

## Association between Parental Smoking Status and Smoking Initiation among Children in the Gambia: Global Youth Tobacco Survey (GYTS)

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### Abstract

Tobacco use is one of the leading causes of morbidities and mortalities that result from noncommunicable diseases globally. It is therefore imperative to understand the determinants of tobacco use initiation among children at different ages in order to come up with the most effective prevention strategies. This study examined the relationship between age (early, middle and late adolescence) at smoking initiation and parental smoking and other covariates. A total analytic sample of 1,301 participants between ages 11 and 17 from the cross-sectional Gambian Global Youth Tobacco Survey (GYTS) of 2017 were included in this study. We conducted descriptive analyses for each potential predictor variable by each of the categories of the outcome variable (early, middle and late adolescence smoking initiation). Since the outcome variable is not binary, we conducted multinomial logistic regression to identify the factors associated with initiation. While parents' smoking was not significantly associated with any age cohort at smoking initiation, close friends' smoking was strongly associated with smoking initiation at all the 3 stages of adolescence - 0.84 (95%CI: 0.28-1.39); 0.77 (95%CI: 0.05-1.49); and 1.69 (95%CI: 1.69-2.71) at early, middle and late adolescence, respectively). While other people smoking at home was only associated with smoking initiation at early adolescence (0.79 [95%CI: 0.30-1.29]), perceived harm from smoking was statistically associated with smoking initiation at only middle and late adolescence (0.64 [95%CI: 0.17-1.12] and 1.01 [95%CI: 0.33-1.68], respectively). Thus, it is of paramount importance that programs and policies targeting the prevention of smoking initiation among adolescents are tailored to what works best for each of the 3 age categories (early, middle and late adolescence).

**Keywords:** Adolescents, Age, Gambia, Initiation, Smoking.

### Introduction

Currently, cardiovascular and other non-communicable diseases account for most morbidities and mortalities around the world. It has for long been established that tobacco use is one of the major risk factors of such outcomes,

resulting in the deaths of close to 8 million people in 2019 alone [1]. Notwithstanding the existence of empirical evidence that there is a decline in the global prevalence of people who actively smoke currently, population increase has put the estimated absolute number of

smokers at over 1 billion people [2]. Unless there are swift and deliberate strategies targeted at drastic tobacco use reduction, it is estimated that the prevalence of smoking will continue to be high, especially in low- and middle-income countries (LMICs) [3].

From 1990 to date, there is a documented 75% increase (68% for The Gambia) in the number of people who smoke in Sub-Saharan Africa, a significant proportion of whom are young people who, more often than not, continue using tobacco in adulthood [2-5]. A study conducted in Senegal and The Gambia found a 1.6 times higher prevalence of smoking among young people in the Gambia compared with Senegal after adjusting for age [2]. A nationwide survey of students between ages 12 and 20 years in The Gambia found a 16.7% prevalence of current smokers [6]. As in most of the developing countries, young males (19.3%) are significantly more likely than their female counterparts (0.65%) ( $p < 0.001$ ) to initiate and continue to use tobacco in The Gambia [2,7,8]. It is thus imperative for cessation programs to mostly target male adolescents.

Smoking initiation is the act of starting to smoke cigarettes. Several studies have established that most adults who smoke started smoking at an early age or during adolescence and continued with the practice into adulthood [1,9]. Not much is known about age-disaggregated determinants of tobacco use initiation [10]. In fact, in a recent systematic review of 59 similar longitudinal studies on smoking initiation, which identified 98 different risk factors of initiation, only 2 studies investigated predictors by age [11]. A prospective cohort study by Mahabee-Gittens et al. [12] examined the effect of peer smoking and family-related factors on smoking initiation by 7 cohorts of never smokers. It found that while peer smoking had a positive and consistent relationship with smoking initiation at each age between 12 and 17 years, the protective effect of parental control wasn't

consistent across the various adolescent ages. This phenomenon is quite plausible in humans due to the various hormonal, physical and social transformations that occur during puberty and the different stages of adolescence [10]. Thus, the need for tailor-made interventions informed by empirical findings on what is effective in preventing smoking initiation for each age cohort cannot be overemphasized.

