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*Corresponding author: Eniola Olubukola Cadmus, University of Ibadan, Nigeria
E-mail: eniylacadmus@gmail.com

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Rahman Shiri, Finnish Institute of Occupational Health, Finland

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The effect of smokeless tobacco use and exposure to cigarette promotions on smoking intention among youths in Ghana

Eniola Olubukola Cadmus^{1*} and Olalekan A. Ayo-Yusuf²

Abstract: Although controversial, smokeless tobacco use has been implicated as a gateway for smoking. Furthermore, most existing studies did not explore the potential of smokeless tobacco use as a proxy for receptivity to cigarette advertisement rather than an independent predictor of smoking. This study sought to determine the independent effect of smokeless tobacco use, as well as exposure and receptivity to cigarette advertisements on smoking intention among Ghanaian youths. Secondary data obtained from Ghanaian adolescents who participated in the Global Youth Tobacco Surveys conducted during 2006 and 2009 were analyzed using Stata version 13. Data analysis was restricted to current non-smokers and included descriptive and inferential statistics. Intention to smoke for both survey years was associated with: smokeless tobacco use, (OR = 3.74: 95% CI = 2.63–5.32), limited exposure to anti-smoking media messages, (OR = 1.70: 95% CI = 1.09–2.65), being offered cigarettes by tobacco representatives (OR = 2.19: 95% CI = 1.42–3.37) and reporting having both parents (OR = 4.42; 95% CI = 1.84–10.59) or a lot of friends (OR = 3.03: 95% CI = 1.87–4.89) who were smokers.

ABOUT THE AUTHOR

Eniola Olubukola Cadmus has a background in Public Health with training in Health Promotion and Tobacco control. She is a member of the Nigeria Tobacco Control Research Group (NTRCG). Domiciled in the College of Medicine, University of Ibadan, the NTRCG carries out academic, policy and advocacy initiatives to mitigate the scourge of tobacco use and ensure meaningful tobacco control in Nigeria. The group is involved in policy development, advocacy and research in the field of tobacco control and was instrumental to the passage of the Nigeria Tobacco Control Bill into law in 2015. Research reported in this paper relates to wider issues and activities of the Tobacco Industry targeted at encouraging initiation and sustained use of tobacco among the youth in low resource settings. Information thereby obtained will be highly relevant and provide necessary information to inform policy and targeted programmes for tobacco control among in school adolescents.

PUBLIC INTEREST STATEMENT

Tobacco use is one of the major preventable causes of death globally and it is initiated early in adolescence. Recent restrictions and bans on public smoking has led to the marketing of smokeless tobacco as an acceptable, affordable and safer alternative to smoking with increased prevalence of its use. Furthermore, advertising and other promotional activities by tobacco companies have been shown to influence the initiation and continued use of tobacco among adolescents. There are however, conflicting evidence with regard the effect of the use of smokeless tobacco and smoking intention in the future. Most of the studies conducted in this regard, have been in high-income countries and did not control for the influence of exposure of youths to cigarette marketing. Therefore, this study sought to establish the impact of exposure to cigarette advertisements on smokeless tobacco users and its effect on smoking intention among youths in Ghana.

Smokeless tobacco use and exposure to tobacco industry's promotional activities independently influenced smoking intentions among youths in Ghana. Therefore, complete ban of all forms of tobacco products promotional activities needs to be intensified.

Subjects: Behavioral Sciences; Health & Society; Public Health Policy and Practice; Primary Health Care & Family Practice

Keywords: smoke intention; smokeless tobacco use; tobacco advertisement and promotion (TAPS); Ghana; GYTS

1. Introduction

Tobacco use is one of the major preventable causes of death in the world. It is projected that by the year 2030, the number of annual deaths resulting from tobacco use will be around 10 million, most of which will occur in developing countries (World Health Organization [WHO], 2017). Tobacco use includes cigarette smoking and the use of smokeless tobacco, which may be sucked, chewed or snuffed and is usually initiated and established early in adolescence (U.S. Dept of health and Human Services, 2012). Studies have shown that tobacco use initiation may start as early as the age of 10 years and more than 80% of adult smokers were reported to have started smoking before the age of 18 years. Research has also shown that a younger age at tobacco use initiation is a strong predictor of prolonged use.

