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Association Between Smoking Behavior, Academic Performance, and Absenteeism Among Moroccan High School Students in the Rabat–Salé–Kénitra Region, Morocco

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ABSTRACT

Objective: Smoking is a growing phenomenon in developing countries among adolescents and adults; it constitutes a major and global public health problem, particularly for the young population. This study examines the association between smoking behavior, absenteeism, and academic performance among secondary school students.

Methods and Materials: A cross-sectional study was conducted among 891 students from nine high schools in the Rabat–Salé–Kénitra region using a structured questionnaire adapted from validated adolescent tobacco-use surveys. The instrument assessed smoking behavior, absenteeism, and academic performance. Students were classified as never-smokers, experimental smokers, or current smokers. Associations were analyzed using chi-square tests.

Findings: The mean age of participants was 17.64 ± 1.41 years. The prevalence of lifetime smoking was 26%, while the prevalence of current smoking was 3.6%. Lifetime smoking was slightly higher among students in urban areas (27.29%) compared with rural areas (24.34%). Smoking was significantly associated with male gender ($p < 0.001$), age group (16–18 years: 67.7%; $p = 0.007$), and level of study ($p = 0.002$). Students who smoked showed significantly higher absenteeism ($\chi^2 = 84.15$, $p < 0.001$) and lower academic performance ($\chi^2 = 113.21$, $p < 0.001$) compared with non-smokers. The prevalence of current smoking was higher in urban areas (9.76%) than in rural areas (8.08%).

Conclusion: Smoking is significantly associated with higher absenteeism and lower academic performance among adolescents. However, due to the cross-sectional design, causal relationships cannot be established. These findings highlight the importance of school-based prevention and awareness strategies.

Keywords: Prevalence, Drug addiction, School Performance, Absenteeism, High School Students, Morocco.

Introduction

Tobacco smoking remains a major public health concern worldwide, particularly among adolescents, due to its high prevalence and associated health and social consequences. Adolescence is a critical developmental period during which individuals are more vulnerable to initiating health-risk behaviors, including tobacco use, influenced by social and environmental factors. During this stage, smoking initiation may occur and potentially affect both health status and educational outcomes (Lotfi & Chakit, 2024).

Smoking causes several physiological pathologies (respiratory depression, lung cancer, etc.) or psychiatric pathologies; this is particularly the case when tobacco use becomes drug addiction (Choquet et al., 2004).

In Morocco, as in other countries, most smokers start smoking during the period of adolescence (Eaton et al., 2006; Jackson et al., 1997; Kandel & Logan, 1984; Stephens, 2006). Adolescence, with its curious and adventurous side, is a risky period for first experiences with tobacco and its derivatives. Studies have shown that people who start smoking in adolescence and continue to smoke regularly have a life expectancy 20 to 25 years shorter than nonsmokers (Peto, 1994). This period is very important because efforts to prevent or delay smoking initiation can be very effective (Bush & Iannotti, 1993; Glynn, 1993). Smokers not only harm their own health but also interfere with the health of others by exposing them to secondhand smoke.

In Morocco, approximately 18% of young people aged 15 and over smoke, and nearly 41% of Moroccan women are exposed to secondhand smoke. Morocco is considered one of the largest tobacco consumers in the Mediterranean basin, with over 15 billion cigarettes a year. Smoking is therefore considered a public health problem in Morocco, as it is in the rest of the world (Bendaou et al., 2015).

Tobacco use among adolescents remains a significant public health concern worldwide. Beyond its well-established health risks, smoking has been associated with behavioral and educational outcomes, including school absenteeism and reduced academic performance. (Lotfi & Chakit, 2024). Several studies suggest that adolescent smokers are more likely to experience disengagement from school and lower academic achievement. Possible explanations include behavioral factors, reduced concentration, and co-occurring risk behaviors. However, these relationships may also be influenced by underlying social and environmental factors.

In Morocco, data on the association between smoking behavior and school outcomes remain limited, particularly at the regional level. Understanding this relationship is important for informing targeted prevention strategies within the school environment.

The objective of this study was to examine the association between smoking behavior, absenteeism, and academic performance among secondary school students in the Rabat–Salé–Kénitra region.