In The Gambia and other Sub-Saharan African countries, most studies that examined the possible predictors of smoking initiation among young people did not go into the distinct effects of such predictors on the various adolescent ages. For instance, while the study by Maasen et al. [13] examined the effects of social cognitive influences and cigarette sampling on smoking initiation, Addo et al. [14] explored the interplay of various factors on adolescent smoking behaviours in The Gambia and found age, sex, smoking by significant others and a few other covariates to be associated with adolescent smoking initiation. However, both studies fell short of examining the relationship between predictors of adolescent smoking initiation by the different adolescent age groups.

Owing to the paucity of empirical evidence on the distinct influence of established risk factors of smoking initiation by the main age groupings of adolescence – early adolescence (by the age of 13), middle adolescence (by the age of 15) and late adolescence (by the age of 17) [10] – our objective is to determine whether the influence of parental smoking status on adolescent smoking initiation differs across the various age groups of adolescence. Since it is established that each of the aforementioned age groups have distinct mental and psychosocial needs and capacities [15], it follows that tobacco use cessation interventions might need to be tailored to specific age groups to yield maximum impact.

## **Materials and Methods**

### **Ethical Considerations**

The current study used secondary data from The Gambian Global Youth Tobacco Survey (GYTS) conducted in 2017. The said data is publicly available and as such no ethical approval was required to obtain it. As a precondition to conducting such studies in The Gambia, the primary study obtained ethical clearance from the relevant authorities prior to the conduct of the survey.

### **Limitations of the Study**

Lower statistical power, resulting from the apparent reluctance of participants to admit to or answer questions regarding whether they have ever tried smoking during adolescence (1,301), may have resulted in not finding a statistically significant relationship between age at smoking initiation and parental smoking status [29]. This high non-response rate is not surprising due to the conservative nature of The Gambian society [30], where tobacco use is considered a wayward behaviour. Moreover, since participation in this study was restricted to school-going adolescents and those who initiated smoking during adolescent years, caution should be exercised in attempts to generalize findings to the general population.

### **Study Design**

We conducted secondary analyses of the Gambia Global Youth Tobacco Survey data which was a cross-sectional study. The GYTS is a widely recognized international research consortium that includes governments of host countries, WHO and US-CDC. The survey was school-based and it aimed at establishing the magnitude and intricacies of adolescent smoking practices and to assess the impact of smoking cessation and/or prevention programs. In The Gambia, the Ministry of Health provided the necessary oversight supervision, coordination and leadership for the conduct of the GYTS in 2017.

The study was a nationally representative cross-sectional, school-based study of the smoking behaviour of Gambian children between ages 11 and 17 years. While the school response rate was 100% (145/145), the individual interviewee response rate was about 87% [4]. A standard core questionnaire, as in other countries, was used to obtain data from respondents on a number of tobaccos use related variables. A detailed description of the methodology of The Gambian GTYS has been published in elsewhere [16].

### **Study Variables**

The main variables of interest in this study were: age at smoking initiation and parental smoking status. While age at smoking initiation was the dependent variable, parental smoking status was the main independent variable. Age at smoking initiation was categorized into 3 - early adolescence (includes ages 10 to 13), middle adolescence (includes ages 14 and 15) and late adolescence (includes ages 16 and older) – and was assessed with the question: ‘How old were you when you first tried a cigarette?’ with answer options ‘I have never tried smoking a cigarette’, ‘7 years old or younger’, ‘8 or 9 years old’, ‘10 or 11 years old’, ‘12 or 13 years old’, ‘14 or 15 years old’, and ‘16 years old or older’. Those who self-reported to have started smoking prior to their tenth year of life were excluded because that is out of the age bracket of adolescence as defined in this study.

The main predictor variable considered in this study was parental smoking status defined as whether one or both parents of a child smoked. It was assessed with the question: ‘Do your parents smoke tobacco?’ with response options such as ‘none’, ‘both’, ‘father only’, ‘mother only’, and ‘don’t know’. Covariates such as free tobacco product offer, frequency of teacher(s) smoking on school premises, sex, close friend’s smoking status and age of respondent were also considered. The prevalence of smoking initiation along the 3

