Jordan Journal of Nursing Research, Volume **4**, No. **2**, **2025**
DOI: https://doi.org/10.14525/JJNR.v4i2.07

Jordan Journal of Nursing Research

www.jjnr.just.edu.jo

Knowledge and Attitudes toward Smoking among University Students in Jordan: A Comparative Study between Smokers and Non-smokers

Abeer A. Alzayyat, RN, MSN [1*]; Jumanah D. Al-Shawabkeh RPh, PhD [1]; Sajeda Al-Smadi, RN, MSN [1];

Bassam A, Malkawi, BS ChE [2]; Abdulkarim Alzayyat, RN, MSN [3]; Raya Ghanim, RN, MSN [4];

Wafa' Al-Waked, RN, MSN [4]

1 Department of Medical Allied Sciences, Al-Balqa Applied University, Zarqa University College, Zarqa, Jordan.
** Corresponding Author. Email: abeer.zayyat@bau.edu.jo*
2 Faculty of Engineering Technology, Al-Balqa Applied University, Amman, Jordan.
3 Al-Basher Hospital, Amman, Jordan.
4 Philadelphia University, Amman, Jordan.

ARTICLE INFO

Article History:
Received: March 21, 2025
Accepted: May 15, 2025

ABSTRACT

Background: Smoking habit is a significant issue among university students. Little data is available about the smoking habit among Jordanian students. ***Purpose*:** This study compared the levels of knowledge and attitudes between smoking and non-smoking university students in Jordan. ***Methods*:** A descriptive comparative cross-sectional approach was utilized. Data was collected from 300 students from four Jordanian universities *via* a self-report questionnaire. Data collection occurred during the first semester of the academic year 2024/2025. ***Results*:** The total knowledge scores for smokers ranged from 0 to 208 (M = 151.07; SD = 33.3). The total knowledge scores for non-smokers ranged from 19 to 200 (M = 147.9; SD = 31.22). The smoking participants have total attitude scores that ranged from 0 to 82 (M = 46.60; SD = 18.87). The total attitude scores for non-smoking participants ranged from 0 to 65 (M = 26.60; SD = 13.41). Smokers have statistically higher knowledge scores across the three sub-scales: factors related to cigarette smoking initiation (t= 2.12, P = 0.04), factors related to hookah smoking initiation (t= 2.03, P = 0.04), and cigarette/smoking ban (t= 3.27, P = 0.001) sub-scales. Moreover, smokers have significantly higher mean scores on the total attitude scale and its sub-scales ($p < 0.05$). ***Conclusion*:** This study highlights significant differences in knowledge and attitudes toward smoking between smoking and non-smoking participants. ***Implications for Nursing*:** Nurses play a critical role in developing and implementing tailored educational interventions that address specific needs of smoking and non- smoking university students.

Keywords: Knowledge, Attitudes, Smoking, University students, Jordan.

What does this paper add?

1. Few research has compared knowledge and attitude degrees between smoking and non-smoking university students in Jordan.
2. The study results showed that the students in the smoking group perceived higher levels of knowledge and more positive attitudes toward smoking.
3. Public health professionals, including nurses, should play a pivotal role in implementing targeted interventions, to reduce smoking prevalence among university students.

Introduction

Smoking remains one of the leading preventable causes of morbidity and mortality worldwide, with significant public health implications (Aldalaykeh et al., 2023; Putrik et al., 2022). Research on smoking among university students has revealed a complex interplay of social, psychological, and environmental factors influencing smoking (Ahmed et al., 2020; Delgado-Lobete et al., 2020).

Globally, smoking prevalence among university students varies widely, with studies indicating rates ranging from 10% to over 40%, depending on the region and measurement methods (Abdelraouf et al., 2024; Ahmed et al., 2020). According to the World Health Organization (WHO), smoking among youth and young adults continues to rise in certain regions, influenced by social factors, stress, and the tobacco industry's targeted marketing strategies (WHO, 2024).

In developing countries, the burden of smoking among university students is particularly concerning. Studies from countries, such as Egypt and Nigeria, report smoking prevalence rates between 15% and 35%, with notable gender differences and increasing use of alternative tobacco products, such as waterpipes (hookah) and e-cigarettes (Hafez et al., 2022; Okafor et al., 2023). These patterns are often associated with low awareness of smoking-related risks, weak enforcement of smoking control policies, and cultural acceptance of smoking in some contexts.

In Jordan, smoking among university students is alarmingly high. Recent research reports that the prevalence of cigarette smoking ranges between 25% and 35%, while the use of waterpipes can reach up to 50% in some university populations (Alkouri et al., 2022; Al-Sawalha et al., 2021). Jordan ranks among the highest countries globally in smoking relative to its population, and university students are a vulnerable group due to peer pressure, academic stress, and the perceived social appeal of smoking. Despite national smoking control initiatives, including public smoking bans and anti-smoking campaigns, the uptake of smoking among young adults remains a persistent challenge.

A significant body of literature highlights that smoking prevalence rates among university students often depend on demographic factors, such as age, gender, and cultural background (Bin Abdulrahman et al., 2022; Hassan et al., 2019; Mohmad et al., 2022). For instance, some studies indicate that male students tend to smoke more than their female counterparts, although the gap is narrowing, as more women adopt smoking (Chinwong et al., 2018; Hamadeh et al., 2020; Teixeira-da-Costa et al., 2022). A systematic review revealed that there was a consistent finding across various studies on the impact of peers, where students are more likely to smoke if they associate with friends who smoke (Leshargie et al., 2019). This social environment creates a normalization of smoking behavior, particularly in social settings where drinking and partying are common (Zhang et al., 2022; Zhou et al., 2023).

The transition to university life is often marked by increased stress, which is another critical factor in smoking initiation and continuation (Zhao et al., 2023). Many students report using cigarettes as a coping mechanism for academic pressures, social anxieties, and the overall stress of adjusting to a new environment (Al-Natour et al., 2021). This trend is particularly pronounced among first-year students, who may find themselves struggling with independence and the demands of higher education (Mkumbo et al., 2023). Furthermore, mental health issues, like depression and anxiety, were correlated with smoking, suggesting that students may resort to smoking as a means of self-medication (Lavallee et al., 2021; Ürün Ünal & Marakoğlu, 2024).

The rise of alternative tobacco products, particularly e-cigarettes and vaping, has further complicated the smoking landscape among university students (Alhaqbani et al., 2023; Le et al., 2022). Research indicates that many students perceive vaping as a less harmful alternative to traditional cigarettes, leading to an increase in its use (Al-Sawalha et al., 2021). This shift is concerning, as it can serve as a gateway to smoking or maintain nicotine addiction (Chen et al., 2023; Lee et al., 2019). Additionally, the marketing strategies targeting young adults have been shown to contribute to this trend, making tobacco products more accessible and appealing (Isip & Calvert, 2020; Putra et al., 2020).

Cessation efforts on university campuses have garnered attention in recent years (Berg et al., 2021). Various studies have evaluated the effectiveness of smoking cessation programs tailored specifically for students (Dereli et al., 2023; Setchoduk et al., 2023). Successful programs often incorporate peer support, accessibility, and educational components to raise awareness about the risks of smoking. Interventions that

foster a supportive community and promote healthy coping strategies have shown promise in reducing smoking rates (Office, 2020). However, barriers, such as stigma and a lack of resources, can hinder participation in these programs (Smith et al., 2024).

Health awareness campaigns have also played a crucial role in addressing smoking among students (Bafunno et al., 2020; Naganandini et al., 2025). Educational initiatives that emphasize the long-term health risks associated with smoking and the benefits of cessation have been implemented in many universities (Al-Qashoti et al., 2022; Sherman & Smith, 2019). These campaigns often utilize social media and on-campus events to engage students and disseminate information. Research indicates that such interventions can lead to a significant reduction in smoking rates, particularly when they involve interactive and peer-led components (Bafunno et al., 2020; Kjeld et al., 2023).

