the study at any stage and this resulted in a minimum sample size of 1992 students.

The sampling process of the study was done in three stages. The first two stages involved sampling of schools for the study, while the last stage was the selection of students from the schools. In the first stage, three local government areas (LGAs) within the metropolis of Ibadan were selected from the list of the LGAs in the town using a table of random numbers. The second stage involved selection of 10 schools from each LGA using a table of random numbers. In the process, a total number of 30 schools were selected. The last stage was the selection of 70 students from the class registers of the two classes (senior school classes I and II) in each of the 30 schools using a table of random numbers.

Selection criteria

Only students who returned signed consent forms from parents, who gave assent to participate in the study and were available at the time of the study were included in the study. Students who had special needs or were ill at the time of visit to their schools were excluded from the study.

Data collection tool

Data were collected from the students with the use of structured self-administered questionnaire and by oral examination. The questionnaire was divided into four sections: the first section assessed sociodemographic characteristics of the students; the class, age, occupation of parents, and educational qualification of parents. The age of the students was dichotomized around the mean age for ease of analysis. The occupation of the parents was classified based on a modification of Office of Population Censuses and Surveys (OPCS), which had been used previously in this environment.[15] The higher of the occupational classes for the two parents was recorded for each participant.

The students' oral health knowledge, attitude, and practices (KAP) were assessed using a modification of the questionnaire that had been utilized among the younger age group in this environment.[14] The questionnaire was developed through review of literature. The questionnaire was validated by consulting experts in public health dentistry who discussed the contents of the questions and certified the questions as measuring the oral health KAP of adolescents in addition to being deemed appropriate for the age group. The questionnaire was evaluated by students who were not included in this study and were in grades 10 and 11 of schools in another LGA of the town. In addition, the reliability of questionnaires was assessed during the pretest. Cronbach's alpha value ranged from 0.70 to 0.77 for the reliability of different components of the questionnaire.

The questions on oral health knowledge (OHK) evaluated the participants' knowledge of number of primary/deciduous and secondary/permanent teeth, functions of the teeth and causes of tooth decay and gum diseases. They were asked if they had heard of fluoride and the role of fluoride. The questions also evaluated the attitude of participants toward oral health care on a Likert-type scale: "agree," "strongly agree," "indifferent/don't know," "disagree," and "strongly disagree." For the purpose of re-coding, "disagree" and "strongly

disagree" were collapsed as one variable "disagree" and "agree" and "strongly agree" as another—"agree." The questions that assessed oral health practices (OHP) addressed the frequency and duration of tooth and interdental cleaning, type of toothbrush, frequency of change of toothbrush, use of toothpaste, method of tooth cleaning, and consumption of cariogenic food.

A score of one (1) was given for correct answers and zero (0) for wrong answers on knowledge questions. Likewise, a score of 1 was allotted to positive attitude and 0 to negative ones. Healthy oral practices were scored 1 and risky or unhealthy ones scored 0. Responses to KAP questions were summed up for each respondent and converted to percentages to generate OHK, attitude (OHA), and OHP scores. The conversion to percentages was done to obtain a standard score that would make comparison with other studies easy. The total KAP score was generated by adding the OHK, OHA, and OHP scores together for each student and dividing by three to get an average score. The test–retest reliability of the questionnaire was conducted by re-administration of the questionnaire to 10% of the participants after 1 week. The test–retest reliability was 0.93 for knowledge questions, 0.97 for questions assessing attitude and 0.88 for practice questions as evaluated by Kappa statistics.

Oral examination was conducted by four trained and calibrated dentists. The dentists were trained by a qualified oral epidemiologist based on the guidelines of the World Health Organization.[16] The training was conducted over 2 days and calibration of the examiners performed over 5 days with 2 days interval between training and calibration process. The standardization of the oral examination and scoring for both dental caries and periodontal health was achieved when the intra examiner and inter examiner's variability as evaluated by Cohen Kappa statistics was 0.85 to 0.9. Duplicate examination was also done on 10% of the students by the four dentists during the course of the study and the inter examiner's variability ranged from 0.8 to 0.85. Oral examination was conducted with the participants seated upright on a chair near the window so natural lighting could serve as source of illumination. Privacy was ensured at all times. Oral examination was conducted according to the World Health Organization's basic survey for dental caries and periodontal health.[16] Sterile probes and dental mirrors were used for oral examination. Dental caries was charted as Decayed (D), Missing (M), or Filled Teeth (F). The periodontal health was charted as "0" for healthy periodontium. Periodontal disease (unhealthy periodontium) was charted when gingival bleeding was present for participants aged 12–14 years and/or periodontal pocketing for older students.

