



Faculty perspectives on tobacco use and nicotine addiction across eight Italian dental schools

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Received: 30 September 2025 / Accepted: 13 January 2026
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Abstract

Aim Dental faculty members serve as both clinicians and educators, positioning them as key influencers in tobacco and nicotine use prevention and cessation efforts. This multi-institutional study conducted in Italy assessed the prevalence of tobacco and nicotine use and explored faculty members' knowledge, attitudes, and perceptions regarding tobacco and nicotine prevention and cessation.

Subject and methods A cross-sectional online survey was administered among faculty members at eight Italian dental schools. The questionnaire included items on demographics, tobacco use behaviors, knowledge, attitudes toward tobacco, institutional policies, curricular integration, and 38 tobacco use prevention and cessation (TUPAC) competencies aligned with the 5A's model. Descriptive statistics, chi-square tests, and multivariable regression analyses were conducted.

Results The prevalence of current cigarette smoking, electronic nicotine delivery system (ENDS) use, and other tobacco product use was 13.7%, 9.1%, and 3.7%, respectively, with significantly higher rates observed in Southern versus Northern Italy. Over half of the faculty endorsed the need for training to effectively teach students about tobacco prevention and cessation; however, current smokers were less likely to do so (aOR 0.33, $p < 0.01$). Awareness of institutional tobacco policies was limited, and the integration of cessation-related content into curricula was low, particularly regarding ENDS and other tobacco products. While faculty rated TUPAC competencies as important, they identified lack of resources, insufficient time, and limited skills as key barriers to implementation.

Conclusions Tobacco use among dental faculty may undermine their role as health promoters. Strengthening faculty competencies, enforcing institutional tobacco policies, and integrating structured cessation training into dental curricula are critical steps for advancing tobacco control in Italy.

Keywords Tobacco · Smoking · Nicotine · Dental · Faculty · Italy

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Introduction

Tobacco and nicotine use remain one of the leading threats to global public health, accounting for more than 8 million deaths each year due to both direct consumption and secondhand exposure (Pizzo et al. 2013). The associated disease burden encompasses a wide range of chronic conditions, including cardiovascular and respiratory diseases, as well as several types of cancer, including oral cavity carcinoma (Le Foll et al. 2022). Moreover, smoking and nicotine addiction have numerous additional detrimental effects on the oral cavity. These include persistent bad breath (Jiun et al. 2015), tooth discoloration (Zanetti et al. 2019), reduced taste perception (Sever et al. 2024), and delayed wound healing following dental procedures (Balaji 2008). Smoking also contributes significantly to periodontal disease by impairing blood flow to the gums, weakening the immune response, and promoting the buildup of plaque and tartar (Zhang et al. 2019). This can lead to gum recession, tooth mobility, and eventual tooth loss (Baumeister et al. 2025). Additionally, smokers are more likely to develop oral leukoplakia and other mucosal lesions in the oral cavity (Bánóczy et al. 2001; Kumar and Muniyandi 2015), as well as experience complications with dental implants and oral surgeries (Alayadi 2024).

In Italy, it is estimated that there are approximately 11.7 million smokers, accounting for 22.3% of the population, a figure slightly below the European average (25.3%) (World Health Organization 2022). Compared to other European countries, Italy shows a prevalence of smoking similar to that observed in Germany (21.6%), lower than Spain (28.4%) and France (34.6%), but higher than in countries such as Sweden (12.6%) or the United Kingdom (14.2%) (Colaprico et al. 2025; World Health Organization 2023).

Healthcare professionals (HCPs), including oral health providers, play a key role in prevention and in promoting healthy, tobacco-free lifestyles, serving as important behavioral role models (Ficarra et al. 2011). Although smoking prevalence has declined in the general population over recent decades, tobacco use remains high among certain categories of HCPs, with significant implications both for their own health and for the promotion of healthy behaviors. In this context, oral health professionals are in a privileged position to contribute to tobacco control, as they are able to detect early clinical signs associated with tobacco use and provide effective cessation counseling. However, the success of such interventions depends not only on clinical competence but also on the personal behaviors and attitudes of these HCPs toward tobacco products (Pizzo et al. 2013; Rodakowska et al. 2020). Previous studies have shown that HCPs who smoke are less likely to provide smoking cessation advice to their

patients (Duaso et al. 2014). Moreover, the presence of smoking HCPs in clinical and academic settings may expose colleagues, students, and patients to secondhand smoke, while also conveying conflicting messages regarding health promotion (Guerra et al. 2025).