Longitudinal studies provide valuable insights into smoking behaviors of university students over time (Laroussy et al., 2023; Laroussy et al., 2024). These studies reveal patterns of smoking initiation and cessation, highlighting that many students who smoke in their first year may quit before graduation. Conversely, some individuals who do not smoke during their initial years may begin smoking later, influenced by changes in their social circles or increased stress.

Previous research on the knowledge and attitudes toward smoking among university students has revealed significant insights into this population's smoking behaviors (Mustafa et al., 2023). Many studies indicate that while awareness of the health risks associated with smoking is generally high, mis-conceptions persist, particularly regarding the relative safety of alternative tobacco products, like e-cigarettes (Alzahrani, 2020; Hartono et al., 2024). Research shows that students often underestimate the addictive potential of nicotine and overestimate their ability to quit smoking on their own (Pignataro & Daramola, 2020). Attitudinal studies highlight that peer influence plays a crucial role in shaping students' perceptions of smoking, with many believing that smoking enhances social interactions or reduces stress (Madtha et al., 2023). This gap in knowledge and resources underscores the need for targeted interventions that not only increase awareness of the dangers of smoking, but also provide practical support for those looking to quit. Overall, the existing literature emphasizes the importance of understanding the complex interplay between knowledge and attitudes to inform effective public health strategies aimed at reducing smoking among university students (Alves, 2024). Moreover, the research illustrates the multi-faceted nature of smoking among university students, influenced by a range of social, psychological, and environmental factors (Suhányi et al., 2020). As smoking behaviors continue to evolve, particularly with the rise of alternative products, ongoing research and tailored interventions are essential to effectively address this public health issue. Understanding the specific challenges and motivations of university students can help develop targeted strategies to promote healthier lifestyles and reduce smoking in this population.

In Jordan, the prevalence of smoking has raised alarm bells, necessitating a closer examination of the knowledge and attitudes surrounding smoking among this demographic (Alkouri et al., 2022). This study aims to examine and compare the levels of knowledge about the health risks of smoking and the attitudes toward smoking among smoking and non-smoking university students in Jordan.

Understanding these dynamics is crucial for developing effective public health interventions tailored to the unique needs of university students. While existing literature often highlights the detrimental health effects of smoking, there is a significant gap in knowledge regarding how these factors manifest, specifically in the Jordanian context. By conducting a comparative study of smokers and non-smokers, this study seeks to identify key differences in knowledge and attitudes that may inform targeted anti-smoking campaigns and educational programs.

Moreover, this study will contribute to the growing body of literature on the smoking habit among young adults in the Middle East, a region that has seen a rise in smoking habit in recent years. Through a comprehensive analysis of the factors influencing smoking behaviors, this study aims to provide actionable recommendations for policymakers, educators, and health professionals to combat smoking among university students in Jordan effectively. Ultimately, addressing the knowledge gaps and reshaping attitudes towards smoking can play a pivotal role in promoting healthier lifestyles and reducing smoking in this vulnerable population.

Purpose and Research Questions

The purpose of this study was to examine and

compare the levels of knowledge about the health risks of smoking and the attitudes toward smoking among smoking and non- smoking university students in Jordan. The following research questions guided the present study:

1. What are the levels of knowledge about the health risks of smoking among smoking and non- smoking university students in Jordan?
2. What are the levels of attitudes toward smoking among smoking and non- smoking university students in Jordan?
3. Do the levels of knowledge and attitudes toward smoking differ significantly between smoking and non-smoking university students in Jordan?

Methods

Design

A descriptive comparative cross-sectional approach was utilized to answer the research questions. According to Polit and Beck (2021), this design is suitable for investigating research problems that are not amenable to experimentation and manipulation, like the problem of this study (i.e., smoking). Moreover, this design is efficient, because it allows researchers to compare the study groups (smokers *versus* non-smokers) on intended outcomes (knowledge and attitudes). Data collection occurred during the first semester of the academic year 2024/2025.

Settings

This study was conducted at four universities (2 public universities & 2 private universities) located in the middle part of Jordan (Amman & Al-Zarqa). The selection of the four universities was based on several considerations. First, these two cities are among the most populous and urbanized areas in Jordan, housing a significant portion of the country's university-student population. Second, by including both public and private institutions, the study aimed to capture potential differences in smoking behaviors and attitudes across different educational settings and socio-economic backgrounds. Third, these universities were accessible and cooperative in terms of granting ethical approval and facilitating data collection. Collectively, this sampling strategy aimed to ensure diversity and enhance the representativeness of the findings for university students in the central region of Jordan, which serves as a cultural and educational hub. Data was collected in the students' classrooms, as it is easy to approach large numbers of students while they attend their courses.

Population and Sampling

The target population is all undergraduate university students in Jordan. On the other hand, the accessible population is those undergraduate university students who were studying at the previously selected universities. The students were included in this study if they meet the following inclusion criteria: 1) being available during data-collection time, 2) being registered at any course at the selected universities, 3) being able to read and understand Arabic language, 4) agree to participate in the present study and 5) the enrollment year of the student at the university should be between the first year and the fourth year. Conversely, the students were excluded from participation if they were having any medical or psychiatric condition that hindered their participation (such as acute myocardial infarction and psychosis). The eligible students were selected through stratified random sampling technique. There were two groups (smokers *versus* non-smokers). In this study, a stratified random sampling technique was employed to ensure balanced representation of both smoking and non- smoking university students. The total population of students at the selected universities was first stratified into two main groups based on self-reported smoking status: smokers and non-smokers. From each university, lists of students (from registrar records and through initial screening) were categorized according to these strata. Then, a simple random sampling method was used within each stratum to select participants. This approach ensured that both groups—smokers and non-smokers—were adequately represented for meaningful comparison in the analysis.

In relation to the sample size, a power analysis procedure was conducted using the G power 3.1 software program. The researchers applied the following parameters: t test as a test family, a power of 80%, a significance level (i.e., alpha) of 0.05, and a medium effect size, two-tailed. The resulting sample size was 128 participants (64 for each study group). However, 333 students were approached as a precaution.

Instrumentation

This study used two forms of self-report questionnaire: a demographics sheet and a smoking questionnaire.

Demographics Sheet

The researchers developed this sheet to measure the socio-demographic characteristics of the participants. The sheet included the following variables age, gender, place of residence, university year, occupational status, monthly income, grade point average (GPA), marital status, academic major or specialty, family smoking status, and the methods of smoking (for smoking students).

Smoking Questionnaire

The questionnaire is adopted from a previous similar study on knowledge, attitudes and practices of smoking (Haddad et al., 2020). The questionnaire is designed in Arabic language. The questionnaire is composed of two sections. The first section is the knowledge section consisting of 54 items. This section is composed of five sub-sections; cigarette harms and associated hazards (13 items), factors related to cigarettes' smoking initiation (9 items), hookah harms and associated hazards (13 items), factors related to hookah smoking initiation (9 items), and 8 questions about the cigarette-smoking ban. All questions utilized a five-point Likert scale ranging from 0 (no opinion) to 4 (strongly agree). The total score for the knowledge section is calculated by summing all items together and it ranges from 0 to 216. Higher scores indicate a higher level of knowledge. Moreover, the respondents' knowledge scores can be divided into three categories; low level of knowledge (scores between 0 and 54), moderate level of knowledge (scores from 55 to 162) and high level of knowledge (scores between 163 and 216). The internal consistency of the first section of the questionnaire has been tested and the results revealed an adequate reliability of the scale (Cronbach's alpha was 0.87).