Data analysis

Quantitative data obtained was analyzed with SPSS. Numeric variables were summarized using means and standard deviations. For the purpose of analysis, age, OHK, OHA, and OHP were dichotomized around the mean score into "12–15 years" and "16–18 years" for age, "$\leqslant$15 and $>$15" for OHK, "$\leqslant$43 and $>$43" for OHA, "$\leqslant$42 and $>$42" for OHP. In addition, total KAP score was categorized into a binary value around the mean score into "$\leqslant$44% and $>$44%." Occupational class of the participants' parents was dichotomized as "skilled workers" and "others," which included unskilled workers and dependents. Decayed missing filled teeth (DMFT) score was recorded as "DMFT = 0," "DMFT $\geqslant$ 1." Logistic regression was used to evaluate factors associated with OHK, OHA, OHP, and KAP scores. The unadjusted and adjusted odd ratios were presented. The level of statistical significance was set at $p < 0.05$.

Ethical approval for the study was obtained from the Oyo State Ethics Review Board (AD/13/479/743). Permission to conduct the study was obtained from the principal of each school. Each student signed a consent form or gave assent before recruitment into the study. In addition, each of the participants turned in a consent form signed by either of the parents.

Results

A total of 2100 students were approached for the study, of which 2097 (99.9%) consented to participate in the study. There were 1126 (53.7%) males and 971 (46.3%) females. The mean age of the students was 15.3 ($\pm$1.4) years. The majority of their parents, 1809 (86.3%), belonged to the unskilled occupational class. Only 331 (15.9%) had participated in oral health education and 79 (3.8%) had consulted a dentist. A total of 1537 (73.3%) students had unhealthy periodontal condition and 98 (4.7%) had dental caries (Table 1). The number of decayed teeth ranged from 1 to 4. Of the 98 students with carious teeth; 65 (66.3%) had one tooth with carious lesion, 24 (24.5%) had two carious teeth, 5 (5.1%) had 3 carious teeth and 4 (4.1%) students had four carious teeth. None of the students had missing or filled teeth due to caries.

The OHK, OHA, and OHP scores obtained were less than 50% among 2096 (99.9%), 1288 (61.4%), and 1519 (72.4%) students respectively. The OHK score ranged from 0% to 60%; the mean OHK score was 15.1% ($\pm$6.6%). Only 342 (16.3%) had heard of fluoride and 67 (3.2%) knew about the role of fluoride in the prevention of tooth decay. The OHA score ranged from 0% to 91.3%; the mean OHA score was 44.5% ($\pm$14.3)%. The OHP score ranged from 0% to 88.9% and the mean OHP score was 42.5% ($\pm$13.8%). The majority (90.2%) used toothpaste.

Students in the younger age group (12–15 years old), those whose parents were skilled workers and students who had previously received oral health education were more likely to have higher OHK scores (Table 1). The effect of occupational class became insignificant with reduced odds (odds ratio (OR) = 1.3, 95% confidence interval (CI) = 1.0–1.8, p = 0.079) of having higher OHK scores when independent variables were controlled for in the analysis model (Table 1).

Table 1. Logistic regression analysis of association between participants' characteristics and OHK scores.