Among the estimated 186 million adolescents aged between 13 and 15 years currently in schools globally, 34.8 million are using some form of tobacco product, and 25.8 million are smoking cigarettes (The Global Youth Tobacco Survey Collaborative Group, 2002). Factors which contribute toward initiation of tobacco use include: male gender, low socio-economic status, low levels of education and ethnicity (Rudatsikira, Muula, & Siziya, 2010; Substance Abuse and Mental Health Services Administration Office of Applied Studies, 2009; U.S. Dept of health and Human Services [HHS], 2012). In addition, having a parent, sibling or close friend who uses some form of tobacco may reinforce the habit (Rudatsikira et al., 2010). Furthermore, the availability of different types of tobacco products, the tobacco control policies and strategies in place, as well as advertisements and promotional activities by the tobacco industry play a huge role in propagating the epidemic of tobacco use (WHO, 2003).

In recent times, due to restrictive measures on cigarettes and smoking, smokeless tobacco has been marketed more intensively, and the prevalence of its use has increased globally (Morrison, Krugman, & Park, 2008). Some studies have revealed a relatively high prevalence of smokeless tobacco use in Congo-Brazzaville (18%), India (16.1%) and South Africa (12.1%), and lower levels in Tanzania (5.7–9.5%) (Kaduri, Kitua, Mbatia, Kitua, & Mbwambo, 2008; Muttappallymyalil, Sreedharan, & Divakaran, 2010; Reddy et al., 2010; Rudatsikira et al., 2010). However, increased prevalence of smokeless tobacco has been linked to the erroneous perception that its use is associated with fewer negative health consequences than smoking (Rudatsikira et al., 2010). In addition, smokeless tobacco is usually cheaper than cigarettes. This price advantage has been suggested to have contributed to the increased use of smokeless tobacco products among adolescents in many low- and middle-income countries (Rantao & Ayo-Yusuf, 2012).

Research suggest that there is a possibility that smokeless tobacco use may serve as a gateway in encouraging progression to smoking (Haddock et al., 2001; Rudatsikira et al., 2010; Tomar, 2003). Conversely, some studies have concluded that this gateway effect does not exist and that smokeless tobacco use does not necessarily lead to cigarette smoking in the future (Bates et al., 2003; O'Connor, Kozlowski, Flaherty, & Edwards, 2005). Furthermore, advertising helps to “normalize” tobacco use by creating appealing images and suggesting that the product being used is prevalent, desirable and safe (American Psychological Association [APA], 2012; Morrison et al., 2008). Research conducted by the American Psychological Association (APA) suggests that youths are particularly susceptible to

advertisements which make the use of a product seem normal (APA, 2012). Thus, exposure of children and adolescents to tobacco advertisements may lead to the development of positive attitudes, beliefs and expectations about both the marketing and use of the products (National Cancer Institute, 2008). In addition, being receptive to tobacco promotions by virtue of owning or being willing to use a tobacco promotional item, or having a favorite tobacco advertisement, has been shown to increase susceptibility to tobacco use (Choi, Gilpin, Farkas, & Pierce, 2001; National Cancer Institute, 2008).

Most of the existing studies on the determinants of smoking have been carried out in developed countries. In addition, available research also from high income countries suggest that smokeless tobacco use and smoking may be influenced by the level of exposure to cigarette advertisements. However, there is limited evidence about the influence of cigarettes advertisement on uptake of smoking among youths in many LMIC including Ghana.

Ghana is the 12th most populous nation in West Africa with an estimated population of about 22 million people (Ghana Statistical Service, 2010). Ghana is among the 176 countries that have signed the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) treaty for the global control of tobacco and has implemented the recommended guidelines (Owusu-Dabo, McNeill, Lewis, Gilmore, & Britton, 2010). General estimates from the school-based Global Youth Tobacco survey (GYTS) have shown a decreased uptake in the use of all forms of tobacco including smokeless tobacco. (Wellington, Gyapong, Twum-Barima, Aikins, & Britton, 2011), In 2000, the prevalence of smoking among students in Ghana was 14.6% but has progressively declined to 11.5% in 2006 and 8.9% in 2009 (Wellington, 2006; Wellington, 2009; Wellington et al., 2011). The use of other forms of tobacco apart from cigarettes was at a level of 12.5% in 2006 and 10.6% in 2009 (Wellington et al., 2011).