Methods and Materials

Study Design

This is a cross-sectional epidemiological study. Data were collected by a questionnaire on smoking behavior (QCT2). This study was conducted in public secondary schools across multiple provinces in the Rabat–Salé–Kénitra region, including Kénitra, Rabat, Salé, and Témara. The study area was therefore defined at the regional level rather than a single province; Volunteer investigators participated in carrying out this survey. They were informed to carry out this work, targeting the age group 15 to 22 years.

The questionnaire took almost 15 minutes to complete; the collection was done immediately after the survey. No significant problem was noted during the survey, with the exception of some difficulty in understanding some items by the students; explanations were provided by the investigators.

Conduct of the survey

The survey was conducted on a sample of 891 high school students from common core , 1st year of baccalaureate, and 2nd year of baccalaureate; volunteer teachers contributed to the realization of this survey. They were informed to carry out this work.

Six high schools were chosen in urban areas and three in rural areas. The high schools are spread over five provinces (Rabat, Salé, Kenitra Tamara, Sidi Slimane). The classes were chosen randomly.

The students completed the questionnaire which was translated into Moroccan dialect to be assimilated, the information collected had focused, in addition to sociodemographic data, on items allowing knowledge of

smoking behavior, absenteeism, academic performance, tobacco consumption habits, the school environment. The investigation took place over a period of three months from December 2023 to March 2024.

The students were classified, according to their cigarette consumption habits, into two categories: non-smokers (who have never smoked cigarettes and those who have smoked for experiments) and current or occasional smokers (regularly smoke one or more cigarettes per day or several times per week or per month).

Smoking Classification

Participants were classified into three categories: never-smokers, experimental smokers (tried smoking but not current users) and current smokers. This classification was used to better distinguish smoking behaviors and avoid misclassification bias.

Participants

The target sample size was set at approximately 1000 students based on feasibility and school enrollment size. A total of 891 students participated (response rate: 89.1%). A stratified sampling approach was used, with schools selected based on geographic location (urban/rural), followed by random selection of students within schools.

The sample size is estimated at 1000 students 891 responded to the questionnaire. 109 students did not agree to cooperate. The distribution of students in urban and rural areas was taken into account. The survey targeted students belonging to an age category between (15 and 22 years old) including high school students.

Inclusion and exclusion criteria

The inclusion criteria were to be high school students. All streams and options. Students who refused to participate in the study were excluded.

Instruments

Data were collected using a structured questionnaire adapted from internationally validated adolescent smoking surveys. The questionnaire was translated and pilot-tested to ensure clarity and cultural appropriateness. Internal consistency was assessed using Cronbach's alpha ($\alpha = 0.79$).

The tool used is a self-questionnaire that was translated into Arabic, revised several times to be adapted to the context, the vocabulary of the students and the local language in order to be assimilated by the students. 15 minutes are necessary to complete the questionnaire.

The tool is composed of four questionnaires, each one allows us to collect socio-demographic information (age, sex, school environment, school level, medical follow-up, absenteeism, dubbing; etc.). Also, information on the smoking behavior of the participants was collected.

Data analysis

Descriptive statistics were applied to all data and included means for continuous variables and frequency distributions for non-continuous variables. SPSS 18 software was used to perform data analysis. Categorical variables were analyzed using chi-square tests to examine associations between smoking status, absenteeism, and academic performance. Statistical significance was set at $p < 0.05$.

Ethical considerations

The present study was conducted in respect of Helsinki guidelines Association (2013) and validated by the Ethics Committee of the Biology Department - Kenitra City University Ibn Tofail with the number 03/2021.

Findings and Results

A total of 891 high school students participated in the survey. Their mean age was 17.64 ± 1.41 years. Table 1 presents the general characteristics of the study population. The majority of participants are male (58.7%) aged 17-18 years (51.2%) (Table 2).

Table 1

Characteristics of surveyed students.

Variable		Number	Percentage
Gender	Male	523	58.7
	Female	368	41.3
Age	15	50	5.6
	16	147	16.5
	17	226	25.4
	18	230	25.8
	19	142	15.9
	20	81	9.1
	21	12	1.3
	22	3	0.3
Origin	Urban	513	57.57
	Rural	378	42.43
Study level	Common core	279	31.31
	1Bac	365	40.96
	2 Bac	247	27.72

Urban students constitute 67.57% compared to rural students (42.43%) (Figure 1). 40.96% of participants follow their study in 1st year of Baccalaureate (1Bac), 27.72% in the second year of Baccalaureate (2Bac), and 31.31% in common core.