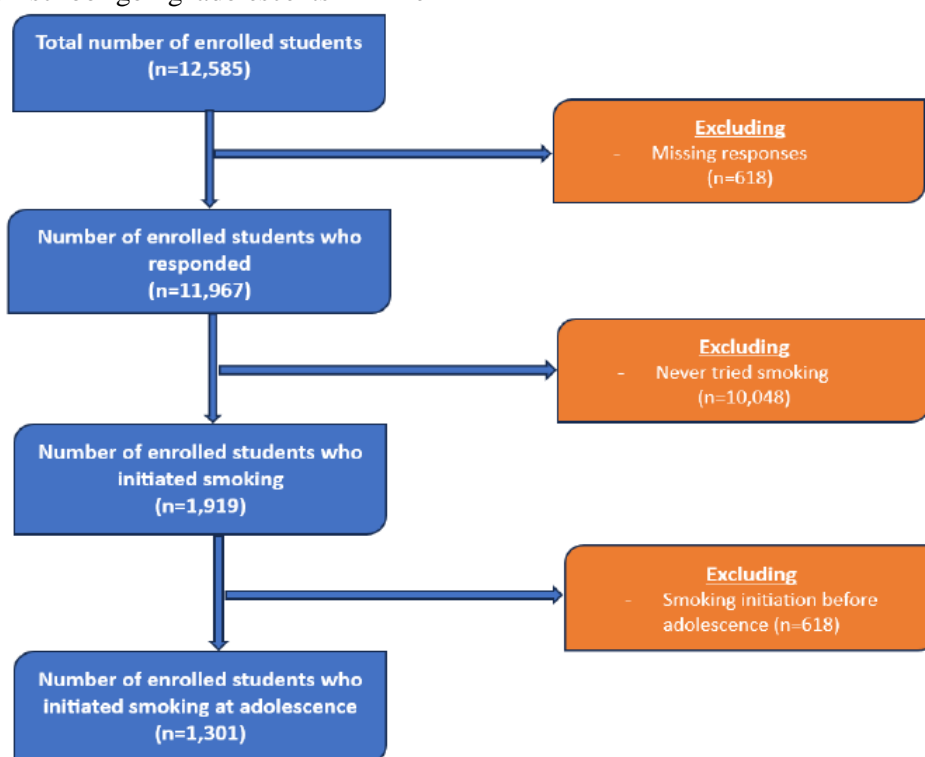
adolescent age groups by parents' smoking status, sex, smoking at home, offer of free tobacco products, perceived harm from smoking, close friend's smoking status and age of respondent was also estimated. This culminated in the establishment of the degree of association between the two variables by conducting multivariate logistic regression analyses. Other variables that were included in the multivariable model are participants' perception of harm associated with smoking, sex, offer of free tobacco products, smoking at home, close friend's smoking status and age of respondent.

### Study Population, Sample Selection and Inclusion and Exclusion Criteria

The current study analysed data obtained from a primary GYTS conducted in The Gambia in 2017 (accessed on Friday, 24 May 2024, 9:06:26 am, but authors did not have access to information that could identify individual participants during or after data collection). This was a school-based survey that investigated the smoking behaviour and exposure of school-going adolescents in The

Gambia. Respondents were children between ages 11 and 17 years. A multistage sampling strategy that used enrolment size as the main criterion to recruit individual schools into the study was applied. Upon the selection of schools, the next stage was the random selection of classes within the selected schools which was followed by the selection of individual adolescent participants with every prospective participant having had an equal chance of being selected. Eventually, a total of 12,585 students between ages 11 and 17 years were recruited for the cross-sectional study [17].

To be eligible for inclusion in the analytic sample for the current study, a student must have at least experimented with cigarette smoking during adolescence. Participants who did not meet any of the precedent inclusion criteria were excluded from the analyses. This resulted in the inclusion of only 1,301 adolescents between ages 11 and 17 for analyses in this study. Figure 1 is a flow chart showing the steps taken to arrive at the sample size for the current study.



**Figure 1.** Flowchart of participant selection (Global Youth Tobacco Survey (GYTS) 2017)

## Data Collection

The questionnaire used to obtain data for the study was structured and self-administered and required approximately 30-40 minutes to complete. In a bid to reduce non-response and under-reporting to the barest minimum, participants' responses were all anonymous and the answer sheets were computer scannable. It took a duration of 6-8 weeks to complete the field work.

