

Motivation and readiness to quit smoking tobacco among healthcare students

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Key words: smoking cessation, students, nicotine, motivation, health occupations.

Abstract

Introduction: Tobacco use remains one of the most serious public health problems worldwide. This addiction continues to affect a significant proportion of the population, including healthcare workers.

Aim of the research: The objective of this study was to assess the level of motivation and readiness to quit smoking among healthcare students.

Material and methods: The study involved 135 healthcare students who were tobacco smokers. An original questionnaire and Schneider's Motivation Test for Smoking Cessation were used to conduct the study.

Results: Low motivation to quit smoking was found in one-fifth of the study group ($n = 28$; 20.7%), while high motivation was found in the majority ($n = 107$; 79.3%). People under the age of 20 were more likely to have low motivation to quit smoking, while those over the age of 20 had high motivation (42.9% vs. 84.1%, $p = 0.002$). Respondents who smoked 5 to 10 cigarettes a day had a high level of motivation to fight their addiction, while those who smoked 10–15 cigarettes a day were more likely to have low motivation to quit smoking (61.7% vs. 35.7%, $p = 0.031$).

Conclusions: The study group of healthcare students showed a high level of motivation to quit smoking. Significant factors differentiating the level of motivation were age, number of cigarettes smoked per day, and self-assessment of knowledge about the harmful effects of smoking. Interventions supporting healthcare students in quitting smoking and comprehensive education on nicotine dependence and smoking cessation methods should be considered.

Introduction

Tobacco smoking remains one of the most serious public health problems worldwide, contributing to millions of premature deaths each year. Despite widely available information about the harmful effects of smoking, this addiction still affects a significant proportion of the population, including healthcare professionals. The health attitudes of future medical professionals are important not only for their own well-being, but also for the effectiveness of health messages directed at patients. The motivation to quit smoking is a complex process, determined by both internal factors (such as concern for health, desire to improve physical condition, and sense of professional responsibility) and external factors (social pressure, availability of therapeutic support, anti-smoking campaigns). For healthcare students, an additional motivating factor may be the awareness of the impact of their own habits on how they are perceived by patients and the need to set an example through healthy lifestyle choices. Studies show that the number of healthcare workers who smoke varies significantly from country to country – in the United States it is 7%, in Germany 22.1% and in China as high

as 66.9% [1]. Students often have limited awareness of the risks associated with smoking. Peer pressure and easy access to cigarettes increase the risk of using nicotine products. Studies conducted in various countries around the world indicate a high frequency of smoking among university students. The percentage of smokers is 48.8% in Sudan, 32.6% in Bangladesh, 27.9% in Turkey, 26% in France, and 17.7% in England [2].

Starting college is a time of great change for young people, involving leaving their families and friends behind, adapting to new circumstances, and facing the challenges of studying and related problems [3]. As a result, students begin experimenting with various types of substances. They most often reach for alcohol and cigarettes, with addiction to these substances often occurring simultaneously [4]. A study by Seven and Günay [3] showed that among students who started smoking during their studies, the majority began using nicotine products during their first year of academic education (50%). After conducting research among students at the Medical University of Wrocław, Pazdro-Zastawny *et al.* [1] showed that 14.9% of people started smoking during their medical studies and 32.4% were exposed to secondhand

smoke while on university premises. In turn, 77.1% of students indicated that education on the harmful effects of smoking was insufficient during higher education. Several cross-sectional studies from China and Hong Kong showed that less than 40% of nursing students had received organized training on the harmful effects of smoking and smoking cessation during their studies [5]. In an analysis by Dzwilewska [6], in which 560 healthcare students participated, it was found that 25.7% of them were heavy smokers, even though 97.3% were aware of the consequences of using nicotine products. Healthcare providers play a key role in tobacco prevention, their staff advise patients on smoking cessation and are considered reliable and competent sources of health information. The number of smokers in Brazil who contacted a healthcare professional about any health problem in 2019 was 88.7% [7]. Fighting addiction is a long process that requires motivation and full commitment from the addicted person. A link has been shown between personality traits and the propensity to smoke cigarettes and the effectiveness of quitting smoking permanently [8]. When nicotine use is reduced or stopped, withdrawal symptoms may occur, such as anxiety, restlessness, bradycardia, depressed mood, insomnia, irritability, increased appetite and coughing [9]. Most people who quit smoking have trouble staying abstinent and make multiple attempts to overcome their addiction [4]. Alanazi and co-authors examined the factors that facilitate the process of quitting smoking and those that constitute barriers for the university student population. The lack of time due to the large number of classes during the course of study, insufficient funds for nicotine replacement therapy, being in the company of smokers and the associated relapses of addiction proved to be obstacles to quitting smoking. Lack of social support, insufficient knowledge about nicotine addiction and low motivation also constituted obstacles to attempting to quit smoking. The struggle with addiction was further complicated by factors such as depression, fear of weight gain and stress associated with the demands of academic life. Easy access to anti-smoking programs proved helpful, which translated into an increase in the number of participants, as well as the use of mobile applications and online forms of support, previous attempts to quit smoking and the associated sense of self-efficacy. In addition, education about nicotine addiction significantly increased motivation to quit smoking [2].