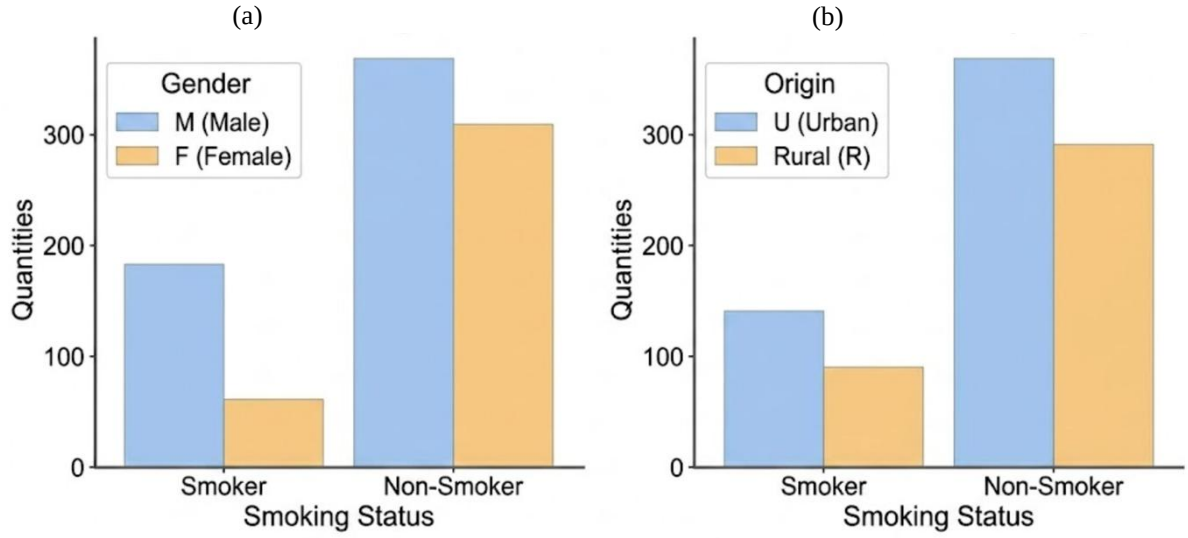

Figure 1

Distribution of participants according their smoking status and gender (a) and origin (b).

The incidence of ever smoking was 26% (n = 232). The mean age of first-time smoking was 9 ± 2.34 years, with a median age of 9.5 years. The youngest age of first smoking was seven years (Table 2).

Table 2

Percentage of smokers among participants (n=891).

	Age (years)							
	15	16	17	18	19	20	21	22
Males	21.74	21.79	34.72	42.86	31.39	32.14	50	50
Females	3.7	13.04	18.29	14.42	16.07	16	50	100
Total	12	17.69	28.76	30	25.35	27.16	50	66.67

Table 3 presents the association between smoking and sociodemographic characteristics of participants. The table shows a significant relationship between smoking and male gender ($p < 0.001$), age (67.7% of students aged between 16 and 18 years) ($p < 0.01$), and level of study ($p < 0.01$).

Table 3

Categorical associations between smoking and sociodemographic characteristics.

		Smoker	No smoker	Total	p-value
Gender	Male	176	347	523	<0.01
	Female	56	312	368	
Age	15	6	44	50	0.007
	16	26	121	147	
	17	65	161	226	
	18	69	161	230	
	19	36	106	142	
	20	6	6	12	
	21	2	1	3	
	22				
Level study	TC	54	225	279	0.002
	1Bac	116	249	365	
	2Bac	62	185	247	
Origin	Urbain	140	373	513	0.321
	Rural	92	286	378	
School performance		11.01±1.84	12.24±2.25		0.000

Effect of smoking on academic achievement

Academic performance differed significantly between smokers and non-smokers. The mean academic performance score was lower among smoking students (11.01 ± 1.84) compared with non-smoking students (12.24 ± 2.25). This difference was statistically significant ($p < 0.001$), indicating poorer academic performance among smokers (Table 4). Additionally, analysis of grade categories showed that 67.92% of smokers had a grade below 9/20, compared with 27.04% of non-smokers. Only 0.63% of smokers achieved a grade above 14/20, compared with 14.07% of non-smokers. The association between smoking status and academic performance categories was assessed using the chi-square test ($\chi^2 = 113.21$, $p < 0.001$).

