

Role of school as supportive entity for positive oral health behaviour of adolescents in south-western Nigeria

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Abstract

Background

The school is primed as an avenue for promoting health among adolescents. Conversely, the high unmet dental needs among school-going adolescents raises concern about the role of schools in this task. This study therefore assessed the role of schools in promoting positive oral health behaviour among adolescents through Capabilities, Opportunities, Motivation (COM-B) model in a Low-Income-Country.

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 on Capabilities; Oral Health Knowledge (K), Attitude (A), Practices (P) and Motivation of the students as well as oral health promotional (OHP) activities (Opportunities) in the schools were assessed through a questionnaire. A checklist was used to assess availability of OHP materials and the schools' tuck shops for sale of healthy food (Opportunities). Data were analyzed with STATA version 14.

Results

The mean KAP score was 43.8 (\pm 11.4)%. Oral health education was the only activity reported and this was in 8 (26.7%) schools; only 331 (15.8%) students had been educated about their oral health. There were no oral health promotional materials in the schools. About half 1161 (55.4%) were motivated to participate in school oral health program. All the tucks shops had cariogenic foods and drinks for sale. Students who had better KAP scores - Capabilities (OR = 1.2, 95%CI = 1.0-1.5, p = 0.018) or had been educated about oral health - Opportunities (OR = 1.5, 95%CI = 1.2-2.0, p < 0.001) were better motivated about their oral health.

Conclusion

The schools surveyed played very little or no role to support positive oral health behavior of adolescents. There were no OHP materials in the schools. Students who had superior oral health KAP (capabilities) or had been exposed to oral health education (opportunities) were better motivated about their oral health.

Background

Adolescence is the transition stage between childhood and adulthood. It is a crucial period when the foundations of healthy behavior that linger into adulthood are formed. The school is one of the important avenues for promoting such healthy behavior among a sizeable number of adolescents [1]. Globally, school health program has gained popularity in promoting health among children and adolescents [2]. It has been utilized to address various health issues and promote health awareness with positive results on behavior change among other health outcomes [3–7]. Despite, the positive influence that the school has on general health, there is very little documentation of the role schools play in promoting oral health

among adolescents globally. This is important in view of the prevalent poor oral hygiene and periodontal diseases among adolescents in many countries [8–12]. This is in spite of the positive effects of oral health education interventions that had been evaluated in schools [13–17]. In addition, many adolescents live with high unmet dental needs, which significantly impact on their quality of life [18]. As such, it is necessary to investigate the role of the school as an entity for oral health promotion among adolescents. Furthermore, understanding and analyzing the factors that could influence behavior, which are peculiar to the oral health of adolescents in schools, based on the Capabilities, Opportunities and Motivation (COM-B) model [19, 20] is imperative. The COM-B model has been used in implementation science to monitor and evaluate interventions [19, 20]. The model has been adopted to evaluate behavior change because it aids assessment of factors necessary for positive behavior change to occur [19–22]. Evaluating the factors that could serve as determinants of oral health will assist in identifying the behavioral target and inform interventions [19–21, 23, 24]. In addition, it will provide information on existing oral health promotion activities and the strengths or deficiencies of such programs in schools. These will serve as baseline information that will guide oral health promotion interventions among adolescents. More so, there is overwhelming evidence of need for school based oral health promotion programs in low income countries [25]. This study therefore assessed the role of schools in supporting positive oral health behavior among adolescents in a low-income country.

Methods

Study design

This cross-sectional study was conducted among senior secondary school 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. There are major tertiary educational and health institutions within the city. The institutions serve as important centers where oral health promotion is organized among adolescents and the general populace. One of the tertiary institutions has an upcoming unit; the school oral health subunit, which used to be part of the oral health promotion unit. The school oral health subunit has a goal of reaching out to children, adolescents, teachers and their families. Part of the initial efforts of the subunit is acquisition of baseline information on existing oral health promotion in schools.

Sample size determination

Sample size was calculated using sample size formula for observational studies [26] at a power of 80%, prevalence rate of 18.3% of participation of secondary schools in an audit from a previous study [27] and degree of error of 2%. This was inflated by a non-response rate of 30% and resulted in a minimum sample size of 2052 students.