The second section of the questionnaire is the attitude section. It consists of 23 items divided into 2 sub-scales as follows: attitudes toward cigarette smoking (10 items) and attitudes toward hookah smoking (13 items). Attitudes toward smoking sub-scale used a 4-point Likert scale that ranges from 0 (no) to 3 (yes of course), and the attitudes toward hookah smoking sub-scale utilized a five-point Likert scale ranging from 0 (no opinion) to 4 (strongly agree). The total score of the attitude section is calculated by summing all items together. The total score of this section ranged from 0 to 82; higher scores on this section indicate more positive attitudes. In this study, the scale demonstrated an excellent internal consistency reliability (Cronbach's alpha was 0.92).

Data-collection Procedures

A multi-stage sampling approach was used to select a representative sample of university students from the central region of Jordan. First, four universities (two public and two private) were selected using cluster sampling from Amman and Al-Zarqa, which were chosen due to their high student population and representation of both public and private education sectors. To select the universities. the researchers got the list of all universities located in Amman and Al-Zarqa from the Jordanian Ministry of Higher Education and Scientific Research, and used this list for the selection of universities under study. Second, from each selected university, one class was randomly chosen using simple random sampling to serve as the primary sampling unit. To fulfill this purpose, the researchers contacted the admission and registration office at each selected university to get a list of all theoretical classes offered for undergraduate students during the first semester of the academic year 2024/2025. Then, one class from each institution was selected. Each selected class included students from a variety of academic disciplines and levels. From each class, 75 students were recruited, resulting in a total sample of 300 students. The students' records for the classes were obtained from the lecturers and were used to select the participants.

To ensure balanced representation of both smokers and non-smokers, stratified random sampling was applied within each class. Students were first stratified into two groups based on self-reported smoking status (smokers and non-smokers), and then, the participants were randomly selected from each group according to proportional allocation, where possible. This method allowed for an adequate and unbiased representation of both groups across different universities and academic settings.

The researchers approached the teachers/ lecturers of the selected classes and briefed the study for them and agreed about the suitable time for collecting data during their classes. The lecturers introduced the researchers to the students, and then left the classes. The researchers distributed the students' information sheets for the eligible and selected students. Then, informed consent forms were obtained from the participants. The students were then given the study instruments. It is important to note that the Arabic version of the questionnaire was distributed to the study participants to eliminate any language barriers, as the mother language of the

participants in Joran is Arabic. The filled questionnaire forms were collected from the students by the researchers who were available in the classrooms. The collected questionnaire forms were kept in a private locker for the researchers.

Ethical Considerations

The researchers followed the ethical principles of nursing research. The study was revised by the ethical committees of the selected universities and Institutional Review Board (IRB) approvals were obtained (IRB numbers 202566, 2025108, 2025333, & 2025225). The study participants were aware of the study purpose and the nature of commitment through using the students' information sheets. Participation was voluntary and the students signed an informed consent form before participation. Also, the participants were having the right to withdraw from the study at any time without any penalty. The students' responses were anonymous, as the study used a questionnaire that did not request any personal data (such as name and university number) from the participants. The researchers obtained the approvals to use the study tools from the original authors.

Data-analysis Plan

The researchers used the Statistical Package for Social Sciences (SPSS), version 26, for Windows. Initially, the collected data was coded and entered into an SPSS sheet. Data cleaning procedures were conducted. The researchers employed both descriptive and inferential statistics. The researchers used the following descriptive measures for describing the characteristics of the participants and the main study variables: mean, standard deviation, frequency, and percentage. In order to compare both the study groups (smokers *versus* non-smokers) on the key variables, the researchers used independent sample t-test.

Results

Demographic Characteristics

A total of 300 university students participated in the study. Of the 333 students who were invited to participate, 300 completed the questionnaire, yielding a high response rate of 90%. This high response rate enhances the reliability of the findings and suggests strong engagement from the target population. The students' age ranged from 18 years to 24 years (M = 20.10; SD = 2.06), their family income ranged from 200 Jordanian Dinars to 1000 Jordanian Dinars (M = 487.04; SD = 189.37), and their cumulative grade point average (GPA) ranged from 52% to 85 % (M = 68.02; SD = 6.54). The study results showed that most of the participants were single (n= 287, 95.7%), females (n= 179, 59.7%), first-year university students (n= 146, 48.7%), studying at scientific faculties (n= 100, 33.3%), resided in urban areas (n= 230, 76.7%), unemployed (n= 253, 84.3 %), had a smoker family member (n= 228, 76 %). A half of the students were smokers (n= 150, 50 %) and the most commonly smoking method among smokers was cigarette smoking (n= 80, 26.7%). Table 1 summarizes the characteristics of the study participants.

Table 1. Characteristics of the study sample (n = 300)

Variable		**Mean**	**SD**
Age		20.10	2.06
Income		487.04	189.37
Grade (GPA)		68.02	6.54
Variable		**Frequency**	**Percent**
Gender	Male	121	40.3 %
	Female	179	59.7 %
Marital Status	Single	287	95.7 %
	Married	10	3.3 %
	Divorced	3	1 %
Enrollment Year	First Year	146	48.7 %
	Second Year	129	43 %
	Third Year	20	6.7 %
	Fourth Year	5	1.7 %

Major	Humanistic Faculties	60	20 %
	Scientific Faculties	100	33.3%
	Engineering Faculties	50	16.7 %
	Health Faculties	90	30 %
Residence	Urban	230	76.7%
	Rural	70	23.3 %
Current Occupation	Unemployed	253	84.3 %
	Employed	47	15.7 %
Living With Smokers	Yes	228	76 %
	No	72	24 %
Smoking Family Member	Yes	228	76 %
	No	72	24 %
Smoking Status	Yes	150	50 %
	No	150	50 %
Smoking Method	Not a Smoker	150	50 %
	Regular Cigarettes	80	26.7 %
	Electronic Cigarettes (Vaping)	32	10.7 %
	Hookah	38	12.7 %

Knowledge Related to Smoking

The results revealed that the total knowledge scores for smoking participants ranged from 0 to 208 (M = 151.07; SD = 33.3). The mean scores for smokers indicate that this group has moderate knowledge related to smoking. Similarly, the total knowledge scores for non-smoking participants ranged from 19 to 200 (M = 147.9; SD = 31.22). The mean scores for non-smokers indicate that this group has moderate knowledge related to smoking.

Considering the sub-scales of knowledge, for smokers, the results showed that the highest ranked sub-scale is the cigarette harms and associated hazards sub-scale (M = 37.39; SD = 9.14). Conversely, the lowest ranked sub-scale is the factors related to cigarette smoking initiation sub-scale (M = 24.87; SD = 8.17). Comparable findings are evident for non-smokers, where the results indicate that that highest ranked sub-scale is the cigarette harms and associated hazards sub-scale (M = 36.45; SD = 7.38), and the lowest ranked sub-scale is the factors related to cigarette smoking initiation sub-scale (M = 22.71; SD = 9.47).

Individual item analysis of the knowledge questionnaire showed that the highest reported score by smoking participants is for item number 12 (“Cigarettes affect infants”) (M = 3.54; SD = 0.96). In contrast, the lowest reported score is for item number 1 (“Will you smoke cigarettes in 5 years?”) (M = 1.74; SD = 1.50). For non-smoking participants, the highest reported score is for item number 53 (“I support a smoking ban on public transport”) (M = 3.73; SD = 0.77). In contrary, the lowest reported score is for item number 1 (“Will you smoke cigarettes in 5 years?”) (M = 1.02; SD = 0.52). The results are presented in Table 2.