Aim of the research

The aim of this study was to assess the level of motivation and readiness to quit smoking among healthcare students. Observing the environment of healthcare students and learning their opinions on their readiness and motivation to quit smoking

may prove helpful in planning preventive strategies and developing effective interventions in the field of smoking cessation, thereby contributing to a reduction in the number of smokers. According to research, medical students who are not addicted to nicotine are more likely to provide advice on quitting smoking and achieve better results in supporting patients in their smoking cessation efforts [3]. Therefore, identifying and understanding the factors that motivate healthcare students to quit smoking may prove valuable for future healthcare professionals who will face the problem of nicotine addiction and support patients in smoking cessation.

Material and methods

The study was conducted between January and April 2023 among healthcare students. An original questionnaire and Schneider's Motivation Test for Smoking Cessation were used to conduct the study. The questionnaire was developed in Polish using the Google Forms website. The beginning contained an introduction explaining the purpose of the study, instructions on how to complete it and the email address of the author of the study in case of questions and/or concerns. The survey was anonymous and included information that the collected data would be used for scientific purposes and the respondent had the option to discontinue the survey at any time without providing a reason. The inclusion criteria were confirmation of tobacco smoking and informed consent to participate, which allowed the respondent to begin completing the survey. People who did not smoke tobacco, did not consent to participate in the study, and students from non-medical fields were excluded from the study. A link to the survey was posted on the social media pages of healthcare students: Facebook and Messenger. The survey included questions concerning the sociodemographic characteristics of healthcare students (gender, age, place of residence, place of work, work system, field of study, and mode of study), level of nicotine dependence, knowledge of treatment options, motivation, and readiness to quit smoking. At the end, Schneider's Motivation Test for Smoking Cessation was administered. It consists of 12 questions that respondents can answer with "yes" or "no." Each answer is scored from 0 to 1. If the total number of "yes" answers is 7 or more, the person is considered more likely to quit smoking without additional support. If the test is dominated by "no" answers, it suggests that the person is not yet ready to quit smoking and may require motivational support [10]. The study was designed and conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for reporting observational studies and the principles of the Declaration of Helsinki [11].

Table 1. Basic descriptive statistics for motivation to quit smoking and results of the Kolmogorov-Smirnov test

Dependent variable	M	Me	SD	Sk.	Kurt.	Min.	Max.	D	p
Motivation to quit smoking	8.35	8.00	1.99	−0.37	−0.31	2.00	12.00	0.15	< 0.001

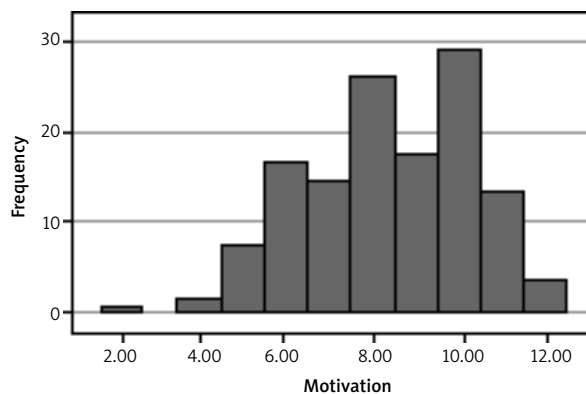
M – mean, Me – median, SD – standard deviation, Sk. – skewness, Kurt. – kurtosis, Min. – minimum value, Max. – maximum value, D – Kolmogorov-Smirnov test result, p – p-value for the Kolmogorov-Smirnov test