Sampling

The schools included in this study were selected through simple random sampling method in three stages. The first stage involved selection of three Local Government Areas within the metropolis of Ibadan using a table of random numbers. The second stage involved selection of 10 schools from each Local Government Area using a table of random numbers. This resulted in the selection of a total number of 30 schools from the list of schools within the metropolis of Ibadan. Seventy students were selected 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, 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. A checklist was used to assess the school environment for oral health promotional activities and materials. The questionnaire assessed sociodemographic characteristics of the students; the class, age, occupation of parents and educational qualification of parents. 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 [28, 29]. The higher of the occupational classes for the two parents was recorded for each participant.

Measures

Information on the components of the COM-B model was used to analyze factors associated with the students' behavior [21, 23, 24]. The model describes the interaction between capabilities, opportunities and motivation and how these influence behavior [21]. Capabilities of the schools in promoting oral health was assessed objectively with the assumption that this will have impacted on the students. Thus, the students' capabilities (physical/psychological) were assessed using questions evaluating their oral health knowledge, attitude and practices (KAP). The questions had been utilized among the younger age group in this environment [25]. The knowledge questions assessed the number of primary and secondary teeth, functions of the teeth and causes of tooth decay and gum diseases. Questions also assessed attitude towards oral health care. The questions that assessed oral health practices addressed the frequency and duration of tooth and interdental cleaning, method of tooth cleaning and utilization of dental services. 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 knowledge, attitude and practice questions were summed up for each respondent and converted to percentages to generate oral health knowledge (OHK), attitude (OHA) and practice (OHP) scores. 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.

Opportunities (physical/social) were assessed based on the availability of oral health promotional activities in the school. A checklist was used to assess oral health promotional materials available in the school. The checklist was a ten-item tool that was used to assess: the presence or absence of oral health posters, electronic boards displaying oral health information and bill boards. There was a column to record other oral health information display tools. In addition, the checklist assessed the presence or absence of tuck shops within the school or outside the school but within the reach of the students. The items on sale at tuck shops such as fruits, water, sugar containing drinks or cariogenic foods were also checked as being present or not.

Motivation (reflective/automatic) was assessed by the respondent's value of oral health as being important or not and "perceived benefit from school oral health education programme", which was described as "positive", "negative" or being "indifferent".

Data analysis

Quantitative data obtained was analyzed with SPSS. Independent student t test was used to summarize numeric variables: OHK, OHA, OHP and oral health KAP scores. For the purpose of analysis, total KAP score was categorized into a binary value around the mean score into $\leq 44\%$ and $> 44\%$. Chi-square statistics was used to test for associations between categorical variables such as recoded KAP scores and sociodemographic characteristics of the students. Logistic regression was used to evaluate predictors of higher KAP scores. The level of statistical significance was set at $p < 0.05$.

Ethical consideration

Ethical approval for the study was obtained from the State Ethics Review Board. Permission to conduct the study was obtained from the principal of each school. 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. All participants were given the right to withdraw from the study at any point in time.

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 ± 1.4 years. The majority of their parents, 1809 (86.3%), belonged to the unskilled occupational class (Table 1).

Table 1
Association between participants' characteristics and mean OHK scores

Variable	Mean (SD)	Mean difference	95% CI	t statistic	p value
Gender					
Female = 971	15.6 (6.6)	0.8	0.2–1.4	2.760	0.006*
Male = 1126	14.8 (6.6)				
Age (years)					
12–15 = 1285	15.8 (6.7)	1.8	1.2–2.4	6.064	< 0.001*
16–18 = 812	14.0 (6.3)				
Parent's occupational class					
Skilled = 200	16.3 (6.6)	1.3	0.4–2.2	2.686	0.007*
Others (unskilled and dependents) = 1897	15.0 (6.6)				
Previous oral health education					
Yes = 331	16.8 (6.7)	2.0	1.3–2.8	5.197	< 0.001*
No = 1766	14.8 (6.6)				
Previous dental consultation					
Yes = 79	16.3 (4.9)	1.2	0.3–2.4	1.594	0.111
No = 2018	15.1 (6.7)				
CI – Confidence Interval; *Statistically significant					

Capabilities

Less than 50% Oral Health Knowledge (OHK), Attitude (OHA) and Practice (OHP) scores were recorded among 2096 (99.9%), 1288 (61.4%) and 1519 (72.4%) students respectively. The oral health knowledge (OHK) score ranged from 0 to 60%; the mean OHK score was 15.1 (\pm 6.6)%. The oral health attitude (OHA) score ranged from 0 to 91.3%; the mean OHA score was 44.5 (\pm 14.3)%. The oral health practice (OHP) score ranged from 0 to 88.9% and the mean OHP score was 42.5 (\pm 13.8)%. Females, 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 had higher mean OHK scores (Table 1).