Table 2. Smoking knowledge among Jordanian students (N=300)

		Smokers (n = 150)		**Non-smokers (n = 150)**	
No.	**Sub-scale/Item**	**Mean**	**SD**	**Mean**	**SD**
	Cigarettes harms and associated hazards (items 1-13)	**37.39**	**9.14**	**36.45**	**7.38**
1	Will you smoke cigarettes in 5 years?	1.74	1.50	1.02	0.52
2	Do you intend to stop smoking cigarettes?	2.33	1.58	1.56	1.82
3	Do you have friends or family members who smoke cigarettes?	3.35	0.98	2.82	1.21
4	Cigarettes are as harmful as hookah.	3.03	1.33	3.39	1.11
5	Cigarettes are more harmful than hookah	2.53	1.51	2.67	1.43
6	Cigarettes contain ingredients that may cause cancer.	3.43	1.05	3.56	1.03

7	Cigarettes are safe, because they are filtered.	1.91	1.29	1.41	0.94
8	Cigarettes contain addictive substances.	3.31	1.77	3.51	0.93
9	Cigarettes produce harmful gases.	3.29	1.161	3.52	0.96
10	Cigarettes contain carcinogenic substances.	3.26	1.20	3.60	0.91
11	Cigarette smoking affects the fetus in pregnant women.	3.51	1.03	3.61	0.94
12	Cigarettes affect infants.	3.54	0.96	3.68	0.76
13	Smoking cigarettes in smaller quantities does not lead to a reduced harmful effect on the fetus.	2.16	1.41	2.10	1.45
	Factors related to cigarette smoking initiation (items 14-23)	**24.87**	**8.17**	**22.71**	**9.47**
14	Entertainment	2.85	1.37	2.48	1.46
15	Relaxation	2.63	1.29	2.21	1.46
16	Filling time (boredom/loneliness/lack of alternative entertainment)	2.87	1.27	2.79	1.36
17	Out of curiosity	2.71	1.35	2.69	1.34
18	For social communication	2.74	1.36	2.21	1.47
19	To test something new	2.51	1.42	2.59	1.38
20	For fun	2.81	1.31	2.70	1.36
22	Individual pressure	2.87	1.29	2.35	1.60
23	Stress	3.15	1.17	2.68	1.53
	Hookah harms and associated hazards (items 24-37)	**36.44**	**10.56**	**35.79**	**8.28**
24	Will you smoke hookah in 5 years?	1.69	1.53	1.12	0.76
25	Are you planning to quit smoking hookah?	2.30	1.69	1.48	1.79
26	Do you have friends or family members who smoke hookah?	3.19	1.17	2.69	1.29
27	Hookah is as harmful as cigarettes.	3.17	1.20	3.33	1.15
28	Hookah is more harmful than cigarettes.	3.01	1.37	3.01	1.45
30	Hookah contains ingredients that may cause cancer.	3.07	1.46	3.37	1.15
31	Hookah is safe, because it is filtered.	1.99	1.38	1.55	1.16
32	Hookah contains addictive substances.	2.98	1.40	3.29	1.21
33	Hookah produces harmful gases.	2.99	1.38	3.45	1.03
34	Hookah contains carcinogenic substances.	3.06	1.36	3.18	1.39
35	Hookah affects the fetus in pregnant women.	3.03	1.20	3.51	0.97
		Smokers (n = 150)		**Non-smokers (n = 150)**	
No.	**Sub-scale/Item**	**Mean**	**SD**	**Mean**	**SD**
	Hookah harms and associated hazards (items 24-37)	36.44	10.56	35.79	**8.28**
36	Hookah affects infants.	3.45	0.96	3.61	0.90
37	Smoking hookah in smaller quantities does not lead to a reduced harmful effect on the fetus.	2.25	1.41	2.21	1.49
	Factors related to hookah smoking initiation (items 38-46)	**26.13**	**9.11**	**23.93**	**9.59**
38	Entertainment	3.18	1.19	2.81	1.37
39	Relaxation	2.95	1.20	2.51	1.45
40	Filling time (boredom/loneliness/lack of alternative entertainment)	2.85	1.37	2.87	1.37
41	Out of curiosity	2.84	1.28	2.74	1.37
42	For social communication	2.77	1.32	2.37	1.49
43	To test something new	2.66	1.46	2.65	1.41
44	For fun	2.94	1.25	2.87	1.29
45	Individual pressure	2.95	1.22	2.48	1.48
46	Stress	3.00	1.24	2.64	1.48

	Cigarette/smoking ban (items 47-54)	**29.02**	**6.45**	**26.23**	**8.23**
47	I support a smoking ban for those under 18 years of age.	3.39	1.19	3.68	0.91
48	I support a ban on tobacco ads on TV and radio.	3.24	1.33	3.53	1.11
49	I support the warning message on cigarette packs.	3.37	1.14	3.57	1.03
50	I support a smoking ban in hospitals and healthcare facilities.	3.50	1.04	3.63	1.05
51	I support a smoking ban in restaurants.	3.29	1.29	3.66	0.93
52	I support a smoking ban at work.	3.13	1.34	3.61	1.03
53	I support a smoking ban on public transport.	3.29	1.18	3.73	0.77
54	I support a smoking ban in public parks or gardens.	3.01	1.39	3.61	0.97
	Overall knowledge score	**151.07**	**33.3**	**147.9**	**31.22**

Attitudes toward Smoking

Analysis of the attitude section of the questionnaire revealed that smoking participants have total attitude scores ranging from 0 to 82 (*M* = 46.60; *SD* = 18.87). On the other hand, the total knowledge scores for non-smoking participants ranged from 0 to 65 (*M* = 26.60; *SD* = 13.41). Individual item analysis of the attitude section of the questionnaire showed that the highest reported score by smoking participants is for item number 23 ("I think I can stop smoking hookah at any time") (*M* = 2.85; *SD* = 1,39). In contrast, the lowest reported score is for item number 8 ("Would you be willing to give up your family on a holiday to find cigarettes?") (*M* = 0.94; *SD* = 1.18). For non- smoking participants, the highest reported score is for item number 23 ("I think I can stop smoking hookah at any time") (*M* = 1.91; *SD* = 1.28). In contrary, the lowest reported score is for item number 1 ("I smoke (or plan to smoke) cigarettes to lift my spirit") (*M* = 0.45; *SD* = 0.77). The results are presented in Table 3.

Table 3. Attitude toward smoking among Jordanian students (N=300)

		Smokers (n = 150)		**Non-smokers (n = 150)**	
No.	**Sub-scale/Item**	**Mean**	**SD**	**Mean**	**SD**
	Attitudes toward cigarette smoking (items 1-10)	**13.15**	**9.14**	**5.42**	**5.79**
1	I smoke (or plan to smoke) cigarettes to lift my spirit.	1.34	1.25	0.45	0.77
2	I smoke (or plan to smoke) cigarettes for pleasure.	1.63	1.24	0.52	0.85
3	I smoke (or plan to smoke) cigarettes to focus at work.	1.59	1.17	0.59	0.86
4	I smoke (or plan to smoke) cigarettes to reduce nervousness.	1.73	1.28	0.58	0.85
5	I smoke (or plan to smoke) cigarettes for socializing.	1.07	1.20	0.55	0.88
6	I smoke (or plan to smoke) cigarettes, because it is a personal habit.	1.46	1.18	0.56	0.87
7	I smoke (or plan to smoke) cigarettes to avoid eating.	1.01	1.23	0.58	0.92
8	Would you be willing to give up your family on a holiday to find cigarettes?	0.94	1.18	0.65	0.96
9	Would you rather smoke cigarettes than go to the theater or other activities?	1.19	1.24	0.49	0.83
10	Are you ready to stop eating for a cigarette?	1.18	1.26	0.60	
	Attitudes toward hookah smoking (items 11-23)	**33.39**	**13.87**	**21.09**	**11.75**
11	You smoke (or plan to smoke) hookah because of entertainment.	2.63	1.43	1.57	1.34
12	You smoke (or plan to smoke) hookah, because it is a very affordable way to relax.	2.66	1.28	1.67	1.20
13	You smoke (or plan to smoke) hookah, because it is eye-catching.	2.41	1.39	1.53	1.17
14	You smoke (or plan to smoke) hookah, because it is romantic.	2.44	1.37	1.44	1.22
15	You smoke (or plan to smoke) hookah, because it is entertaining.	2.62	1.34	1.70	1.19
16	You smoke (or plan to smoke) hookah, because it is very popular.	2.56	1.28	1.53	1.17
17	You smoke (or plan to smoke) hookah, because it is socially acceptable.	2.55	1.34	1.69	1.23