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 29. Basic descriptive statistics were calculated, and the Kolmogorov-Smirnov test was performed to assess the distribution of the motivation-to-quit-smoking variable. However, this variable was presented in a binary form (low vs. high) and analyzed accordingly. To verify the relationship between motivation to quit smoking and sociodemographic variables (gender, age, mode of study and night shift work system) and knowledge about nicotine (self-assessment of knowledge about the harmful effects of smoking an assessment of nicotine as a psychoactive substance), a χ^2 test of independence was performed, while for the intensity of nicotine use by the environment and oneself (estimated percentage of friends who use nicotine, duration of nicotine use, and number of cigarettes smoked per day), a Fisher-Freeman-Halton exact test was performed due to a violation of the assumption of a minimum number of expected values. To summarize the previous analyses, a logistic regression analysis was performed for the level of motivation to quit smoking. The classic threshold of $\alpha = 0.05$ was adopted as the level of statistical significance. The study involved 135 healthcare students who were smokers. The percentage of female respondents was higher than that of male respondents (64.4% vs. 35.6%). The age of the respondents ranged from 18 to 60 years. The largest group consisted of people aged between 21 and 30, accounting for 73.3% ($n = 99$). Most of the students were enrolled in second-cycle (master's) programs (40.0%) and attended full-time classes (66.7%). The largest group consisted of nursing students (30.4%), followed by emergency medical services students (13.3%) and medical students (10.4%). Smaller groups were represented by physiotherapy students (9.6%), dentistry students (8.9%), pharmacy students (8.1%), midwifery students (7.4%), public health students (5.9%), and dietetics students (5.9%). Among those who declared employment, the majority worked in a single-shift system (68.1%). More than half of the respondents (67.4%) reported that they had been using nicotine for more than 1 year.

Results

An analysis of the motivation to quit smoking index, assessed using Schneider's Motivation Test for Smoking Cessation, in a group of healthcare students showed

**Figure 1.** Histogram for motivation to quit smoking

a distinction between participants with low motivation (< 7 points) and high motivation (≥ 7 points). Detailed results are presented in Table 1.

The average motivation-to-quit-smoking score was 8.35 points, with a standard deviation of ± 2 points. Most respondents scored 10 points ($n = 29$; 17.9%) and 8 points ($n = 27$; 16.7%). The least motivated individuals scored 2 points, while the most motivated scored 12 points. The Kolmogorov-Smirnov test showed that the distribution deviated significantly from normality ($p < 0.05$; Figure 1).

Based on the calculated score, the participants were divided into two groups: low motivation (< 7 points) and high motivation (≥ 7 points). According to this classification, low motivation to quit smoking was observed in one-fifth of the study group ($n = 28$; 20.7%), whereas high motivation was observed in the majority ($n = 107$; 79.3%).

Analysis of sociodemographic variables, knowledge about nicotine, its use in the environment and personally, and the level of motivation to quit smoking

Among the analyzed sociodemographic variables, a statistically significant relationship was found between the level of motivation to quit smoking and the age of the respondents. Participants aged ≤ 20 years were more likely to have low motivation, while those aged >20 years were more likely to have high motivation to quit smoking (42.9% vs. 84.1%, $p = 0.002$). The observed association with age was weak, as evidenced by the value of Cramér's V coefficient. The other sociodemographic variables analyzed did not show any statistically significant associations with

the level of motivation to quit smoking. This motivation did not depend on gender, mode of study or work system involving night shifts. A statistically significant association was found between self-assessed

knowledge about the harmful effects of smoking and the level of motivation to quit smoking. People who rated their knowledge about the harmful effects of smoking as poor were more likely to have low motiva-

Table 2. Associations between participant characteristics, smoking-related variables, and motivation to quit smoking