Table 2
Association between participants' characteristics and mean OHA scores

Variable	Mean (SD)	Mean difference	95% CI	t statistic	p value
Gender					
Female = 971	44.9 (14.0)	0.8	0.4–2.0	1.293	0.196
Male = 1126	44.1 (14.5)				
Age (years)					
12–15 = 1285	45.9 (13.6)	3.7	2.4–4.9	5.715	< 0.001*
16–18 = 812	42.2 (15.1)				
Parent's occupational class					
Skilled = 200	46.7 (13.6)	2.4	0.3–4.5	2.268	0.023*
Others (unskilled and dependents) = 1897	44.2 (14.4)				
Previous oral health education					
Yes = 331	48.0 (13.0)	4.2	2.6–5.9	4.984	< 0.001*
No = 1766	43.8 (13.7)				
Previous dental consultation					
Yes = 79	46.8 (13.9)	2.4	0.8–5.6	1.462	0.144
No = 2018	44.4 (14.3)				
CI – Confidence Interval; *Statistically significant					

Higher OHA scores were associated with age 12 to 15 years, parents being skilled workers and previous oral health education (Table 2). Female students, those aged 12 to 15 years, those whose parents were skilled workers or who had received previous oral health education or seen a dentist in the past had higher mean OHP scores (Table 3).

Table 3
Association between participants' characteristics and mean OHP scores

Variable	Mean (SD)	Mean difference	95% CI	t statistic	p value
Gender					
Female = 971	43.5 (14.2)	1.9	0.7–3.0	3.113	0.002*
Male = 1126	41.6 (13.4)				
Age (years)					
12–15 = 1285	44 (13.5)	4.1	2.9–5.3	6.689	< 0.001*
16–18 = 812	40 (13.8)				
Parent's occupational class					
Skilled = 200	44.4 (14.6)	2.2	0.2–4.2	2.149	0.032*
Others (unskilled and dependents) = 1897	42.2(13.7)				
Previous oral health education					
Yes = 331	45.4 (13.9)	3.5	1.9–5.1	4.230	< 0.001*
No = 1766	41.9 (13.7)				
Previous dental consultation					
Yes = 79	56.1 (14.7)	14.2	11.2–17.2	9.149	< 0.001*
No = 2018	41.9 (13.5)				
CI – Confidence Interval; *Statistically significant					

The Oral Health Knowledge, Attitude and Practice (KAP) score ranged from 0 to 77.3% with a mean score of 43.8 (\pm 11.4)%; 1377 (65.7%) students had a total KAP score below 50%. Bivariate analysis of the sociodemographic factors and categories of total KAP scores about the mean class score (\leq 44% and $>$ 44%) showed that age group, occupational class of parents, previous oral health education and dental consultation were significantly associated with KAP scores (Table 4).

Table 4
Bivariate analysis of association between oral KAP score and participants' characteristics

Characteristics	Mean Oral KAP score (%)		χ^2	P value
	< 44	\geq 44		
Age (years)				
12–15	543 (42.3)	742 (57.7)	44.904	< 0.001*
16–18	465 (57.3)	347 (42.7)		
Gender				
Female	436 (44.9)	535 (55.1)	7.264	0.007*
Male	572 (50.8)	554 (49.2)		
Occupational class				
Skilled	74 (37.0)	126 (63.0)	13.522	0.001*
Unskilled	880 (48.8)	923 (51.2)		
Dependent	54 (57.4)	40 (42.6)		
Previous oral health education				
Yes	129 (39.0)	202 (61.0)	13.027	< 0.001*
No	879 (49.8)	887 (50.2)		
Previous dental consultation				
Yes	23 (29.1)	56 (70.9)	11.815	< 0.001*
No	985 (48.8)	1033 (51.2)		

*Statistically significant, χ^2 - Chi square statistics

Multiple logistic regression showed that age (12–15 years), parental occupational class, previous oral health education and previous dental consultation were significant predictors of higher KAP scores among the students (Table 5).