18	You smoke (or plan to smoke) hookah, because it is fashion.	2.53	1.24	1.62	1.19
19	You smoke (or plan to smoke) hookah, because it is strange.	2.55	1.38	1.67	1.18
20	You smoke (or plan to smoke) hookah, because it is intimate.	2.44	1.41	1.52	1.21
21	The number of hookahs I smoke now is greater than when I started.	2.55	1.34	1.54	1.20
22	I am ready to stop smoking hookah.	2.59	1.45	1.71	1.25
23	I think I can stop smoking hookah at any time.	2.85	1.39	1.91	1.28
	Overall attitudes' score	**46.60**	**18.78**	**26.60**	**13.41**

Comparisons between the Two Study Groups

Using independent-sample t-test analysis, the results showed that the mean of the three knowledge sub-scale scores (namely factors related to cigarette smoking initiation, factors related to hookah smoking initiation, and cigarette/smoking ban sub-scales) are higher among smokers. The results showed that there are statistically significant differences in these sub-scale scores between smoking and non-smoking students (Table 4).

From a different perspective though, the independent-sample t-test results revealed that the mean of the total attitude scale and the two perceived attitude sub-scale scores are higher among smokers. The results showed that there are statistically-significant differences in the total attitudes' score and all sub-scale scores between smokers and non-smokers. This indicates that smoking students have more positive attitudes (Table 4).

Table 4. Independent-samples t-test statistics that compare knowledge and attitude scores between smokers and non-smokers (N=300)

Scale/Sub-scale	Mean (SD)	*t*	d.f.	*P*-value
Total smoking knowledge scale		0.85	298	0.40
Smokers	151.07 (33.31)			
Non-smokers	147.90 (31.22)			
Cigarette harms and associated hazards sub-scale		0.98	298	0.33
Smokers	37.39 (9.14)			
Non-smokers	36.45 (7.38)			
Factors related to cigarette smoking initiation sub-scale		2.12	298	0.04*
Smokers	24.87 (8.165)			
Non-smokers	22.71 (9.47)			
Hookah harms and associated hazards sub-scale		0.59	298	0.56
Smokers	36.44 (10.86)			
Non-smokers	35.79 (8.28)			
Factors related to hookah smoking initiation sub-scale		2.03	298	0.04*
Smokers	26.13 (9.11)			
Non-smokers	23.93 (9.59)			
Cigarette/smoking ban sub-scale		3.27	298	0.001*
Smokers	29.02 (6.45)			
Non-smokers	26.23 (8.23)			
Total smoking attitudes' scale		-10.53	298	0.001*
Smokers	46.60 (18.76)			
Non-smokers	26.06 (13.41)			
Attitudes toward cigarette smoking sub-scale		8.69	298	0.001*
Smokers	13.15 (9.14)			
Non-smokers	5.42 (5.79)			
Attitudes toward hookah smoking sub-scale		8.29	298	0.001*
Smokers	33.39 (13.87)			
Non-smokers	21.09 (11.75)			

* Significant at $\alpha = 0.05$ (2-tailed).

Discussion

This study aimed to examine the knowledge and attitudes related to smoking among university students in Jordan, comparing smokers and non-smokers to identify key differences. The findings provide valuable insights into students' awareness of smoking-related risks, their perceptions of smoking behavior, and their attitudes that consist of a set of emotions, beliefs, and behaviors toward the smoking matter. Understanding these differences is crucial for developing targeted interventions and educational programs aimed at reducing smoking prevalence and promoting healthier behaviors among university students. In this part of the study, the researchers discussed the study's key findings in relation to existing literature, exploring their implications, and highlighting potential recommendations for public health initiatives and future research.

The study results showed that students in the smoking group perceived a higher level of knowledge concerning factors that contribute to either cigarette or hookah smoking, as well as the smoking-ban dimension. In contrast to this finding, Al Omari et al. (2021) found that non-smoking students had a higher level of knowledge than smoking students in Oman. The differences in the findings between our study and Al Omari et al.'s study could be attributed to the use of different tools to measure students' knowledge.

The finding that smokers have higher knowledge scores across the three sub-scales—factors related to cigarette smoking initiation, factors related to hookah smoking initiation, and cigarette/smoking ban sub-scales—can be justified by several interrelated factors. First, smokers are more likely to have firsthand experience with smoking initiation, making them more aware of the various influences that contribute to smoking, such as peer pressure, social settings, and psychological triggers (Mohammadnezhad & Kengganpanich, 2021). Their personal engagement with smoking behaviors may enhance their understanding of these factors compared to non-smokers, who may have limited exposure.

Additionally, smokers may actively seek information related to smoking, whether due to personal curiosity, risk assessment, or attempts to quit, leading to an increased awareness of smoking initiation factors and related regulations (Kostagiolas et al., 2022). Furthermore, smokers are often more exposed to discussions regarding smoking bans and restrictions, as these policies directly affect their behavior (Catalano & Gilleskie, 2021). This exposure may make them more knowledgeable about smoking control regulations and public health campaigns compared to non-smokers, who may not pay as much attention to such issues.

Another possible explanation is the role of cognitive dissonance, where smokers, in an attempt to justify or rationalize their behavior, become more informed about smoking-related issues (Keskindağ, 2023). They may acquire knowledge as a means of either validating their choices or preparing for possible future cessation attempts. Additionally, social and cultural norms play a crucial role in shaping knowledge levels, particularly in societies where smoking is prevalent among young adults (Wallace-Williams et al., 2023). Smokers may be more immersed in discussions surrounding smoking, both informally within peer groups and formally through public discourse, increasing their awareness. The case of hookah smoking is particularly relevant in this context, as its growing popularity among young adults, especially in Middle Eastern countries, exposes smokers to more information about its initiation factors (Asiedua et al., 2025). Many smokers engage in both cigarette and hookah smoking, which may contribute to their broader understanding of smoking in different forms. Collectively, these factors suggest that higher knowledge scores observed among smokers are likely a result of their direct engagement with smoking behaviors, increased exposure to smoking-related information, and the cognitive and social dynamics associated with smoking.

From a different perspective though, our results showed that smoking students have more positive attitudes toward smoking than non-smoking students. Similar results were evident in the literature; for instance, Alves et al. (2022) reported that smoking university students in Portugal had favorable attitudes toward smoking. The finding that smokers have significantly higher mean scores on the total attitude scale and its sub-scales indicates more positive attitudes toward smoking, which can be attributed to several psychological, social, and behavioral factors. One possible explanation is the normalization and social acceptance of smoking within peer groups (Hoek et al., 2022). Smokers are more likely to be surrounded by other smokers, reinforcing positive perceptions of smoking and diminishing negative views. The cognitive dissonance theory also plays a role, as smokers may

develop favorable attitudes toward smoking to justify their behavior and reduce the internal conflict between knowing its harmful effects and continuing practicing the habit.

Additionally, the perceived benefits of smoking, such as stress relief, social bonding, and enhanced concentration, may contribute to more positive attitudes among smokers (Perski et al., 2022). These perceived advantages can lead to a stronger psychological attachment to smoking, making them view it in a more favorable light than non-smokers, who may not experience these effects firsthand. Another key factor is exposure to pro-smoking influences, including smoking advertisements, media portrayals, and social interactions that reinforce smoking as a socially acceptable or even desirable behavior (Addo et al., 2024).