In Ghana, based on the WHO FCTC recommendations, there is local and national ban on direct tobacco advertising on various media outlets such as television, radio and print outlets including magazines and newspapers (Owusu-Dabo et al., 2010; WHO, 2009). However, as at the time of this publication, there was no ban on direct tobacco advertising on international outlets including the internet. Furthermore, there was no ban on tobacco promotion or sponsorship in the country. Nevertheless, there has been documented increase in tobacco advertising promotion and sponsorship (TAPS) activities along the years in the country (WHO, 2009). For instance, previous GYTS have revealed changes in exposure between 2000 and 2009. In 2000, over half (52.7%) of students aged between 13 and 15 years old were reported to have been exposed to TAPS activities (WHO, 2009). These estimates were sustained in 2006 while definite increase was reported in 2009. (WHO, 2009). Likewise, possession of tobacco branded items were reported to have been about 16.3 % in 2000, decreased to 12.5% in 2006 and increased to 15.4% in 2009. There are however no established causes for the observed changes (WHO, 2009).

Considering that most of the existing studies on the determinants of susceptibility to smoking have been carried out in developed countries and that the association between smokeless tobacco and smoking may be moderated by the level of exposure to cigarette advertisement, this study sought to determine the independent effect of the use of smokeless tobacco and exposure to cigarette advertisements on smoking intention among non-smoking youths in Ghana during 2006 and 2009.

2. Materials and methods

2.1. Participants and procedure

This study utilized a cross-sectional analytical design and involved analysis of secondary data from the 2006 and 2009 GYTS in Ghana. The initial data collection employed a two-stage cluster sample design to produce representative data for Ghana. In the first stage, schools were selected with a probability of inclusion proportional to their enrolment size. At the second stage, classes were randomly selected and all students in selected classes were eligible to participate. Ethical approval was obtained from the Research Ethics Committee of the University of Pretoria, Pretoria, South Africa (Protocol #:S190/2012).

2.2. Instruments

The data for the study were obtained from two GYTS conducted in Ghana during 2006 and 2009. The GYTS from 2000 was excluded because it did not include information on the use of smokeless tobacco. The Ghana GYTS included data on the prevalence of cigarette and other tobacco products use. In addition, the survey also provided information on potential determinants of tobacco use namely, access to tobacco products as well as its availability. Other determinants include the information on price of the product, exposure to second-hand tobacco smoke (SHS), smoking cessation behaviors, exposure to media advertising and promotional activities, and schools' anti-tobacco curricula (Centers for Disease Control and Prevention [CDC] and World Health Organization [WHO], 2006).

2.3. Measures

2.3.1. Dependent variable

Smoking Intentions: The main outcome measure was the intention to smoke cigarettes in the next 12 months. Participants were asked: "At any time during the next 12 months, do you think you will smoke a cigarette?" Following the approach used in similar prior studies (Arora et al., 2012; Choi et al., 2001), a response of either "definitely yes" or "probably yes" was considered as an intention to smoke.

2.3.2. Independent variables

Respondents who reported they had not smoked in the past 30 days were categorized as non-smokers, and were the focus of the current study. Other independent variables included socio-demographic characteristics of the respondents such as age, gender, previous history of smoking as well as the smoking status of parents and friends of the respondents. Furthermore, information on respondent's attitude toward smokers, current use of smokeless tobacco and exposure to anti-smoking messages were also obtained. Lastly, exposure to cigarette promotion and advertisement and receptivity to pro-tobacco advertising. Exposure to cigarette promotion was measured by asking about the frequency of seeing actors smoke cigarette on television, cigarette advertisements at events, on billboards, in magazines and seeing cigarette brand names. Exposure to indirect pro-tobacco advertising was measured by asking the questions: "Has a cigarette representative ever offered you a free cigarette?" and "Do you have something (t-shirt, pen, backpack, etc.) with a cigarette brand logo on it?" Other information obtained included previous history of smoking, exposure to anti-smoking messages in the media and at events, attitude toward smokers, parents' smoking status and friends' smoking status.

2.4. Data analysis

Data analysis was carried out using Stata Version 13. Appropriate weighting was done to account for selection probabilities and effect of the cluster sample design used in the GYTS. Group differences were tested using chi-square statistics for categorical variables. Multi-variable adjusted logistic regression was carried out using the backward deletion approach. All tests were two-tailed and statistical significance was set at $p < 0.05$.