Variable	Low motivation		High motivation		χ^2	<i>p</i>	df	Vc/ ϕ
	<i>n</i>	%	<i>n</i>	%				
Gender								
Women	16	57.1	71	66.4	0.82	0.365	1	0.08
Men	12	42.9	36	33.6				
Age (years)								
Up to 20 years	12	42.9	17	15.9	9.57	0.002	1	0.27
Over 20 years	16	57.1	90	84.1				
Type of studies								
Full-time	21	75.0	69	64.5	1.10	0.293	1	0.09
Part-time	7	25.0	38	35.5				
Shift work system with night shift								
No	23	82.1	69	64.5	3.19	0.074	1	0.15
Yes	5	17.9	38	35.5				
Self-assessment of knowledge of harmful effects of smoking								
Poor	5	17.9	2	1.9	12.79	0.002	2	0.31
Good	16	57.1	59	55.1				
Very good	7	25.0	46	43.0				
Recognition of nicotine as a psychoactive substance								
Yes	19	67.9	76	71.0	0.46	0.794	2	0.06
No	7	25.0	21	19.6				
I don't know	2	7.1	19	9.3				
Percentage of peers using nicotine (%; according to the respondents' estimates)								
< 10%	1	3.6	12	11.2	2.39*	0.813	5	0.15
10–20%	11	39.3	32	29.9				
21–30%	10	35.7	35	32.7				
31–40%	4	14.3	15	14.0				
41–50%	2	7.1	9	8.4				
> 60%	0	0.0	4	3.7				
Period of nicotine use (years)								
< 1	7	25.0	37	34.6	1.49*	0.662	3	0.12
1–5	16	57.1	50	46.7				
5–10	5	17.9	17	15.9				
> 10	0	0.0	3	2.8				
Number of cigarettes smoked per day								
5–10	10	35.7	66	61.7	9.77*	0.031	4	0.28
10–15	10	35.7	14	13.1				
15–20	5	17.9	19	17.8				
20–30	3	10.7	6	5.6				
> 40	0	0.0	2	1.9				

For 2 × 2 tables, ϕ was calculated, while for tables larger than 2 × 2, Vc was calculated.

*The exact Fisher-Freeman-Halton test was used due to a violation of the assumption regarding the number of expected observations.

Bold values in the proportion columns showed statistically significant differences in the Bonferroni-corrected test.

N – number of observations, χ^2 – chi-square test result, *p* – statistical significance, ϕ/Vc – effect size index

Table 3. Logistic regression analyses for motivation to quit smoking in the study group

Variables	B	SE	Wald(1)	p	OR [95% CI]
Constant	0.82	1.55	0.28	0.597	2.27
Gender	0.36	0.54	0.46	0.500	1.44 [0.50; 4.12]
Age (years)	0.85	0.55	2.42	0.120	2.34 [0.80; 6.81]
Number of cigarettes smoked per day	−0.69	0.55	1.57	0.211	0.50 [0.17; 1.48]
Self-assessment of knowledge about the harmful effects of smoking					
Poor	−2.24	1.01	4.97	0.026	0.11 [0.02; 0.76]
Good	−0.42	0.51	0.69	0.406	0.66 [0.24; 1.78]
Chi-square test	$\chi^2(5) = 16.19; p = 0.006$				
Hosmer-Lemeshow test	$\chi^2(6) = 2.84; p = 0.829$				
Nagelkerke's R^2	0.177				

Coding of motivation to quit smoking: 1 – low, 2 – high; gender: 1 – women, 2 – men; age: 1 – persons under 20 years of age, 2 – persons over 20 years of age; number of cigarettes smoked per day: 1 – up to 10 cigarettes, 2 – more than 10 cigarettes. Self-assessment of knowledge about the harmful effects of smoking was entered using dummy coding, with very good knowledge as the reference category.

B – non-standardized regression coefficient, SE – standard error, Wald – Wald test result, p – statistical significance, OR with 95% CI – odds ratio with 95% confidence interval

tion to quit smoking than high motivation to quit (17.9% vs. 1.9%, $p = 0.002$). Statistical analysis also showed a statistically significant relationship between the number of cigarettes smoked per day and the level of motivation to quit smoking. Respondents who smoked 5 to 10 cigarettes per day had a high level of motivation to quit smoking, while those who smoked 10–15 cigarettes per day were more likely to have low motivation to quit smoking (61.7% vs. 35.7%, $p = 0.031$). Cramér's V coefficient indicated a weak association (Table 2).