## Data Management and Analytic Strategy

STATA (version 12) was used to conduct all the statistical analyses. Descriptive analyses were performed for each potential predictor variable by each of the categories of the outcome variable (early, middle and late adolescence smoking initiation). Rates were reported as percentages with their corresponding 95% confidence intervals. Moreover, univariate and multivariate associations between each independent variable and each outcome (early, middle and late adolescence cigarette smoking initiation) were assessed. Since the outcome variable is not binary, but instead has 3 possible responses, we used multinomial logistic regression models at both the univariate and multivariate levels. We considered P-values that are more than 0.05 or confidence intervals that embraced the 'null' to be statistically insignificant.

In order to adjust for the effects of potential confounders, demographic and other baseline

variables were included in the regression model. We were also cognisant of the collinearity of certain individual-level variables and to avoid inflating the variance and standard error of coefficient estimates, we had to exclude the "ever smoked" variable from the final models after initial trial runs. The other independent variables included are: free tobacco product offer, frequency of teacher(s) smoking on school premises, sex, frequency of smoking at home, perceived harm from smoking, close friend's smoking status and age of respondent. Stata's Svy command was used to adjust for the complex study design of the GTYS. Sampling weights were also calculated for each observation in order to accurately determine prevalence and to as well stratify cluster variables. To assess the fitness of the model, Stata's Fitstat command was used.

## Results

### Demographic and Other Important Characteristics of Participants

A total of 1,301 participants were included in this study with missing responses ranging from 11 to 51 across the various demographic and other characteristics of respondents. Of the 1,301 respondents, 82% were male and their ages ranged from 11 to 17 years. Table 1 presents the demographic and other characteristics of participants.

**Table 1.** Participant Characteristics, Global Youth Tobacco Survey–AFRO, The Gambia All Schools, 2017

	Unweighted Frequency	Weighted Percent (95% CI)
<b>Sex</b>		
Male	1052	82.4 (79.3-85.5)
Female	224	17.6 (14.5-20.7)
Missing	24	
<b>Age</b>		
≤11 Years Old	5	0.4 (0.04-0.8)

12 years Old	31	2.5 (1.1-3.9)
13 years Old	96	7.7 (5.6-9.8)
14 years Old	216	17.3 (14.1-20.5)
15 years Old	255	20.4 (17.7-23.1)
16 years Old	250	20.0 (17.0-23.0)
≥17 years Old	396	31.7 (27.3-36.1)
Missing	51	
<b>Frequency Teacher Smoking on Sch. Premises</b>		
About every day	87	6.9 (4.9-8.9)
Sometimes	349	27.7 (23.2-32.2)
Never	560	44.5 (39.1-50.0)
Don't Know	263	20.9 (17.8-24.0)
Missing	42	
<b>Parents' smoking status</b>		
None	943	73.1 (70.2-76.0)
Both	40	3.1 (1.9-4.3)
Father Only	197	15.3 (13.1-17.6)
Mother Only	43	3.3 (2.0-4.7)
Don't Know	67	5.2 (3.4-6.9)
Missing	11	
<b>Close friends' smoking status</b>		
None	686	53.4 (49.7-57.1)
Some	460	35.8 (32.5-39.2)
Most	105	8.2 (6.1-10.2)
All	33	2.6 (1.5-3.6)
Missing	17	
<b>Offer of free tobacco product</b>		
Yes	118	9.2 (7.0-11.4)
No	1162	90.8 (88.6-93.0)
Missing	21	
<b>Age at Smoking Initiation</b>		
Early	713	54.8 (51.1-58.5)

Middle	380	29.2 (26.2-32.3)
Late	208	16.0 (12.7-19.3)
Missing	0	
<b>Perceived harm from smoking</b>		
No	344	26.8 (21.9-31.8)
Yes	104	8.1 (6.1-10.0)
Missing	18	
<b>Frequency of people smoking at home</b>		
Don't see	240	18.7 (15.0-22.6)
About everyday	150	11.7 (9.2-14.3)
Sometimes	596	46.4(41.9-50.9)
Never	297	23.1 (19.0-27.2)
Missing	16	
(N=1,301)		

### Proportion of Respondents who initiated smoking at Early, Middle and Late Adolescence by Categories of Potential Exposure

Of the 1,301 total analytic sample, each participant self-reported to have initiated smoking at one of the 3 stages of adolescence.

Of these, 56% (N =731), 29% (N =382) and 14% (N = 188) reported to have initiated tobacco use at early, middle and late adolescence, respectively.