Table 5
Multivariate logistic regression analysis of association between mean oral KAP score and participants' characteristics (with KAP score as dependent variable and > 44% as reference)

Variable	Category	OR	95% CI	p value
Age (years)				
	12–15	1.7	1.4–2.1	< 0.001*
	16–18	1.0		
Gender				
	Female	1.2	1.0–1.4	0.065
	Male	1.0		
Occupational class				
	Skilled	2.1	1.3–3.4	0.005*
	Unskilled	1.4	0.9–2.2	0.105
	Dependent	1.0		
Previous oral health education				
	Yes	1.4	1.1–1.8	0.011*
	No	1.0		
Previous dental consultation				
	Yes	2.1	1.3–3.5	0.004*
	No	1.0		

OR – Odds Ratio; CI – Confidence Interval; *Statistically significant

Opportunities

There was no oral health promotional material in any of the schools. The only oral health promotional activity documented was oral health education, which had been conducted in 8 (26.7%) schools; only 331

(15.8%) students had been educated about their oral health. Teachers 202 (61.0%), dentists 128 (38.7%) and a nurse 1 (0.3%) were the educators. Previous oral health education was associated with better OHK, OHA and OHP scores (Tables 1, 2 and 3). It was also a significant predictor of KAP scores being higher than 44% (Table 5). All the schools had tuck shops within the school premises; all had cariogenic foods and drinks, water and fruits for sale.

Motivation

About half 1161 (55.4%) of the respondents were motivated and will participate in an oral health promotion programme, 128 (6.1%) had negative views/were not interested, and 808 (38.5%) were indifferent.

Many 1628 (77.7%) agreed or strongly agreed that caring for the teeth makes them healthy and contributes to their general health. A total of 779 (37.1%) students indicated that cariogenic foods should be restricted from the school's tuck shops.

Association between capabilities, opportunities and motivation

Bivariate analysis showed that a higher proportion of students with total KAP score > 44% i.e. above the class mean KAP score (better capabilities) were more exposed to opportunities (been educated about their oral health) than those with KAP score ≤ 44%. (61.0% vs 39.0%, $X^2 = 13.027$, $p < 0.001$). Students who were more motivated (positive views about school oral health programs) had higher capabilities than those who were not motivated (those who had negative views or were indifferent) (60.1% vs 39.9%, $X^2 = 6.227$, $p = 0.013$).

Multivariate analysis showed that having total KAP score higher than class mean score (capability scores) and previous oral health education (opportunity) were significant predictors of being positively motivated (Table 6). Students with higher total KAP scores (i.e. > 44%, the class mean score) were nearly six times (OR = 5.6, 95%CI = 4.2–7.4, $p < 0.001$) more likely to agree that caring for the teeth makes one healthy and more likely to agree that tuck shops in schools should be restricted from sales of cariogenic foods (OR = 1.3, 95%CI = 1.1–1.6, $p = 0.002$) than those with lower capabilities (≤ 44% KAP scores).

Variable	Category	OR	95% CI	p value
KAP score	>44%	1.2	1.0 – 1.5	0.018*
	≤44%	1.0		
Previous oral health education	Yes	1.5	1.2 – 2.0	< 0.001*
	No	1.0		

*Statistically significant

Table 6

Multivariate logistic regression analysis of association between capability, Opportunities and variable assessing motivation (with motivation variable as dependent variable and lack of motivation as reference)

Students who had been educated about their oral health (opportunity) had higher odds (OR = 1.9, 95%CI = 1.3–2.8, $p = 0.001$) of indicating that caring for the teeth prevents oral diseases and makes one healthy or agreeing to restriction of sales of cariogenic food in the tuck shops in schools (OR = 1.9, 95%CI = 1.4–2.4, $p < 0.001$) than those who had not been educated about their oral health.