Variable	Unadjusted		p value	Adjusted		p value
	OR	95% CI		OR	95% CI	
Gender						
Female = 971	1.2	1.0–1.4	0.077	1.1	0.9–1.3	0.418
Male = 1126						
Age (years)						
12–15 = 1285	1.7	1.4–2.1	<0.001*	1.7	1.4–2.0	<0.001*
16–18 = 812						
Parent's occupational class						
Skilled = 200	1.5	1.1–2.0	0.018*	1.3	1.0–1.8	0.079
Others (unskilled and dependents) = 1897						
Previous oral health education						
Yes = 331	1.6	1.3–2.1	<0.001*	1.5	1.2–1.9	0.01*
No = 1766						
Previous dental consultation						
Yes = 79	1.5	0.9–2.4	0.083	1.3	0.8–2.1	0.225
No = 2018						
Periodontal health						
Unhealthy = 1537	1.1	0.9–1.3	0.423	1.1	0.9–1.3	0.435
Healthy = 560						
Dental caries						
DMFT ⩾ 1 = 98	0.8	0.5–1.2	0.365	0.8	0.5–1.2	0.289
DMFT = 0 = 1999						

OHK: oral health knowledge; OR: odds ratio; CI: confidence interval; DMFT: decayed missing filled teeth.
*Statistically significant.

Higher OHA scores were associated with age 12–15 years (OR = 1.5, 95% CI = 1.3–1.8, $p < 0.001$) and having participated in oral health education (OR = 1.4, 95% CI = 1.1–1.8, $p = 0.007$; Table 2).

Female students, those aged 12–15 years, those who had received previous oral health education or seen a dentist in the past, or had unhealthy periodontal condition had higher OHP scores (Table 3). However, the effect of gender was nullified; OR was reduced from 1.3 to 1.2 (OR = 1.2, 95% CI = 1.0–1.4, $p = 0.063$) when independent variables were controlled for in the model (Table 3).

The KAP score ranged from 0% to 77.3% with a mean score of 43.8% (±11.4%); 1377 (65.7%) students had a total KAP score below 50%.

Multivariate analysis showed that age (12–15 years), being a female, offspring of skilled workers, previous oral health education, previous dental consultation, and unhealthy periodontal condition were predictors of higher KAP scores (Table 4).

Discussion

Our findings showed that the adolescents had poor oral health awareness. In addition, there was a high prevalence of periodontal disease but very few students had dental caries. The high prevalence of periodontal disease is expected as poor oral health has been associated with low level of awareness of oral health.[17] However, the level of awareness was not commensurate with the prevalence of dental caries among the participants. The low dental caries experience among the students may be attributed to availability of fluoride-containing toothpaste in the markets in the country.[18] In addition, almost all the study participants reported usage of toothpaste, although many were not aware of the role of fluoride in oral health. On the other hand, it is surprising that none of the students with dental caries sought treatment for their condition. This confirms the low level of awareness among the participants and a need for school oral health promotion with accessible dental health services for adolescents.

To corroborate the above findings, knowledge of the causes of common oral diseases was disappointingly low among the studied adolescents. The performance of the adolescents in this study on questions pertaining to knowledge was poorer than that reported in Sarawak, Malaysia,[19] where the mean knowledge score was 6.22 (62%). It also agrees with previous reports about the poor level of oral health awareness that is a general problem among the Nigerian populace.[14] In addition, lack of formal school oral health education in the country may have contributed to the finding.

Factors associated with higher OHK include female gender, younger age, and previous oral health education. It has been previously reported that females have better OHK than males.[20] In addition, the meticulousness of females and their interest in health issues could be a possible reason for this

Table 2. Logistic regression analysis of association between participants' characteristics and OHA scores.

Variable	Unadjusted		p value	Adjusted		p value
	OR	95% CI		OR	95% CI	
Gender						
Female = 971	1.2	1.0–1.4	0.081	1.1	0.9–1.3	0.291
Male = 1126						
Age (years)						
12–15 = 1285	1.5	1.3–1.8	<0.001*	1.4	1.2–1.7	<0.001*
16–18 = 812						
Parent's occupational class						
Skilled = 200	1.3	1.0–1.7	0.103	1.2	0.9–1.6	0.284
Others (unskilled and dependents) = 1897						
Previous oral health education						
Yes = 331	1.4	1.1–1.8	0.007*	1.3	1.0–1.6	0.036*
No = 1766						
Previous dental consultation						
Yes = 79	1.4	0.9–2.2	0.149	1.3	0.8–2.1	0.274
No = 2018						
Periodontal health						
Unhealthy = 1537	1.2	1.0–1.4	0.105	1.2	1.0–1.4	0.097
Healthy = 560						
Dental caries						
DMFT ⩾ 1 = 98	1.0	0.7–1.5	0.922	1.0	0.7–1.5	0.911
DMFT = 0 = 1999						

OHA: oral health attitude; OR: odds ratio; CI: confidence interval; DMFT: decayed missing filled teeth.
*Statistically significant.