Table 2 presents the proportion of participants who initiated smoking at the 3 stages of adolescence (early, middle and late) by the various categories of the covariates.

**Table 2.** Prevalence of respondents who initiated smoking at Early, Middle and Late Adolescence by potential exposure categories among Gambian students, Global Youth Tobacco Survey – AFRO, Gambia All Schools, Regions 1-6, 2017

	Unweighted sample n	Age at Smoking Initiation - % (95% CI)		
		Early Adolescence, n= 731	Middle Adolescence, n=382	Late Adolescence, n= 188
Sex				
Male	1052	54.6 (50.4-58.7)	28.5 (24.8-32.2)	16.9 (13.1-20.7)
Female	224	55.6 (48.1-63.2)	31.9 (23.9-39.8)	12.5 (7.1-17.9)
Parents' smoking status				
None	943	55.1 (51.0-59.3)	27.7 (24.1-31.2)	17.2 (13.4-20.9)

Both	40	54.1 (35.1-73.1)	43.4 (24.5-62.2)	2.5 (0.02-5.1)
Father Only	197	58.5 (49.9-67.2)	29.7 (22.1-37.2)	11.8 (5.6-18.0)
Mother Only	43	58.9 (41.0-76.9)	32.1 (16.4-47.8)	9.0 (1.2-16.8)
Don't Know	67	39.6 (25.4-53.8)	38.4 (25.4-51.3)	22.0 (10.1-33.9)
<b>Close friends' smoking status</b>				
None	686	59.4 (54.6-64.1)	27.3 (23.0-31.7)	13.3 (9.7-16.9)
Some	460	50.3 (43.3-57.4)	30.4 (25.2-35.6)	19.3 (12.9-25.6)
Most	105	49.9 (37.0-62.8)	33.0 (23.5-42.5)	17.1 (7.5-26.6)
All	33	48.5 (30.3-66.7)	27.4 (13.0-41.9)	24.1 (9.3-38.9)
<b>Frequency Teacher Smoking on Sch. Premises</b>				
About every day	87	46.1 (35.3-56.9)	33.8 (22.1-45.5)	20.1 (8.3-31.9)
Sometimes	349	57.7 (51.6-63.9)	28.2 (22.3-34.1)	14.1 (9.1-19.1)
Never	560	55.3 (51.2-59.4)	29.3 (25.2-33.3)	15.4 (11.5-19.4)
Don't Know	263	52.1 (45.0-59.3)	29.6 (22.6-36.5)	18.3 (12.1-24.5)
<b>Offer of free tobacco product</b>				
Yes	118	58.2 (47.0-69.4)	26.2 (19.2-33.2)	15.6 (5.6-25.6)
No	1162	54.7 (50.8-58.5)	29.5 (26.2-32.8)	15.8 (12.7-19.0)
<b>Perceived harm from smoking</b>				
No	344	55.5 (48.6-62.4)	32.2 (25.5-38.9)	12.3 (7.3-17.3)
Yes	104	48.2 (39.3-57.1)	34.7 (26.0-43.4)	17.1 (9.6-24.5)
<b>Frequency of people smoking at home</b>				
Don't see	240	53.1 (46.0-60.3)	32.4 (25.6-39.1)	14.5 (9.8-19.2)
About everyday	150	53.1 (45.1-61.1)	28.0 (20.2-35.8)	18.9 (10.2-27.5)
Sometimes	596	54.6 (50.0-59.6)	28.2 (23.5-32.8)	17.2 (12.4-22.0)
Never	297	55.9 (48.5-63.4)	30.1 (24.4-35.8)	13.9 (9.4-18.5)
(N=1,301)				



### Factors Associated with Smoking Initiation at the 3 Stages of Adolescence among Gambian Students

Results of multivariable analyses along the 3 stages of adolescence by the categories of the 8 potential predictor variables, considered in this analysis, are as presented in Table 3.

Parental smoking status, the main independent variable examined, has for the most part not exhibited any statistically significant association with smoking initiation at any of the 3 stages of adolescence. The only slight statistically significant but inverse association (-2.24 [95%CI: -4.15--0.33]) observed with parental smoking was with having both parents smoking at late adolescence. Sex had a strong ( $p < 0.001$ ) and stable but inverse association with smoking initiation along all the 3 stages of adolescence – (-1.69 [95%CI: -2.10--1.27]) at early; (-1.39 [95%CI: -1.97--0.81]) at middle; and (-1.56 [95%CI: -2.53--0.58]) at late adolescence.