. Smokers are also more likely to underestimate the health risks of smoking, either due to misinformation, selective exposure to pro-smoking content, or a defense mechanism that minimizes perceived harm (Brennan et al., 2025). Furthermore, cultural and environmental factors may shape attitudes, especially in regions where smoking is prevalent and not strongly discouraged. In such contexts, smokers may develop a sense of identity and belonging within smoking groups, further reinforcing positive attitudes. Taken together, these factors suggest that the more favorable attitudes observed among smokers are a result of social reinforcement, psychological justification, perceived benefits, and cultural influences that shape their views on smoking.

Implications for Nursing

The findings of this study, which highlights significant differences in knowledge and attitudes between smoking and non-smoking university students, have important implications for public-health initiatives, smoking-prevention programs, policy development, and nurses. The higher knowledge scores among smokers suggest that awareness alone may not be sufficient to deter smoking behavior, emphasizing the need for behavioral change strategies that go beyond simply educating students about smoking risks. This underscores the importance of integrating targeted interventions, such as motivational interviewing, peer-led programs, and smoking cessation support services, to help smokers translate their knowledge into action. Additionally, the more positive attitudes toward smoking among smokers indicate the strong influence of social and psychological factors, necessitating interventions that address peer pressure, stress management, and cognitive dissonance in smoking-related attitudes. Universities should implement campus-wide anti-smoking policies, awareness campaigns, and peer education programs to shift social norms and reduce the appeal of smoking. Moreover, public-health efforts should focus on counteracting pro-smoking influences, such as media portrayals and social acceptance, by promoting evidence-based messages on the harms of smoking, enhancing the visibility of smoking-cessation resources, and fostering supportive environments for quitting. Given that non-smokers demonstrated lower knowledge scores, incorporating comprehensive smoking education into university curricula could further strengthen preventative efforts and equip students with the knowledge needed to resist smoking initiation. Overall, these findings highlight the need for multi-level interventions that combine education, policy enforcement, and behavioral strategies to reduce smoking rates and promote healthier attitudes among university students.

The findings of this study have significant implications for nurses, particularly those involved in public health, health promotion, and smoking-cessation programs. Given the differences in knowledge and attitudes between smokers and non-smokers, nurses play a critical role in developing and implementing tailored educational interventions that address the specific needs of both groups. For smokers, nurses can use behavioral counseling techniques, such as motivational interviewing, to help them recognize the risks of smoking and support their efforts to quit. Since the study revealed that smokers have higher knowledge, yet maintain more positive attitudes toward smoking, nurses should focus on bridging the gap between awareness and behavior change by incorporating strategies that challenge cognitive dissonance and reinforce the negative health consequences of smoking. Additionally, nurses can advocate for and lead peer support groups and smoking-cessation workshops, providing university students with practical tools and psychological support to overcome smoking addiction.

For non-smokers, nurses should focus on strengthening preventive measures by increasing awareness of smoking risks and enhancing students' ability to resist social influences that encourage smoking

initiation. Given the lower knowledge scores observed in non-smokers, nurses can collaborate with universities to integrate smoking education into health promotion programs, ensuring that all students are well-informed about the dangers of smoking, including both cigarettes and hookah. Furthermore, nurses can play a key role in policy advocacy by working with university administrations to enforce smoke-free campus policies and promote a culture of health and well-being. By conducting regular health education sessions, awareness campaigns, and individualized counseling, nurses can help shift social norms around smoking, making it less acceptable and desirable among students. Additionally, nurses can leverage social media platforms and digital health interventions to reach a broader audience, providing evidence-based information on smoking risks and cessation strategies. Ultimately, nurses serve as frontline healthcare professionals who can significantly influence smoking behaviors among university students through education, counseling, advocacy, and community engagement, contributing to a healthier, smoke-free academic environment. More research is needed to explore the predictors or influencing factors that affect knowledge of university students and their attitudes toward smoking.

Limitations

The study has some limitations that need to be considered. Initially, the study used a self-report questionnaire; thus, the participants might provide socially accepted responses. Secondly, the participants were recruited from those universities located in the middle part of Jordan, and therefore, the results could not be generalized to other parts of Jordan, like peripheral north and south areas, as well as to other countries.

Conclusion

In conclusion, this study highlights significant differences in knowledge and attitudes toward smoking between smoking and non-smoking university students in Jordan, providing valuable insights into the factors influencing smoking behavior in this population. The findings indicate that while smokers possess higher knowledge regarding smoking initiation factors and smoking bans, they also exhibit more positive attitudes toward smoking, suggesting that awareness alone is not sufficient to deter smoking. These results emphasize the complex interplay between knowledge, social influences, and psychological factors in shaping smoking behavior. The study underscores the need for comprehensive smoking prevention and cessation programs that not only focus on educating students about the harms of smoking, but also address the underlying cognitive and social factors that contribute to positive attitudes toward smoking. Public health professionals, including nurses, should play a pivotal role in implementing targeted interventions, campus-wide smoking policies, and behavioral counseling programs to promote healthier attitudes and reduce smoking prevalence among university students. Additionally, integrating smoking-related education into university curricula and utilizing peer-led initiatives may help counteract the normalization of smoking and strengthen prevention efforts. Future research should explore additional factors influencing smoking behaviors, such as psychological stress, socio-economic status, and cultural perceptions, to develop more effective and culturally tailored smoking-prevention strategies. By addressing both knowledge gaps and attitudinal influences, universities and healthcare professionals can work collaboratively to create a supportive environment that discourages smoking and promotes the overall student well-being.

Acknowledgements

The authors dedicate this academic work for the Jordanian students who inspired them to conduct this study.

Conflict of Interests

The authors declare that they have no conflict of interests.

Funding or Sources of Financial Support

This research paper is not funded from any institution.

REFERENCES

Abdelraouf, M.M., Abdalla, R.A., Mohamed, D.M., Ahmed, A.K., Abuzaid, M.A., Issak, M.A., Eljack, I. A., Saeed, E., & Abdelaziz, M.O. (2024). Prevalence of smoking and its associated factors among students of the University of Dongola, Northern State, Sudan: A cross-sectional study. *Annals of Medicine and Surgery*, *86*(5), 2543-2548.

Addo, I.Y., Acquah, E., Nyarko, S.H., Dickson, K.S., Boateng, E.N., & Ayebeng, C. (2024). Exposure to pro-tobacco and anti-tobacco media messages and events and smoking behaviour among adolescents in Gambia. *BMC Public Health*, *24*(1), 1041-1054.

Ahmed, M.S., Sayeed, A., Jahan, I., Dewan, M.F., & Mali, S.K. (2020). Prevalence and factors associated with cigarette smoking among resident university students: A cross-sectional study from Bangladesh. *Population Medicine*, *2*(2), 3-9.

Aldalaykeh, M., Bawaaneh, A., Beam, E., Al-Dwaikat, T., & Alazzam, M. (2023). Sleep, dietary habits, smoking status and physical activity among Jordanian nurses. *Jordan Journal of Nursing Research*, *2*(1), 29-39.

Alhaqbani, A., Alismail, M., Alotaibi, A., Alibrahim, Z., Alqahtani, A., Omair, A., & Al-Nasser, S. (2023). The use of vaping among male health sciences students compared to other male students in Riyadh. *Cureus*, *15*(12), e51257-e51265.

Alkouri, O., Khader, Y., & Al-Bashaireh, A.M. (2022). Prevalence of cigarette and waterpipe smoking among Jordanians, refugees, and migrants in Jordan and its associated factors: A secondary-data analysis. *International Journal of Environmental Research and Public Health*, *20*(1), 1-10.

Al-Natour, A., Gillespie, G.L., & Alzoubi, F. (2021). "We cannot stop smoking": Female university students' experiences and perceptions. *Applied Nursing Research*, *61*, 151477-151483.