Among HCPs in Europe, the prevalence of tobacco use varies considerably by specialty and region. A systematic review covering 229 studies, including many European countries, found an overall HCP smoking prevalence of 21% (31% in men, 17% in women), with occupational rates among physicians at 20%, nurses at 24%, and dental personnel at 18% (Nilan et al. 2019). In Italy, physician smoking prevalence has been reported at 21.4%, while nurses show a much higher rate of 37.6% (Colaprico et al. 2025). Despite the potential influence of Dentistry and Dental Hygiene academic programs across Europe in promoting healthy lifestyles, evidence regarding their smoking behaviors, awareness of tobacco-related risks, and support for preventive policies remains limited. This is especially true in the Italian academic context, where most research has concentrated on dental students (Lorenzo-Pouso et al. 2019; Riad et al. 2022; Rodakowska et al. 2020; Virtanen et al. 2015), while studies examining the prevalence of tobacco and nicotine use among dental faculty members, as well as their knowledge, attitudes, perspectives, and practices regarding tobacco prevention and cessation remain scarce.

Compounding this issue is the frequent absence of dedicated modules on smoking cessation and effective communication with smoking patients within university curricula, which limits the effectiveness of clinical training in tobacco prevention. Given their dual role as clinicians and educators, university faculty members are key figures in transmitting knowledge and shaping attitudes among future generations of HCP. Their engagement can significantly influence both curricular content and the integration of smoking cessation strategies into dental education (Costantino et al. 2024).

In this context, the present cross-sectional study aims to assess the prevalence of tobacco and nicotine use, as well as to explore factors associated with knowledge, attitudes, and perceptions related to tobacco prevention and control among faculty members of Dentistry and Dental Hygiene programs at eight Italian universities, through the administration of an anonymous online questionnaire. This study is also aligned with national strategies outlined in Italy's National Prevention Plan (PNP 2020–2025), which promotes tobacco control through regional coordination, institutional support, and targeted interventions to prevent initiation, reduce exposure, and support cessation (Ministero della Salute 2020).

Findings from this study will provide up-to-date and detailed data to inform the design and implementation of systematic, coordinated smoking prevention and cessation programs targeting both dental students and faculty bodies.

Such initiatives aim to strengthen their role as health promoters and role models in the fight against tobacco use.

Methods

Study design, site, and participants

A cross-sectional study utilizing a non-probability voluntary convenience sampling collected data through an online survey among faculty members at the eight Italian dental schools located in Bologna, Catanzaro, Insubria, Napoli Vanvitelli, Novara, Padova, Palermo, and Trieste.

On the basis of the sampling frame of 382 faculty members at the eight Italian dental schools and considering the reported incidence of tobacco/nicotine consumption of 17.8% among Italian healthcare workers (Minardi 2021), a minimum sample size of 230 participants was determined to be necessary to adequately assess the landscape of tobacco use in this population. All 382 eligible faculty members were invited across the eight universities, of whom 241 completed the survey, yielding an overall response rate of 63.1%.

Data collection and management

The self-administered data collection instrument (online survey) comprised seven sections: (1) demographic details, (2) tobacco use behaviors, (3) knowledge and attitudes toward tobacco use, (4) school policy, (5) school curriculum, (6) tobacco use and nicotine addiction prevention and control competencies (TUPAC), and (7) barriers to providing tobacco education. The 38 TUPAC questions were adapted from a 2014 study that assessed tobacco use prevention and control competencies among dental educators in the Latin American region (Tamí-Maury et al. 2014). These questions were further categorized into five groups based on the key steps of the 5As evidence-based model for smoking prevention and cessation: Ask about tobacco use at every visit, Advice all tobacco users to quit, Assess patient's willingness to quit, Assist patient with a quit plan, including counseling and medication, and Arrange for follow-up appointments to support the patient's quit attempt). The Cronbach's alpha ranged from 81.7% to 94.2% (Tamí-Maury et al. 2014). The online survey was built and managed on Qualtrics, an online data collection and management platform that securely transmits research data. The online survey was pilot-tested among three dental faculty members in Italy, and relevant modifications were implemented before initiating data collection.

Measures

We collected data on age, sex at birth, current academic role (faculty member vs dean/director), institution's location, and

years as a faculty member at the current institution. The six dental schools were further classified geographically into (1) Northern Italy (Bologna, Insubria, Novara, Padova, and Trieste) and (2) Southern Italy (Catanzaro, Napoli Vanvitelli, and Palermo). The participants' use of (a) the conventional cigarette, (b) electronic nicotine delivery systems (ENDS) (e.g., e-cigarettes, e-cigs, vapes, vaporizers, vape pens, etc.), and (c) other tobacco products (e.g., cigars, pipe, chewed tobacco, hookah/narghile/water pipe, etc.) were also collected.