While the association between age group and age at smoking initiation at early adolescence was not statistically significant (0.06 [95%CI: -

0.04-0.159]), it was at both middle and late adolescence (0.36 [95%CI: 0.25-0.47] and 1.42 [95%CI: 1.09-1.76]) respectively. Close friends' smoking was strongly associated with smoking initiation at both early (0.66 [95%CI: 0.27-1.06]) and middle adolescence (1.12 [95%CI: 0.63-1.60]), but the association lost potency at late adolescence (0.64 [95%CI: -0.13-1.41]) when only some of the participants' close friends smoked. However, when most of the participants' close friends smoked, the association was significant at all 3 stages of adolescence (early 0.84 [95%CI: 0.28-1.39]; middle 0.77 [95%CI: 0.05-1.49]; and late 1.69 [95%CI: 1.69-2.71]). While other people smoking at home was only associated with smoking initiation at early adolescence (0.79 [95%CI: 0.30-1.29]), perceived harm from smoking was statistically associated with smoking initiation at only middle and late adolescence (0.64 [95%CI: 0.17-1.12] and 1.01 [95%CI: 0.33-1.68], respectively). Teacher smoking on school premises and offer of free cigarette products were not associated with smoking initiation at any age.

**Table 3.** Factors Associated with Age at Smoking Initiation among Gambian Adolescents, Global Youth Tobacco Survey – AFRO, Gambia All Schools, Regions 1-6, 2017

	Unweighted sample n	Age at Smoking Initiation		
		Early Adolescence, n= 731	Middle Adolescence, n= 382	Late Adolescence, n= 188
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Sex				
Male®	1052	1	1	1
Female	224	-1.81(-2.09--1.53)***	-1.58 (-1.96--1.20)***	-1.76 (-2.28--
Agea		0.003(-0.07-0.07)	0.35 (0.26-0.44)***	1.61 (1.35-1.88)***
Parents' smoking status				
None®	943	1	1	1
Both	40	0.13 (-0.62-0.88)	0.51(-0.13-1.15)	-1.80 (-3.04--0.56)*
Father Only	197	0.50 (0.23-0.76)	0.37(0.01-0.73)	-0.01 (-0.65-0.64)
Mother Only	43	0.19 (-0.64-0.68)	-0.01 (-0.81-0.79)	-0.86 (-2.24-0.52)
Don't Know	67	- 0.54 (-1.13-0.05)	0.05 (-0.48-0.58)	0.01 (-0.74-0.75)
Close friends' smoking status				

None®	686	1	1	1
Some	460	0.66(0.38-0.93)***	0.82 (0.48-1.17)***	0.91(0.47-1.35)***
Most or All	138	0.73(0.26-1.20) **	1.06 (0.63-1.50)***	1.27 (0.63-1.91)***
<b>Other people smoking at home</b>				
Don't see®	240	1	1	1
About everyday	150	0.44 (0.02-0.87)*	0.05 (-0.54-0.65)	0.71 (-0.05-1.48)
Sometimes	596	0.65 (0.36-0.95)***	0.46 (0.10-0.82)*	0.83 (0.28-1.37)**
Never	297	-0.13 (-0.48-0.22)	-0.25 (-0.69-0.20)	-0.02 (-0.56-0.52)
<b>Teacher Smoking on Sch. Premises</b>				
About everyday	87	1	1	1
Sometimes	349	0.31 (-0.19-0.80)	-0.19 (-0.73-0.36)	-0.21 (-1.25-0.83)
Never	560	0.02 (-0.45-0.49)	-0.44 (-0.95-0.07)	-0.47 (-1.43-0.49)
Don't Know	263	-0.08 (-0.55-0.39)	-0.43(-0.96-0.09)	-0.21 (-1.35-0.92)
<b>Offer of free tobacco product</b>				
Yes®	118	1	1	1
No	1162	-0.37 (-0.70-0.04)	-0.04(-0.54-0.45)	-0.03 (-0.82-0.76)
<b>Perceived harm from smoking</b>				
No®	344	1	1	1
Yes	104	0.37 (0.09-0.65) **	0.10 (-0.21-0.42)	0.53 (0.12-0.94) *