Discussion

The present study assessed the roles of the schools in supporting positive oral health behavior among adolescents in selected secondary schools in a metropolis in Nigeria using the COM-B model. Our findings showed that more than half of the students had low oral health capabilities as the total mean KAP scores for the study participants was below 50%. In fact, knowledge of the causes of common oral diseases was disappointingly low with a mean score of 15.1%. This finding is similar to what had been documented previously on the poor level of awareness about oral health among students in Nigeria [25]. It also corroborates previous reports about the low level of oral health awareness that is a general problem among the Nigerian populace [30]. Higher knowledge scores than that noted in this study had been reported [31]. The variations in the knowledge scores reported in the studies may be ascribed to the level of awareness of respondents at different study sites. Oral health knowledge score of study participants varied according to age group, gender, parental occupational class and previous oral health education. Similar trend of association of OHA and OHP scores with parental occupational class, age as well as previous health education were also noted in this study. In the same vein, total KAP scores (capabilities) was significantly associated with age, parents occupational class and previous dental consultation. The 12–15 year old students, those whose parents were skilled workers, females and those who had consulted the dentists had higher KAP scores or better capabilities. The influence of occupational class and its relationship with better oral health knowledge, attitude and practices have been documented [22]. That females have better oral health knowledge, attitude and practices than males may be attributed to the fact that females tend to be more meticulous with their health, as had been reported by others [25, 32]. The 12-15-year-old respondents had better capabilities than those in the older age group. The early stage of adolescence, which may be associated with more self-consciousness and inquisitiveness compared to the older age group may be a contributing factor. In addition, OHP was associated with previous dental consultation, which was not the case with OHK and OHA. In fact, dental consultation was the only factor that was able to raise the OHP scores above 50. This highlights the role of dentists in 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 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 [33]. As such, to reduce patient waiting time, dentists may resort to educating patients with the most appropriate skills required to improve their oral health. This brings to the fore front the need for dentists to consider imparting knowledge of causes of common oral diseases on patients. The role of dental consultation on oral health knowledge, attitude and practices is a major factor that has been reported by a previous study [25]. These findings are thus suggestive of a need for school dental health services, which is a component of health promoting school that is pertinent in this environment. Shortage of dentists in the country and in other LMICs may pose an obstacle to accomplishing this recommendation in the nearest future. Overall, it is evident that instituting any oral health intervention should take into cognizance the need for oral health education to improve the oral health knowledge of

students. In addition, providing dental services in schools where dentists and other trained personnel will play prominent roles in educating the students is important.

Opportunities for healthy behavior in the schools was almost nonexistent, as the only promotional activity in the schools was oral health education. It is also noteworthy that less than 50% of the schools had benefitted from such programs. Furthermore, none of the schools had oral health promotional materials in place for the students to learn from or serve as a reminder on daily basis. This may have contributed to the poor capabilities noted among the students with very low knowledge scores. Consistency is important in instilling knowledge for positive attitude and behavior change [14]. Written communication has also been found helpful in behavior change [20]. The need for oral health promotional materials such as posters among others will have to be looked into for prospects and success of an oral health promotion intervention. Furthermore, production of oral health education materials on a large scale for all schools to improve awareness as well as provide an atmosphere where opportunities for good oral health behavior can be developed and sustained may be encouraging to the students. All the tuck shops in the schools had fruits and cariogenic food on their shelves. Although the availability of fruits is a positive effort, this is countered by the continuous supply of cariogenic food. Policies from the school may also go a long way in restricting its sale and thus limiting the negative influence that its availability may have on the students' behavior.

About half of the students were motivated and agreed that they can benefit from school oral health program, likewise many believed that caring for the teeth will promote oral health and general health. On the other hand, the majority did not want restriction of sales of cariogenic diet in the school's tuck shops. In view of the above, motivation of the students towards positive oral health behavior is questionable. More so, the actual step to reduce cariogenic food consumption is grossly deficient among them. Encouraging and pleasantly, those who were motivated to accept restriction of cariogenic food from the schools' tuck shops had higher capabilities and opportunities. In general, higher oral health capabilities were associated with availability of opportunities for behavior change at schools and resulting motivation of the students. Availability of oral health promoting opportunities in schools will go a long way in impacting the students' behavior positively and a higher likelihood of being motivated for a positive behavior change. However, in the schools that were studied, low level of oral health awareness, inadequate oral health promotional activities, lack of OHP materials existed and the students were averagely motivated about their oral health.

The study has a limitation: that it was conducted among public school students only. 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 LMICs.

Conclusion

The schools surveyed played very little or no role to support positive oral health behavior of adolescents. There were no OHP materials in the schools. Students who had superior oral health KAP (capabilities) or had been exposed to oral health education (opportunities) were better motivated about their oral health.

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the Ethics Review Board of the Ministry of Health, Oyo State of Nigeria (AD 13/479/743). Permission to conduct the study was obtained from the principal of each school. A written consent was obtained from the parents of each student. Assent was also obtained from the students before recruitment into the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

FBL conceptualized the study, wrote the proposal for the study, designed the study instrument, coordinated data collection and analysis and wrote the first draft of the manuscript. GAO contributed to the study proposal, the design of the study instrument and parts of the manuscript. Both authors read and approved the final version of the manuscript.

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List Of Abbreviations

CI – Confidence interval

COM-B – Capabilities, Opportunities, Motivation model for Behavioral change

KAP – Knowledge, Attitude and Practices

LMIC – Low and middle income countries

OHA – Oral health attitude

OHK – Oral health knowledge

OHP – Oral health practice

OR – Odds ratio

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