3. Results

Demographic characteristics of participants in 2006 and 2009 did not differ significantly (Table 1). Of all the non-smoking participants, most of the respondents were males (66.7%) and between 14 and 16 years of age (48.7%). Also, 3.4% of non-smoking participants reported they had intention of smoking in the next 12 months and 21.1% reported using smokeless tobacco. As shown in Table 2, a greater proportion of students who were 13 years and younger were using smokeless tobacco (25.9%) and were most likely to have reported smoking intention (4.4%) in the next 12 months.

Exposure to cigarette advertisements and promotion on television, billboards, magazines and at events were significantly associated with smokeless tobacco use and smoking intention in the next 12 months (Table 3). Although exposure to anti-smoking media campaigns did not have a

Table 1. Socio-demographic characteristics, tobacco use and smoke intention of all the respondents by survey year

Characteristic		2006 n (%)	2009 n (%)	p-Value
Sex				0.22
	Male	4896 (54.6)	4195 (53.0)	
	Female	4662 (45.4)	3846 (46.9)	
Age (in years)				0.28
	≤13	3337 (35.6)	3241 (38.9)	
	14–16	5047 (55.4)	3921 (52.0)	
	≥17	934 (9.0)	745 (9.1)	
Smokeless tobacco use				0.18
	Yes	2291 (23.1)	2085 (25.6)	
	No	6772 (76.9)	5687 (74.4)	
Current smokers				0.51
	Yes	457 (3.8)	303 (4.4)	
	No	7961 (96.2)	6864 (95.6)	
Smoke intention				0.70
	Yes	8809 (97.4)	7369 (96.6)	
	No	239 (2.6)	324 (3.4)	

significant effect on smokeless tobacco use, respondents who were exposed to anti-smoking media campaigns were less likely to have smoke intentions in the next 12 months (Table 3). Receptivity to cigarette advertisements by virtue of ownership of a branded item or accepting the offer of free cigarettes by tobacco representatives were significantly associated with smokeless tobacco use as well as intention to smoke in the future (Table 3).

The final multi-variable adjusted model showed that smokeless tobacco users were more likely to express intentions to smoke when compared to non-users (OR = 3.74; 95% CI: 2.63–5.32). Other factors associated with intention to smoke include having at least the mother (OR = 4.00; 95% CI: 1.12–13.20) or both parents who were smokers (OR = 4.42; 95% CI: 1.84–10.59) as compared to having none of the parents smoking. Having a few friends (OR = 1.92; 95% CI: 1.41–2.60) or most friends as smokers (OR = 3.03; 95% CI = 1.87–4.89) was also associated with intention to smoke compared to having no friends who smoke. Furthermore, reported attitude toward seeing girls who smoke displayed a protective relationship with smoking intention. Respondents who viewed girls who smoke as being unattractive were significantly less likely to have smoking intention compared to those who thought smoking among girls was attractive (OR=0.45; 95% CI: 0.28–0.72). Also, being offered free cigarettes by a tobacco representative (OR = 2.19 95% CI = 1.42–3.37) affected smoke intention among these youths (Table 4). There was no significant interaction between cigarette advertisement and smokeless tobacco use ($p = 0.92$). However, there was a significant interaction between cigarette advertisement and the year of survey ($p = 0.01$). As such, subsequent multivariate analysis stratified by year of survey (Table 5), showed that the independent effects of current smokeless tobacco use and of peer and parental influences on smoking intention remained significant in both survey years. However, the influence of exposure to tobacco adverts at events, promotion activities in the media and exposure to class teachings of harmful tobacco effects were all only significant in year 2009 and not in 2006 (Table 5). Surprisingly, exposure to less cigarette advertisement and promotion were associated with higher intention to smoke which is unexpected.