*a Computed as a continuous variable ® Reference: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$*

## Discussion

Despite being an omnibus analysis of the determinants of smoking initiation, our study is one of the few, if not the only study, that looked into the possible determinants of smoking initiation at the various stages of adolescence (early, middle and late) in sub-Saharan Africa. It is therefore envisaged that the findings will bring new insights into how tobacco use prevention efforts, targeting adolescents, are planned and implemented. Parental smoking not having any statistically significant relationship with initiation at any age may be due to the small analytic sample that resulted from the many sub-divisions or categories (both, father only, mother only and those who don't know of their parents' smoking status) of parental smoking in our study. This is unlike studies such as the one conducted by O'Loughlin et al [10], which found strong

associations with initiation at all ages with parents' smoking having binary responses or categories only. Conversely, our findings corroborate the waned strength of association found between friends' smoking and initiation at late adolescence despite having a strong association at early and middle adolescence [10]. This may be due to the fact that the effectiveness of peer pressure in influencing deviant behaviour diminishes in late adolescence when children become more independent in their decision making processes [18]. However, this phenomenon was only observed in instances where only some of the close friends smoked. Where most or all of the close friends of participants actively smoked, there was association at all the ages of adolescence which is also supported by the findings of most studies that having friends who smoke is a strong risk factor of smoking initiation [19].

Cognitive theories such as those postulated in the 1980s could explain this phenomenon. For instance, Ajzen and Fishbein [20] found that while parental smoking had only an indirect influence on adolescent smoking initiation, smoking by friends had both direct and indirect influences on smoking initiation among adolescents. Also, Mahabee-Gittens et al. [12] found that while peer smoking had a positive and consistent relationship with smoking initiation at each age between 12 and 17 years, the protective effect of parental control wasn't consistent across the various adolescent ages. Overall, similar to the findings of our study, friends' smoking was found to have had a much stronger and consistent effect on adolescent smoking, especially for initiation, than parents' smoking [21]. Thus, there is the need for smoking preventive measures to disproportionately focus on more on children.

Moreover, our study found a stable and strong ( $p < 0.001$ ) association between sex and smoking initiation at all ages of adolescence. This finding is also consistent with prior adolescent-based studies where being female was strongly associated with smoking initiation for purposes of losing weight, even though it was mostly a positive association [22]. A similar strength of association ( $p < 0.001$ ) was observed for age too but only in middle and late adolescence. This is corroborated by Harlow et al. [23] who found that smoking initiation occurs later in adolescence among black children than their counterpart white children who initiate smoking much earlier. Our participants were all black adolescents.

Perception of harm from tobacco use was found to be associated with smoking initiation at both middle and late adolescence but no statistical significance was found at early adolescence. While prior studies have established a strong association between smoking initiation and perception of harm [24], it was found that risk perceptions increased as one moved towards younger age groups [25] with lower but significant odds for smoking

initiation. There is need for further studies to investigate why there was no statistical significance between risk perception and tobacco use initiation at early adolescence.

While a prior study has found adolescents exposed to smoking at home to be more susceptible to smoking initiation than those exposed to it in public places [26], our study found this to be true only in early adolescence. This difference may be due to the lower analytic samples for middle and late adolescence in our study. Notwithstanding the establishment of tobacco advertisement/promotion and teachers' outdoor smoking on school premises as risk factors of smoking initiation among adolescents [27 and 28], our study found no statistically significant association between both and initiation at any age. This may be due to methodological differences across the different studies.

## **Conclusion**

Our study found that while parental smoking does not, for the most part, directly influence adolescent smoking initiation, friends' smoking does in early, middle and late adolescence. Also, boys compared to girls had increased odds of initiating smoking at all ages. We found different levels of association between age at smoking initiation and perception of smoking-related risks, age and the existence of smoking at home by other people (besides parents) at home. While both age and perception of harm from smoking had increased odds of initiation at middle and late adolescence only, smoking at home by other people increased the odds of smoking initiation only at early adolescence. Thus, it is imperative that programs and policies targeting the prevention of smoking initiation among adolescents are tailored to what works best for each of the 3 age categories (early, middle and late adolescence).

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## Conflict of Interest

We have no conflict of interest to declare.

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