Table 3. Logistic regression analysis of association between participants' characteristics and OHP scores.

Variable	Unadjusted		p value	Adjusted		p value
	OR	95% CI		OR	95% CI	
Gender						
Female = 971	1.3	1.1–1.5	0.007*	1.2	1.0–1.4	0.063
Male = 1126						
Age (years)						
12–15 = 1285	1.7	1.5–2.1	<0.001*	1.7	1.4–2.0	<0.001*
16–18 = 812						
Parent's occupational class						
Skilled = 200	1.4	1.0–1.8	0.053	1.2	0.9–1.6	0.246
Others (unskilled and dependents) = 1897						
Previous oral health education						
Yes = 331	1.5	1.1–1.9	0.003*	1.3	1.0–1.6	0.061
No = 1766						
Previous dental consultation						
Yes = 79	6.0	2.8–12.5	<0.001*	6.0	2.8–12.5	<0.001*
No = 2018						
Periodontal health						
Unhealthy = 1537	1.3	1.1–1.6	0.013*	1.3	1.1–1.6	0.011*
Healthy = 560						
Dental caries						
DMFT ⩾ 1 = 98	1.0	0.6–1.5	0.902	1.0	0.6–1.5	0.911
DMFT = 0 = 1999						

OHP: oral health practices; OR: odds ratio; CI: confidence interval; DMFT: decayed missing filled teeth.
*Statistically significant.

Table 4. Logistic regression analysis of association between mean oral KAP score and participants' characteristics (with KAP score as dependent variable and >44% as reference).

	Unadjusted		p value	Adjusted		p value
	OR	95% CI		OR	95% CI	
Age (years)						
12–15	1.8	1.5–2.14	<0.001*	1.7	1.4–2.0	<0.001*
16–18						
Gender						
Female	1.3	1.1–1.6	0.002*	1.2	1.0–1.5	0.024*
Male						
Occupational class						
Skilled	1.7	1.2–2.2	0.001*	1.5	1.1–2.0	0.010*
Others						
Previous oral health education						
Yes	1.5	1.2–1.5	0.001*	1.3	1.0–1.7	0.023*
No						
Previous dental consultation						
Yes	2.1	1.3–3.3	0.003*	1.9	1.2–3.1	0.009*
No						
Periodontal health						
Unhealthy	1.2	1.0–1.5	0.043*	1.2	1.0–1.5	0.042*
Healthy						
Dental caries						
DMFT ⩾ 1	1.0	0.7–1.5	0.958	1.0	0.7–1.5	0.944
DMFT = 0						

KAP: knowledge, attitude and practices; OR: odds ratio; CI: confidence interval; DMFT: decayed missing filled teeth.
*Statistically significant.

finding.[21,22] The younger age group had better knowledge than older ones. This could be related to upsurge in inquisitiveness of early adolescents who are still learning about themselves.[23] The contribution of previous oral health education to knowledge is not surprising as oral health education provides information with an overall aim of knowledge gain.[24]

In the same vein, better OHA was noticed among younger students and those who had participated in oral health education but not with gender. Young adolescence is a stage of development where attention is shifted to body and facial appearance for peer acceptance hence, better attitude.[23] The role of oral health education in changing attitude cannot be overemphasized.[24] Thus, confirming a need for school oral health education in this population. It is of importance that oral health educational intervention in schools should harness incentives for older adolescents to encourage their participation in such programs. This is to achieve the set aim of knowledge gain and positive attitude toward oral health for all the students in the school. Importantly, particular attention should be paid to male students for them to generate interest in gaining OHK. This is necessary as they have been reported to have less interest in health issues compared to females.[22]