Table 2. Bivariate relationship between socio-behavioral factors, smokeless tobacco use and smoking intention among non-smoking adolescents

Characteristics		Smokeless tobacco use n (%)	p-Value	Smoking intention n (%)	p-Value	
Socio-demographic factors	Age (years)		<0.001		0.01	
		≤13	1522 (25.9)		279 (4.4)	
		14–16	1415 (17.2)		214 (2.4)	
		≥17	426 (18.5)		52 (3.2)	
	Class			0.01		0.39
		JSS1	1608 (24.0)		251 (3.3)	
		JSS2	1195 (20.1)		184 (3.5)	
		JSS3	573 (20.4)		118 (2.7)	
	Sex			0.09		0.26
		Male	2183 (19.7)		277 (2.8)	
		Female	1230 (21.6)		286 (3.8)	
	Parents smoke			<0.001		<0.001
		None	2185 (17.8)		288 (2.2)	
	Both	248 (64.4)		113 (22.3)		
	Father only	896 (36.4)		120 (7.0)		
	Mother only	50 (37.3)		33 (26.1)		
Friends smoke			<0.001		<0.001	
	None	2273 (16.4)		251 (1.8)		
	Some	642 (33.5)		158 (6.2)		
	Most/All	458 (49.6)		140 (17.1)		

4. Discussion

Studies have shown that about 50% of first-time smokers will get hooked and become regular smokers. There are many reasons shown to influence an individual's decision to experiment and graduate to habitual tobacco use. These reasons include exposure to tobacco advertising, promotion and sponsorship activities as well as use of other gateway substances such as smokeless tobacco. This study demonstrates that current use of smokeless tobacco was significantly associated with the intention to smoke within the next year. This study also suggests that the influence of tobacco advertisements and promotions have become more significant correlates of smoking intentions in recent years. The observed association between smokeless tobacco use and an expression of a desire to initiate smoking corroborates findings from other studies which suggested that smokeless tobacco use may serve as a gateway to cigarette smoking, in other words, might encourage progression from non-smoking to smoking (Haddock et al., 2001; Rudatsikira et al., 2010; Tomar, 2003). A likely explanation for the association in this study may be the fact that respondents who reported smokeless tobacco use were also those more likely to have a lot of friends who smoke, which in turn was associated with a greater likelihood of expressing the intention of smoking.

Research has shown that the provision of a conducive and supportive social environment for smoking, for example, at home and among peers, makes smoking acceptable and affects youths' intention to smoke (Komersuor & Kofi, 2012). Similar to other studies (Agaku, Akinyele, & Omaduvie, 2012; Doku, Raisamo, & Wiumet, 2012; Epstein, Williams, Botvin, Diaz, & Ifill-Williams, 1999; Rantao & Ayo-Yusuf, 2012), this study revealed that respondents who had friends

Table 3. Bivariate relationship between exposure to cigarette promotional activities, smokeless tobacco use and smoking intention among non-smoking adolescents

Characteristics			Smokeless tobacco use n (%)	p-Value	Smoking intention n (%)	p-Value
Exposure to cigarette promotion						
	Frequency of seeing actors smoke on television			<0.001		0.01
		Never	1850 (25.8)		333 (4.4)	
		Sometimes	804 (16.8)		181 (2.8)	
		A lot	737 (17.9)		181 (2.6)	
	Frequency of seeing adverts on billboards			0.05		<0.001
		Never	1127 (15.6)		224 (2.5)	
		A few	1409 (27.7)		269 (5.2)	
		A lot	817 (23.3)		190 (4.0)	
	Cigarette adverts in magazines			0.04		<0.001
		None	1674 (16.3)		280 (2.2)	
		A few	829 (25.5)		207 (4.6)	
		A lot	819 (24.5)		189 (4.4)	
	Cigarette adverts at events			<0.001		<0.001
		Never	1965 (18.7)		336 (2.4)	
		Sometimes	575 (22.6)		213 (5.1)	
		A lot	816 (24.7)		140 (5.1)	
	Frequency of seeing cigarette brand names			0.35		0.49
		Never	1732 (20.1)		240 (2.9)	
		Sometimes	739 (19.3)		130 (3.4)	
		A lot	891 (22.0)		180 (3.8)	
Exposure to anti-smoking media messages						
	In the media			0.07		0.01
		None	1113 (19.3)		244 (3.4)	
		A few	892 (25.6)		176 (4.7)	
		A lot	1334 (19.1)		257 (2.6)	
	At events			0.20		<0.001
		Never	2076 (19.4)		311 (2.5)	
		Sometimes	610 (21.7)		230 (5.1)	
		A lot	674 (22.3)		149 (3.8)	

(Continued)

Table3. (Continued)