Al Omari, O., Abu Sharour, L., Heslop, K., Wynaden, D., Alkhawaldeh, A., Al Qadire, M., & Khalaf, A. (2021). Knowledge, attitudes, prevalence and associated factors of cigarette smoking among university students: A cross-sectional study. *Journal of Community Health*, *46*, 450-456.

Al-Qashoti, M.R., Aljassim, R., Sherbash, M.A., Alhussaini, N.W., & Al-Jayyousi, G.F. (2022). Tobacco-cessation programs and factors associated with their effectiveness in the Middle East: A systematic review. *Tobacco Induced Diseases*, *20*, 1-27.

Al-Sawalha, N.A., Almomani, B.A., Mokhemer, E., Al-Shatnawi, S.F., & Bdeir, R. (2021). E-cigarette use among university students in Jordan: Perception and related knowledge. *PLoS One*, *16*(12), e0262090-e0262103.

Alves, R.F., Precioso, J., & Becoña, E. (2022). Smoking behavior and secondhand smoke exposure among university students in northern Portugal: Relations with knowledge on tobacco use and attitudes toward smoking. *Pulmonology*, *28*(3), 193-202.

Alves, R.F. (2024). The relationship between health-related knowledge and attitudes and health risk behaviours among Portuguese university students. *Global Health Promotion*, *31*(1), 36-44.

Alzahrani, S.H. (2020). Levels and factors of knowledge about the related health risks of exposure to secondhand smoke among medical students: A cross-sectional study in Jeddah, Saudi Arabia. *Tobacco Induced Diseases*, *18*, 88-102.

Asiedua, C., Abah, E., & Asare, M. (2025). Theoretical perspectives on hookah smoking behavior: A scoping review of studies among young adults in low-and middle-income countries. *Journal of Community Health*, *3*(15), 1-20.

Bafunno, D., Catino, A., Lamorgese, V., Del Bene, G., Longo, V., Montrone, M., ..., & Galetta, D. (2020). Impact of tobacco control interventions on smoking initiation, cessation, and prevalence: A systematic review. *Journal of Thoracic Diseases*, *12*(7), 3844-3856.

Berg, C.J., Yang, Y.T., Pratt-Chapman, M.L., Douglas Evans, W., Cupertino, A.P., Horn, K., ... & Tercyak, K.P. (2021). Campus tobacco control policies and cessation interventions in college students: A commentary calling for research and action to address tobacco-related health disparities. *Translational Behavioral Medicine*, *11*(4), 1030-1036.

Bin Abdulrahman, K.A., Alghamdi, H.A., Alfaleh, R.S., Albishri, W.S., Almuslamani, W.B., Alshakrah, A. M., Alsuwailem, H. A., & Alkhelaiwi, S. A. (2022). Smoking habits among college students at a public university in Riyadh, Saudi Arabia. *International Journal of Environmental Research and Public Health*, *19*(18), 11557-11568.

Brennan, E., Nuss, T., Haynes, A., Scollo, M., Winnall, W.R., Wakefield, M., & Durkin, S. (2025). Misperceptions about the effectiveness of cutting down

and low-rate daily smoking for reducing the risk of tobacco-caused harm. *Nicotine and Tobacco Research*, *27*(5), 932-936.

Catalano, M.A., & Gilleskie, D.B. (2021). Impacts of local public smoking bans on smoking behaviors and tobacco smoke exposure. *Health Economics*, *30*(8), 1719-1744.

Chen, G., Rahman, S., & Lutfy, K. (2023). E-cigarettes may serve as a gateway to conventional cigarettes and other addictive drugs. *Advances in Drug and Alcohol Research*, *3*, 11345-11359.

Chinwong, D., Mookmanee, N., Chongpornchai, J., & Chinwong, S. (2018). A comparison of gender differences in smoking behaviors, intention to quit, and nicotine dependence among Thai university students. *Journal of Addiction*, *2018*(1), 8081670-8081678.

Delgado-Lobete, L., Montes-Montes, R., Vila-Paz, A., Cruz-Valiño, J.M., Gándara-Gafo, B., Talavera-Valverde, M.Á., & Santos-del-Riego, S. (2020). Individual and environmental factors associated with tobacco smoking, alcohol abuse and illegal drug consumption in university students: A mediating analysis. *International Journal of Environmental Research and Public Health*, *17*(9), 3019-3035.

Dereli, F., Tekindal, M., & Tekindal, M.A. (2023). The effect of motivational interviewing on smoking cessation of university students: A meta-analysis. *Addicta: The Turkish Journal on Addictions*, *10*(3).

Hamadeh, R.R., Lee, J., Abu-Rmeileh, N.M., Darawad, M., Mostafa, A., Kheirallah, K.A., Yusufali, A., Thomas, J., Salama, M., Nakkash, R., & Salloum, R.G. (2020). Gender differences in waterpipe tobacco smoking among university students in four Eastern Mediterranean countries. *Tobacco-induced Diseases*, *18*, 100-112.

Hartono, R., Yan, C., Chen, Y., Ma, B., Deng, Y., Sun, Y., Li, P., Dao, Y., & Deng, R. (2024). Knowledge, attitude, and practice of e-cigarette use among undergraduate students: A comparative study between China and Indonesia. *Tobacco-induced Diseases*, *22*, 18320-18332.

Haddad, C., Sacre, H., Hajj, A., Lahoud, N., Akiki, Z., Akel, M., Saade, D., Zeidan, R.K., Rita Farah, R., Hallit, S., & Salameh, P. (2020). Comparing cigarette smoking knowledge and attitudes among smokers and non-smokers. *Environmental Science and Pollution Research*, *27* (16), 19352-19362.

Hafez, S.M., Ghazawy, E.R., Mahfouz, E.M., Abd-El Rahman, T.A., & Emam, S.A. (2022). Smoking prevalence among university students, Minia, Egypt. *International Journal of Health Sciences*, *6*(S2), 7173-7182.

Hassan, M.S., Hossain, M.K., & Khan, H.T. (2019). Prevalence and predictors of tobacco smoking among university students in Sylhet division, Bangladesh. *International Health*, *11*(4), 306-313.

Hoek, J., Edwards, R., & Waa, A. (2022). From social accessory to societal disapproval: Smoking, social norms and tobacco endgames. *Tobacco Control*, *31*(2), 358-364.

Isip, U., & Calvert, J. (2020). Analyzing big tobacco's global youth marketing strategies and factors influencing smoking initiation by Nigerian youth using the theory of triadic influence. *BMC Public Health*, *20*, 1-12.

Keskindağ, B. (2023). Understanding smoking behaviour: Interpretative phenomenological analysis highlighting cognitive dissonance. *Current Research in Health Sciences*, *III*, 37-48.

Kjeld, S.G., Thygesen, L.C., Danielsen, D., Jakobsen, G.S., Jensen, M.P., Holmberg, T., Bast, L.S., Lund, L., Pisinger, C., & Andersen, S. (2023). Effectiveness of the multi-component intervention 'focus' on reducing smoking among students in the vocational education setting: A cluster randomized controlled trial. *BMC Public Health*, *23*(1), 4119-432.

Kostagiolas, P., Parnavela, S., & Theodorou, P. (2022). The impact of smokers' information-seeking behavior on smoking cessation. In: *Worldwide Congress on "Genetics, Geriatrics and Neurodegenerative Diseases Research"* (pp. 645-662). Cham: Springer International Publishing.

Laroussy, K., Castellano, Y., Fu, M., Baena, A., Feliu, A., Peruga, A., Margalef, M., Aldazabal, J., Tigova, O., Galimany, J., Puig, M., Moreno, C., Bueno, A., López, A., Roca, J., Saura, J., Fernández, E., & Martínez, C. (2023). Transitions in smoking status in nursing students: A prospective longitudinal study. *Journal of Advanced Nursing*, *79*(9), 3456-3472.