Model predicting the level of motivation to quit smoking

In the next step of the statistical analysis, a model was created to predict the likelihood of a high level of motivation to quit smoking in the study group. For this purpose, binary logistic regression analysis was performed for the motivation to quit smoking (coding: 1 – low, 2 – high). The model included sociodemographic variables: gender (coding: 1 – women, 2 – men) and age (coding: 1 – people up to 20, 2 – people over 20). In addition, the number of cigarettes smoked per day (coding: 1 – up to 10 cigarettes, 2 – more than 10 cigarettes) and self-assessment of knowledge about the harmful effects of smoking, coded using dummy variables, were also included. Very good self-assessment of knowledge was used as the reference category. The selection of variables for the model and their consolidation into a smaller number of groups was based on previously conducted association analyses. Table 3 presents the test results. Statistical analysis showed that adding predictors to the model significantly improved model fit compared with the null model: $\chi^2(5) = 16.19; p = 0.006$. The Hosmer-Lemeshow test result showed good model fit: $\chi^2(6) = 2.84; p = 0.829$.

Based on Nagelkerke's R^2 value, the model explained 18% of the variance in motivation to quit smoking. Among the predictors included in the model, only poor self-assessed knowledge about the harmfulness of smoking was statistically significant (OR = 0.11, 95% CI = 0.02–0.76; $p = 0.026$). This factor was associated with a lower likelihood of high motivation to quit smoking. People who rated their knowledge of the harmful effects of smoking as poor were 89% less likely to have high motivation than those who rated their knowledge as very good. Other predictors were not significantly associated with motivation to quit smoking in the presented model (Table 3).

Discussion

Smoking remains a significant public health problem, including among future healthcare professionals. In the present study, healthcare students showed a high level of motivation to quit smoking. A low level of motivation to quit smoking was found in one-fifth of the study group ($n = 28$; 20.7%), whereas a high level was found in the majority ($n = 107$; 79.3%). A study conducted in China, involving nearly 125,000 students from 220 universities, found that 7.8% of them currently smoked cigarettes. The Tobacco Survey questionnaire was used in this study. Among current smokers, as in our own study, the majority – as many as 67.5% – expressed readiness to attempt smoking cessation [12]. Similar results were obtained in the analysis by Wiraszka and Obierzyńska [10], conducted on a group of 143 students from the Świętokrzyskie Province. The analysis of the results of the Motivation Test for Smoking Cessation according to Schneider showed that 63.6% of respondents had a strong motivation to quit smoking.

A study conducted by Romero-López *et al.* [13] in southern Spain showed regular smoking among healthcare students. The results were worrying, as only 6.9% of participants had a high level of motivation to quit smoking. However, the study used the Richmond Test, while the analysis by Wiraszka and Obierzyńska used Schneider's Motivation Test for Smoking Cessation, which may partly explain the different distribution of motivation levels. Our own study showed that people up to 20 years old were more likely to have low motivation, while those over the age of 20 were more likely to have high motivation to quit smoking (42.9% vs. 84.1%, $p = 0.002$). A similar relationship was observed by Rzepakowska *et al.* [14]. As in our own study, Schneider's Motivation Test for Smoking Cessation was used in the analysis. The study involved 50 patients with nicotine dependence and dysplasia or cancer. 70% of respondents were highly motivated to quit smoking, with their average age being significantly higher than that of patients with low motivation. Neither the present study conducted among healthcare students nor the study by Rzepakowska *et al.* [14] found a relationship between motivation to quit smoking and gender. Despite the differences between the two groups studied, the results suggest that the motivation to quit smoking is significantly lower among younger people. However, interesting results were obtained in the United States, where a study was conducted involving a group of nearly 28,000 citizens aged 18 and older. It was observed that the frequency of attempts to quit smoking in the last year decreased with age. Among people aged 18-24, 74.4% of respondents attempted to quit their addiction, while in the 45-64 age group, the percentage was lower, at 47.5% [15]. Differences between studies may stem from variations in the study populations and the variables analyzed. American studies focus on the frequency of attempts to quit smoking, which is not the same as the level of motivation. More frequent attempts to quit smoking among younger individuals in studies conducted in the United States may result from greater impulsivity and susceptibility to short-term behavioral changes. In contrast, the motivation assessed in the present study and in the study by Rzepakowska reflects participants' self-reported readiness to quit smoking rather than the frequency of quit attempts. Our analysis showed that healthcare students who smoked 5 to 10 cigarettes a day had a high level of motivation to quit smoking, while those who reported smoking 10-15 cigarettes per day were more likely to have low motivation to quit (61.7% vs. 35.7%, $p = 0.031$). A similar relationship was found in a study by Butler *et al.* [16], where the respondents were students from universities in the United States. People who smoked more than 10 cigarettes a day were 71% less likely to report readiness to quit smoking than those who smoked fewer than 10 cigarettes a day.