Characteristics			Smokeless tobacco use n (%)	p-Value	Smoking intention n (%)	p-Value
Receptivity to cigarette advertisements						
	Items with cigarette brand logo			<0.001		<0.001
		Yes	1188 (40.9)		288 (8.0)	
		No	2082 (15.9)		358 (2.2)	
Offered cigarette by a representative				<0.001		<0.001
		Yes	1023 (42.3)		303 (9.5)	
		No	2284 (16.3)		357 (3.1)	

and at least one parent who smoked were more likely to express the intention to smoke cigarettes in the future. Furthermore, as has been observed in other studies, (Andrews, Netemeyer, Burton, Moberg, & Christiansen, 2004; Wakefield et al., 2004) a previous history of smoking experimentation was associated with future smoke intentions.

Outcome expectancy toward smoking has been shown to play a pivotal role in the intention to smoke (Komersuor & Kofi, 2012). According to the theory of planned behavior, individuals tend to display behavior based on their beliefs about the outcomes and the evaluation of these outcomes (Ajzen, 1991). In our study, respondents who were of the opinion that girls who smoke look more attractive were more likely to have the intention to smoke in the future. Similar findings have been documented among adolescents in Nigeria (Agaku et al., 2012). Also, the respondents' level of receptivity to tobacco promotional activities has been shown to be associated with their attitude toward smoking and the eventual intention to smoke. The fact that experimentation was associated with smoking intention, taken together with the fact that receipt of free cigarettes offered by industry representatives was also significantly associated with a greater intention to smoke highlights the need for a comprehensive ban on the promotion of all forms of tobacco products as intended by Article 13 of the WHO FCTC (WHO, 2003), and the current Tobacco Control Act in Ghana (Owusu-Dabo et al., 2010). It is pertinent that other studies in the region have also revealed that the provision of free cigarette samples to young people contributes to the increased prevalence of smoking (Astrom and Ogwell, 2004; Maassen, Kremers, Mudde, & Joof, 2004).

Studies have shown the benefits of exposure to information about the harmful effects of tobacco on reducing tobacco use (Doku et al., 2012; Siegel & Biener, 2000). As expected, in our study, exposure to anti-smoking media messages was seen as a protective factor against the intention to smoke in the future. In terms of the positive benefits of the inclusion of tobacco control issues in the school curriculum, as identified in a similar study (Flay, 2009), our study also revealed that respondents who could recall having classes about the harmful effects of tobacco use were less likely to intend to smoke in the future.

There are, however, notable differences between predictors of the intention to smoke in the two survey years. In 2009, the effect of exposure to tobacco advertisements was highly visible. This may be a result of a change in tactics by the tobacco industry in advertising products since the ratification of the FCTC in the Ghana in 2005. It may also be that, due to restrictive measures that might have been occasioned by the African Tobacco Situational Analysis project in 2007 (Wellington et al., 2011),

Table 4. Final logistic regression model of factors associated with smoking intention

Variable		Odds ratio (95% CI)	p- value
Smokeless tobacco use			<0.001
	No	1 (reference)	
	Yes	3.74 (2.63–5.32)	
Parents' smoking			
	None	1 (reference)	
	Both	4.42 (1.84–10.59)	<0.001
	Father only	2.81 (1.50–5.23)	<0.001
	Mother only	4.00 (1.21–13.20)	0.02
Friends' smoking			
	None	1 (reference)	
	Some	1.92 (1.41–2.60)	<0.001
	Most/All	3.03 (1.87–4.89)	<0.001
Attitude toward girls' smoking			
	More attractive	1 (reference)	
	Less attractive	0.45 (0.28–0.72)	<0.001
	No difference	0.74 (0.48–1.11)	0.14
Anti-smoking media messages			
	A lot	1 (reference)	
	A few	1.70 (1.09–2.65)	0.02
	None	1.53 (1.05–2.21)	0.03
Offered cigarettes by a tobacco representative			
	No	1 (reference)	
	Yes	2.19 (1.42–3.37)	<0.001
Previous history of smoking			
	No	1 (reference)	
	Yes	1.93 (1.30–2.85)	<0.001
Class taught			
	Yes	1 (reference)	
	No	1.14 (0.81–1.60)	0.43
	Not sure	2.09 (1.34–3.26)	<0.001

the tobacco industry moved the promotion of products to media and social events. It is conceivable that those exposed a lot to cigarette advertisements in media and social events are also more likely to be exposed to anti-smoking messages in the same media and social events. These reasons may also explain the unexpected finding whereby exposure to less cigarette advertisement and promotion were associated with higher intention to smoke.