Laroussy, K., Fernández, E., Castellano, Y., Fu, M., Baena, A., Feliu, A., Peruga, A., Margalef, M., Tigova, O., Galimany, J., Puig, M., Moreno, C., Bueno, A., López, A., Roca, J., Saura., J & Martínez, C. (2024). Determinants of tobacco-use transitions in smoking nursing students in Catalonia: A prospective longitudinal study. *Tobacco Induced Diseases*, *22*, 18315-18332.

Lavallee, K.L., Zhang, X. C., Schneider, S., & Margraf, J. (2021). A longitudinal examination of the relationship between smoking and panic, anxiety, and depression in Chinese and German students. *Addictive Behaviors Reports*, *14*, 100347-100353.

Le, H.T.T., van Tran, A.T., Nguyen, A.Q., & Tran, T.T.T. (2022). E-cigarette use among university students from one university in Hanoi, Vietnam, and associated factors. *Asian Pacific Journal of Cancer Prevention: APJCP*, *23*(11), 3649.-3655.

Lee, P.N., Coombs, K.J., & Afolalu, E.F. (2019). Considerations related to vaping as a possible gateway into cigarette smoking: An analytical review. *F1000 Research*, *7*, 1915-1938.

Leshargie, C.T., Alebel, A., Kibret, G.D., Birhanu, M.Y., Mulugeta, H., Malloy, P., …, & Arora, A. (2019). The impact of peer pressure on cigarette smoking among high school and university students in Ethiopia: A systemic review and meta-analysis. *PloS One, 14*(10), e0222572- e0222591.

Madtha, L.J., Joseph, J., Joy, M.M., Reji, M.P., Mariya, C.S., & Sabu, L. (2023). Peer influence on lifestyle behaviors among undergraduate students of professional colleges. *Journal of Health and Allied Sciences NU*, *13*(03), 389-394.

Mkumbo, D., Otieno, K.O., & Rufyiriza, C.G. (2023). Coping strategies among first-year students and its influence on their education: A study of universities in Arusha region, Tanzania. *Journal of Research Innovation and Implications in Education*, *7*(4), 480-492.

Mohmad, S., Ismail, A., Hayati, K.S., Hassan, N., Imran, A.M., Hamzah, N.F., & Zain, W.A.I. W.M. (2022). Comparison and determination of factors associated with smoking status, smoking knowledge, attitude and practice (S-KAP) between smoke-free and non-smoke-free campuses in public universities in Malaysia: A cross-sectional study. *BMJ Open*, *12*(3), e052275-e052286.

Mohammadnezhad, M., & Kengganpanich, M. (2021). Factors affecting smoking initiation and cessation among adult smokers in Fiji: A qualitative study. *Tobacco-induced Diseases*, *19*(92), 1-10.

Mustafa, N., Bashir, A., Sohail, R., Kumar, S., Khatri, M., & Varrassi, G. (2023). Knowledge, attitude, and practice of cigarette smoking among medical students of Quaid-e-Azam Medical College, Bahawalpur: A web-based cross-sectional study. *Cureus*, *15*(10), e46459- e46467.

Naganandini, S., Seemadevi, T., Luke, A.M., & Ingafou, M.S.H. (2025). Smoking trends and awareness among Indian university students: A qualitative study. *Heliyon*, *11*(1), e41078-e41088.

Office, U.S.P.H.S. (2020). Interventions for smoking cessation and treatments for nicotine dependence: Smoking cessation: A report of the surgeon general [Internet].

Okafor, K.C., Idoko, L.O., Temple-Obi, L., & Bimba, J.S. (2023). The prevalence, pattern, and factors affecting cigarette smoking among undergraduate students in a tertiary institution in Plateau State, Nigeria. *Open Journal of Preventive Medicine*, *13*(5), 169-182.

Perski, O., Theodoraki, M., Cox, S., Kock, L., Shahab, L., & Brown, J. (2022). Associations between smoking to relieve stress, motivation to stop and quit attempts across the social spectrum: A population survey in England. *PLoS One*, *17*(5), e0268447- e0268460.

Pignataro, R.M., & Daramola, C. (2020). Becoming a tobacco-free campus: A survey of student attitudes, opinions and behaviors. *Tobacco Prevention & Cessation*, *6*, 1-5.

Polit, D.F., & Beck, C.T. (2021). *Essentials of nursing research generating and assessing evidence for nursing practice*., 11th edn. Philadelphia: Lippincott Williams & Wilkins.

Putra, H.S., Rosemary, R., Yanuar, D., & Ahsan, A. (2020). The effect of cigarette advertising on smoking behaviour of students in Banda Aceh city, Indonesia. *Jurnal Komunikasi: Malaysian Journal of Communication*, *36*(2), 348-363.

Putrik, P., Otavova, M., Faes, C., & Devleesschauwer, B. (2022). Variation in smoking attributable all-cause mortality across municipalities in Belgium, 2018: Aplication of a Bayesian approach for small-area estimations. *BMC Public Health*, *22*(1), 1699-1709.

Setchoduk, K., Pichayapinyo, P., Lapvongwatana, P., & Chansatitporn, N. (2023). The effectiveness of tobacco-cessation programs for university students: A systematic review and meta-analysis. *Tobacco-induced Diseases*, *21*, 73-91.

Sherman, J.J., & Smith, B.L. (2019). Effect of a smoking cessation educational intervention on knowledge and confidence of pharmacy students *versus* community leaders. *Pharmacy Practice (Granada)*, *17*(1), 1-7.

Smith, P., Quinn-Scoggins, H., Murray, R.L., McCutchan, G., Nelson, A., Moore, G., …, & Brain, K. (2024).

Barriers and facilitators to engaging in smoking-cessation support among lung screening participants. *Nicotine and Tobacco Research*, *26*(7), 870-877.

Suhányi, L., Gavurová, B., Ivanková, V., & Rigelský, M. (2020). Smoking behaviour of university students: A descriptive study. *Adiktologie*, *5*(2), 57-64.

Teixeira-da-Costa, E.I.M., Merino-Godoy, M.D.L.A., Almeida, M.M.M.L., Silva, A.M.M.C., & Nave, F.J.G.M. (2022). Gender and tobacco consumption among university students. *International Journal of Environmental Research and Public Health*, *19*(22), 14772-14785.

Ürün Ünal, B., & Marakoğlu, K. (2024, May). Smoking and depression among medical school students: A cross-sectional study from Turkey's largest province. In: *Healthcare*, *12*(11), 1130. MDPI.

Wallace-Williams, D.M., Tiu Wright, L., & Dandis, A.O. (2023). Social norms, cues and improved communication to influence behaviour change of smokers. *Journal of Marketing Communications*, *29*(3), 288-313.

World Health Organization: WHO. (2024). *Tobacco and nicotine industry tactics addict youth for life*: *Smoking among young youth*. https://www.who.int/news/item/23-05-2024-tobacco-and-nicotine-industry-tactics-addict-youth-for-life

Zhang, Y., Wang, J., Lai, K., Bian, H., Chen, H., & Gao, L. (2022). Socializing with smoker and social smoking behavior among Chinese male smokers with low nicotine dependence: The mediating roles of belief of smoking rationalization and smoker identity. *International Journal of Environmental Research and Public Health*, *19*(22), 14765-14777.

Zhao, S., Zhang, Y., Yu, C., Zhang, H., Xie, M., Chen, P., & Lin, D. (2023). Trajectories of perceived stress among students in transition to college: Mindset antecedents and adjustment outcomes. *Journal of Youth and Adolescence*, *52*(9), 1873-1886.

Zhou, L., Zhang, Y., Shadel, W. G., & Liang, Z. Y. (2023). Impact of social norms on Chinese college students' tobacco use. *Current Psychology*, *42*(21), 17661-17669.