Another study conducted in Canada, the United States, the United Kingdom, and Australia involved adult smokers (18+). People who smoked every day were less likely to try to quit smoking than those who smoked less frequently. Occasional smokers were 20% more likely to attempt to quit than daily smokers [17]. It is worrying that some healthcare students consider their knowledge about the harmful effects of smoking to be insufficient. Our own study found that those who considered their knowledge to be bad were more likely to have low motivation to quit smoking than those who considered their knowledge to be high (17.9% vs. 1.9%, $p = 0.002$). Alanazi *et al.* [2], based on a review of six studies from the United States, Jordan and Qatar, found an association between knowledge and motivation to quit smoking. Students who had inadequate knowledge about methods of quitting smoking showed less motivation to fight their addiction. Zhang *et al.* [5] conducted a systematic review of articles on smoking cessation training among nursing students. Data from 2,114 students were collected as part of the analysis. Seven studies showed that training and the associated increase in knowledge contributed to increased motivation to quit smoking. The use of a logistic regression analysis model in our own study showed that people who rated their knowledge of the harmful effects of smoking as poor had 89% lower odds of high motivation to quit smoking than those who rated their knowledge as very good. A similar association was observed by Oh and Boo [18]. The study collected data from 618 women, of whom only 115 who were currently smoking were included in the analysis. Logistic regression analysis showed that respondents with higher education were 3.26 times more likely to intend to quit smoking. In another study, the results of a logistic regression model showed that people with a lower level of knowledge about the risks of smoking cigarettes were less likely to be motivated to quit than those with more extensive knowledge in this area (OR = 0.623, $p = 0.005$). The information was collected from men aged 15-69, and the study was conducted in Zhejiang Province, China [19]. Despite differences between the study groups, similar associations between knowledge about smoking and motivation to quit smoking were observed.

The study should be interpreted with several limitations in mind. First, it was conducted on a small group of people ($n = 135$). Although students aged 18 to 60 participated in the study, most respondents (73.3%) were between 21 and 30 years old, which indicates little diversity in the group in terms of age. Healthcare students, as future healthcare professionals, may have declared a higher level of motivation to quit smoking for fear of public reaction. Another limitation of the study was the use of subjective self-assessment of knowledge rather than an objective test of knowledge about the harmful effects of smoking.

Using a comprehensive knowledge test would require a much longer questionnaire, which could lower the response rate and discourage respondents from participating in the survey. Furthermore, the survey was conducted online, and there was no way to verify whether participants were using educational materials or other sources while taking the test, which could significantly affect the reliability of the results. With this in mind, students' self-assessments of their knowledge were used, recognizing that these may be subject to both overestimation and underestimation. The results should therefore be interpreted with caution, given the subjective nature of this method. At the same time, despite these limitations, self-assessment provides useful information about participants' perceptions of their knowledge, which can serve as a starting point for further, more detailed research. Considering these limitations, the study makes an important contribution to the current literature. Understanding the factors that motivate people to quit smoking may be helpful in planning preventive measures and interventions in the field of smoking cessation and contribute to reducing the number of smokers among both healthcare students and the general population. The use of a standardized tool, namely Schneider's Motivation Test for Smoking Cessation, enhanced the reliability and comparability of the collected data. Furthermore, its use in previous studies facilitated comparisons with findings reported in the literature. For the purposes of the present study, the authors also developed a questionnaire tailored to healthcare students. This made it possible to assess additional factors not included in Schneider's Motivation Test for Smoking Cessation.

Conclusions

The study group of healthcare students showed a high level of motivation to quit smoking. Significant factors differentiating the level of motivation were age, number of cigarettes smoked per day, and self-assessment of knowledge about the harmful effects of smoking. Low self-assessment of knowledge significantly reduced the likelihood of high motivation to quit smoking. These findings highlight the need for measures to support healthcare students in smoking cessation and to strengthen education on nicotine dependence, smoking cessation methods, and evidence-based treatment options. Further studies are warranted to monitor motivation and readiness to quit smoking among healthcare students, validate the present findings, and inform the development of effective smoking cessation strategies.

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Ethical approval

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

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