Table 4

Academic score of participants in the last semester.

	Main score						
	(5-7)	(8-9)	(10-11)	(12-13)	(14-15)	(16-17)	>17
Smoker	13	95	45	5	1		
No smoker	30	168	262	166	76	27	3
Total	43	263	307	171	77	27	3

Impact of smoking on absenteeism

Table 5 presents the distribution of absenteeism according to smoking status. Smoking students showed higher levels of absenteeism compared with non-smokers. Specifically, 47.17% of smokers reported ≥5 days of absence (27.67% for 5–9 days and 19.50% for >9 days), compared with 14.75% of non-smokers. Conversely, the majority of non-smokers (85.25%) reported fewer than 5 days of absence, compared with 52.83% of smokers.

The association between smoking status and absenteeism was statistically significant, as assessed using the chi-square test ($\chi^2 = 84.25$, $p < 0.001$).

Table 5

Number of absences in smokers and no smokers.

	Smokers		No-smokers		p-value
Number of absence (days)	Number	Percentage %	Number	Percentage	
< 5	84	52.83	624	85.25	< 0.001
5 - 9	44	27.67	62	8.47	
> 9	31	19.50	46	6.28	
Total	159	100%	732	100%	

Discussion and Conclusion

Adolescence is a critical period that the adolescent must overcome to successfully complete his physical and psychological transformation; it is a stage of experimentation and acquisition (Mastorci et al., 2024). It is recognized that risky behaviors, acquired in adolescence, are often difficult to modify in adulthood. Smoking is one of these risky habits. Adolescents who start smoking at an early age are ideal candidates to become regular and dependent smokers. The study explored the association between smoking behavior, absenteeism, and academic performance among secondary school students from Rabat-Salé-Kénitra region, Morocco.

The results showed that smoking was prevalent at 26% at least once in the participant's life and the current smoking rate was 3.6%. This survey reports that 24.34% of high school students in rural areas and 27.29% in urban areas have used cigarettes. In addition, smoking history had a negative impact on students' academic performance, measured by the overall average, days of absence, and the number of school warnings. A substantial association between cigarette smoking and students' academic performance was identified, the number of cigarettes smoked per day negatively influenced the overall average, days of absence, and number of school warnings.

Smoking constitute a major risk factor for morbidity and mortality (Lim et al., 2012). Few studies have been conducted on a continuous basis at the national level to monitor smoking trends; studies conducted in schools showed an average prevalence of 24% (33% in boys and 8.6% in girls) (El Biaze et al., 2000), Another survey stated that 6.5% of students smoke, with a percentage of 8.6% among boys compared to 4.8% among girls. (Kaoutar et al., 2019).

A survey conducted in Casablanca in public middle school smokers in 2012 showed a prevalence of smoking of 7.5% (95% CI 5.5%-10.1%). This prevalence varied according to the establishments from 2.4% to 10.4% with overlapping confidence intervals, Smoking was more frequent among boys (11.4%) than among girls (4.6%) ($p = 0.003$). Smokers were significantly older than non-smokers 17.8 years (SD 0.29) versus 16.4 years (SD 0.18), $p = 0.024$ (Serhier et al., 2012). In 2017, more than 1 in 10 students surveyed (16%, or n=1101) reported having smoked at least one cigarette during their lifetime. The prevalence during the last 12 months is 9% (n=602). The prevalence during the last 30 days concerns less than one in ten adolescents surveyed (6.7%, or n=1101). The differences between the two sexes are significant in terms of cigarette consumption during the last thirty days, the last twelve months and during their lifetime; with greater tobacco use among boys ($p< 0.0001$). Tobacco also remains the psychoactive product that is experimented with the earliest (14.3 ± 1.7 years) among students aged 15-17. In our survey, the prevalence of smoking was 26% at least once in the participant's life with a confidence interval between 0.1573520 and 0.1995503. These rates are higher than those in the European report of the World Health Organization (WHO), where the corresponding rates were 17.5%, and those in the study by Warren et al., in which the rates were 19.7% and 8.9%, respectively, in subjects aged 13–15 years (Warren et al., 2006). El Biaze et al. found that the prevalence of smoking in the school environment is 24%, mainly among boys with a frequency of 33% and low frequency among girls (8.6%) (El Biaze et al., 2000). In another study conducted in Fes, Bendaou et al. reported that 21.2% of students had smoked at least once (Bendaou et al., 2015). In our study, in urban areas, the percentage was (9.76%) compared to (8.08%) in rural areas. This percentage is slightly high for urban areas for both girls and boys and decreases with age. In 2012-2013, the prevalence of smoking estimated by the North Center of Morocco (16.08%) was close to that estimated at the national level (17.3%)