Higher OHP scores were also associated with younger age group. This is in agreement with previous studies.[25] In addition, OHP was associated with previous dental consultation. In fact, dental consultation was the only factor that was able to increase the odds of practices up to six folds. This highlights the role of dentists in the promotion of oral health among their patients. Conversely, dental consultation had minimal influence on OHK and OHA. This dissociation may be attributable to the fact that dentists are more concerned with teaching skills or oral health care practices when patients consult them. This may be further explained by the short time spent with each patient, as there is overwhelming shortage of dentists in the country.[26] This brings to the fore front the need for dentists to consider imparting knowledge of causes of common oral diseases to patients. Unhealthy periodontal condition was an important influence on the OHP of the adolescents. This is surprising, as the reverse should be the case where good practices should correspond to better oral health.[27–29] In addition, unhealthy periodontium was the only clinical finding associated with overall oral health awareness. There are mixed reports on this relationship in the literature.[30] While some authors reported improved gingival health with increased oral health awareness through oral health education,[27–29] insignificant associations between the two had also been reported.[31] The differences between the associations reported in the various studies may be attributed to variation in the sources of awareness, which in the aforementioned studies were interventions. The case for this study, however, could be attributed to illness behavior.[32] This is so, as symptoms from poor

periodontal health drives the affected individual to seek oral health information/remedy and possibly changes in practices to cure or improve the oral condition.

Overall, total KAP scores were significantly associated with age, parents' occupational class, and previous dental consultation. The 12- to 15-year-old students, females, those whose parents were skilled workers, those previously educated about their oral health and who had consulted the dentists had higher KAP scores. It is evident that instituting oral health intervention should take into cognizance the need for oral health education to improve the OHK and skills of students. The skill impaction was obviously deficient in the oral health education in which the students had participated, as it had no significant influence on their OHP. In addition, it is important to provide dental services in schools where dentists and other trained personnel will play prominent roles in educating the students. Furthermore, oral health promotion interventions should bear in mind incentives for students based on the sociodemographic factors identified from this study during the planning, implementation, monitoring, and evaluation phases of such programs.

This study also presented with some limitations. The cross-sectional design has a limit of revealing causal relationships; however, the study provided insights into factors associated with oral health KAP needed for a baseline data. Another limitation was that the use of questionnaires could be associated with over-reporting of positive attitudes and good practices and underreporting of negative attitudes and poor practices. The study was conducted among public school students alone. This may affect generalizability of findings to private schools in the country. However, this was done as school oral health programs will be initiated in public schools as their attendees suffer more often from preventable oral diseases of significant concern in low- and middle-income countries (LMICs).

This study has provided evidence for the need to institute formal oral health promotion programs for adolescents in the country. Efforts to reduce inequalities should be made and one feasible option is the school oral health program; where sizable number of adolescents can be reached. The intervention should look at the psychosocial and behavioral models suitable for the context based on sociodemographic findings as noted in this study. Incorporating dental health services as part of the health program will also go a long way in reducing the unmet dental needs that exist presently.

Further studies are needed to understand the perspectives of adolescents on how the factors identified in this study may influence oral health awareness among them. This will together serve as a template for adequate planning of appropriate oral health promotion programs.

Conclusion

Oral health awareness was poor among the in-school adolescents. There was a high prevalence of periodontal diseases and very few had dental caries. Better knowledge of oral health was observed among the younger age group, offspring of skilled workers, and those who had been educated about their oral health. Students educated about their oral health and aged 12–15 years had better attitude toward oral health. The younger students or those who had consulted the dentists or with unhealthy periodontal condition were more likely to have higher OHP scores. Overall, with the combination of the scores (KAP); higher scores were more likely among younger students, females, those from higher occupational class, those who had consulted the dentists or participated in oral health education and had unhealthy periodontal condition.

Authors' Note

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Declaration of conflicting interests

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Ethical approval

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Informed consent

A written consent was obtained from the parents of each student to conform with the State Schools' Board policy, which mandated that consent be obtained from parents before the student participates in the study regardless of the age of the student. In addition, assent was also obtained from the students before recruitment into the study.

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Supplemental material

Supplemental material for this article is available online.

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