This study has some limitations. First, the results rely on self-reports of smokeless tobacco use and smoke intention, without validation. However, self-reporting of tobacco use has been shown to be a valid measure of smoking status (Bremberg et al., 2005). Second, the cross-sectional design of the study may allow inferences, but cannot establish causality. Another limitation of this study is its focus on in-school adolescents. Hence findings of the study may only be generalized among

Table 5. Multivariate logistic regression stratified by survey year

Variable	2006		2009	
	Odds ratio (95% CI)	p-Value	Odds ratio (95% CI)	p-Value
Smokeless tobacco use				
No	1 (reference)		1 (reference)	
Yes	2.71 (1.44–5.09)	<0.001	4.11 (2.83–5.95)	<0.001
Parents' smoking				
None	1 (reference)		1 (reference)	
Both	2.60 (0.86–7.81)	0.09	3.69 (2.01–6.78)	<0.001
Father only	5.03 (2.12–11.90)	<0.001	2.10 (1.19–3.73)	0.01
Mother only	6.50 (1.71–24.73)	0.01	5.05 (1.79–14.20)	<0.001
Friends' smoking				
None	1 (reference)		1 (reference)	
Some	3.15 (2.06–4.84)	<0.001	1.53 (1.01–2.34)	0.05
Most/All	4.84 (2.57–9.12)	<0.001	3.76 (2.54–5.57)	<0.001
Offered cigarettes by a tobacco representative				
Yes	2.01 (1.27–3.18)	<0.001	2.11 (1.37–3.24)	<0.001
No	1 (reference)		1 (reference)	
Previous history of smoking				
Yes	3.06 (1.63–5.73)	<0.001		
No	1 (reference)			
Attitude toward girls who smoke				
More attractive			1 (reference)	
Less attractive			0.37 (0.24–0.59)	<0.001
No difference			0.77 (0.46–1.30)	0.31
Exposure to cigarette advertisements at events				
A lot			1 (reference)	
Sometimes			2.17 (1.37–3.45)	<0.001
Never			2.25 (1.49–3.43)	<0.001
Exposure to cigarette promotional activities in the media				
A lot			1 (reference)	
A few			1.9 (1.00–3.364)	0.05
None			2.37 (1.61–3.49)	<0.001
Class taught				
Yes			1 (reference)	
No			0.98 (0.66–1.46)	0.93
Not sure			2.02 (1.29–3.15)	<0.001

similar population to the exclusion of out of school youths. There is therefore a need for future research among youths who are not in schools in Ghana as the behavior of the two subsets may be different especially in terms of the use of all forms of tobacco including smokeless tobacco and future smoking practices.

The study has shown that smokeless tobacco use and exposure to cigarette advertisements and other promotional activities independently increase the odds of the intention to smoke among secondary school youths in Ghana. Therefore, efforts to limit all forms of smoking experimentation among youths should be a priority in the prevention of smoking initiation. In particular, policies targeted toward implementing and enforcing total bans on all forms of cigarette promotional activities in Ghana should be intensified.

5. Implications for school health

Little is known of the association between smokeless tobacco use and smoking uptake in low- and middle-income countries. This study adds to existing evidence in support of the gateway effect of smokeless tobacco use on initiation of cigarette smoking among youths in a low-income country. In addition, exposure to both cigarette promotional activities and anti-smoking messages in the media and social events were seen to have independent effects on smoke intention. In order to keep smoking initiation and prevalence low among youths in Ghana, there should be increased focus on prevention of access to smokeless tobacco and the intensification of anti-smoking media messages, as well as the continued inclusion of tobacco control issues in the school curriculum.

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Competing interests

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Author details

Eniola Olubukola Cadmus¹

E-mail: eniyolacadmus@gmail.com

Olalekan A. Ayo-Yusuf²

E-mail: lekanay@gmail.com

ORCID ID: <http://orcid.org/0000-0003-0689-7018>

¹ Department of Community Medicine, University of Ibadan, Oyo, Nigeria.

² Africa Center for Tobacco Industry Monitoring and Policy Research, Sefako Makgatho Health Sciences University, Medunsa, Pretoria, South Africa.

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