through the results of the MedSPAD survey conducted in 2013 at the national level among 5801 students (El Omari et al., 2015). These results are comparable to the results obtained by our survey, the prevalence of which was estimated at 17.84%. At the national level, studies that focused on tobacco consumption and its impact on academic performance and those that studied the relationship between absenteeism, dropping out of school and smoking are very rare. Our survey would be a first in this regard and the results obtained would make it possible to take stock of this phenomenon. An analysis carried out using the (chi-square) test showed a strong dependence between absenteeism and being a smoker with (χ^2 = 84, 151, p-value 0.001) a second test was carried out showing that academic performance is strongly dependent on the smoking status of students (χ^2 = 113, 21, p-value 0.001). This study revealed that when young people are aware of the dangers of tobacco, they are more likely to avoid smoking cigarettes. But more specific information must be disseminated on cigarettes because of their particular danger to health (Kherrab et al., 2024). For example, many cigarette smokers are supposed to contain tar and nicotine.

The results showed a significant relationship between cigarette smoking and academic performance. This finding is consistent with a study conducted in the 1960s that found that adolescent smokers had lower grades than nonsmokers (Matarazzo & Saslow, 1960). Another study demonstrated a negative correlation between smoking and academic scores among students (Borland & Rudolph, 1975). Furthermore, our findings are in line with several studies showing that increased prevalence of smoking is associated with lower academic achievement among adolescents (Corona et al., 2009).

Interestingly, a previous study confirmed that youth smoking is associated with lower educational attainment (Ellickson et al., 2001). Our new findings are further reinforced by a study of Saudi medical students at Jazan University, which shows that there is an inverse relationship between smoking prevalence and the students' overall average. Furthermore, all types of nicotine-containing products are associated with lower academic performance. (Dearfield et al., 2021). However, a study found that poor academic performance depends on multifactorial factors and smoking may be one of these factors. Socioeconomic factor is also an important factor (Kharma et al., 2020). Our study was conducted in parallel with other studies that have found an association between smoking and absenteeism among European school-going adolescents (Perelman et al., 2019) and among workers (Weng et al., 2013).

This study found that smoking behavior is significantly associated with higher absenteeism and lower academic performance among adolescents. These findings are consistent with previous research suggesting that smoking is linked to unfavorable school-related outcomes. However, the cross-sectional design does not allow conclusions about causality. Smoking may contribute to poorer academic outcomes, but it may also be a marker of other underlying factors such as socioeconomic conditions or behavioral risks that were not fully measured in this study.

The observed differences between urban and rural students were not statistically significant, suggesting that the association between smoking and school outcomes may be consistent across different living environments.

The interpretation of academic performance should remain cautious, as it may be influenced by unmeasured confounders such as family background, parental education, and other lifestyle factors.

Limitations

The main limitation of the survey is its voluntary nature. Due to the need to protect confidentiality, we were unable to conduct surveys based on a random sampling technique in schools. But our methodology produced a large sample size, which may not have been achieved through a random survey. It is also not possible to determine whether smokers or nonsmokers were more likely not to respond to the survey. However, we collected a large sample of students and approximated proportions of high school students as represented in the general population of these schools. In addition, given that this is a cross-sectional research, reverse causality bias is a potential problem. Multifactorial influences on students' academic performance mean that confounding factors may impact the results.

Conclusion

This study demonstrates that smoking is significantly associated with higher absenteeism and lower academic performance among secondary school students. However, these relationships should not be interpreted as causal due to the cross-sectional design.

The findings underscore the importance of strengthening school-based smoking prevention and awareness programs. Targeted interventions within educational settings may help reduce tobacco use and support better academic engagement among adolescents.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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