Current smokers were classified as those individuals who answered "Yes" to the question "Have you smoked at least 100 cigarettes in your lifetime?" and responded, "Every day and Some days" to the question "How frequently did you smoke in the last 30 days?" (Centers for Disease and Preventions 2017). Former smokers were those who had smoked at least 100 cigarettes but had not smoked some days or every day in the last 30 days (Centers for Disease and Preventions 2017). Ever smokers were defined as dental faculty members who had smoked 100 or more cigarettes in their lifetime, while Never smokers were dental faculty members who had not smoked up to 100 cigarettes in their lifetime (Centers for Disease and Preventions 2017). "Former smokers" and "Never smokers" were subsequently combined as noncurrent smokers. Current ENDS users were those who had used a form of ENDS product occasionally or daily in the past 30 days. Current users of other tobacco products were defined as faculty members who reported occasional or daily use of any tobacco product other than cigarettes or ENDS within the past 30 days.

The dental faculty members also provided information on their knowledge, perceptions, and attitudes toward tobacco, tobacco prevention, and cessation among their students. Additional information was collected on each dental school's tobacco policy, inclusion of tobacco prevention and cessation training in the dental curriculum, TUPAC competencies, and the barriers the dental faculty members face while providing tobacco education. The participants rated their agreement on the importance of each TUPAC competency for dental students using a 5-point Likert scale. A score of 1 indicated "strongly disagree," while a score of 5 indicated "strongly agree."

Statistical analysis

Descriptive statistics were used to summarize the different characteristics of the participants (such as demographic, tobacco use behavior, knowledge, attitude, school policy, and so on). Chi-squared test (or Fisher's exact test when appropriate) was used to compare the different demographic and tobacco-related variables between participants from Northern and Southern Italian dental schools. Mean and corresponding standard deviation were reported for each

TUPAC competence (Ask, Advise, Assess, Assist, Arrange), as well as all these competencies combined, and the barriers to tobacco education. Multivariable linear regression was used to explore the factors associated with the overall level of TUPAC competencies, while multivariable logistic regression was used to explore factors associated with the need for specific training among faculty members to teach students how to avoid or stop using tobacco products. Variables in the multivariable models were selected a priori (a priori approach) based on established knowledge of demographic and tobacco-related factors that may influence the outcomes. The included covariates were age, site, gender, role, years at the institution, current cigarette use, current ENDS use, current other tobacco product use, and TUPAC competencies. Separate models were fitted for each type of tobacco product (i.e., cigarette, ENDS, and other products). R^2 and pseudo R^2 were used to assess the goodness of fit for multivariable linear and logistic regression, respectively.

The significance threshold was set at 0.05. All quantitative analyses were conducted using Stata v. 18.0/SE (StataCorp, College Station, TX).

Results

Response rate

Out of 382 eligible faculty members invited, 241 completed the survey, corresponding to an overall response rate of 63.1%. Response rates varied across institutions, ranging from 10.5% to 100%.

Demographic characteristics

The average age of the dental faculty members was 48.5 (± 11.21) years, and 53.5% were male. On average, they

Table 1 Demographics and tobacco use and vaping behavior among participants

Characteristics	Total <i>n</i> (%) 241 (100.0)	Northern Italy <i>n</i> (%) 155 (64.3)	Southern Italy <i>n</i> (%) 86 (35.7)	<i>p</i> value
Demographics				
Age (years)				0.1954
Mean ($\pm$ SD)	48.5 (± 11.21)	47.8 (± 11.69)	49.7 (± 10.24)	
Gender				0.781
Male	129 (53.5)	84 (54.2)	45 (52.3)	
Female	112 (46.5)	71 (45.8)	41 (47.7)	
Current academic role				0.288
Faculty member	229 (95.0)	149 (96.1)	80 (93.0)	
Dean/Director	12 (5.0)	6 (3.9)	6 (7.0)	
Year as a faculty at current institution				0.7940
Mean (SD)	9.2 (± 8.21)	9.2 (± 8.67)	8.9 (± 7.35)	
Tobacco use behavior				
Smoked at least 100 cigarettes in lifetime				0.551
Yes	81 (33.6)	105 (67.7)	55 (64.0)	
No	160 (66.4)	50 (32.3)	31 (36.0)	
How often did you smoke in the last 30 days? (<i>n</i> = 81)				0.034
Every day	21 (25.9)	8 (16.0)	4 (12.9)	
Some days	12 (14.8)	34 (68.0)	14 (45.2)	
Not at all	48 (49.3)	8 (16.0)	13 (41.9)	
Cigarette smoking status				0.041
Current smokers	33 (13.7)	16 (10.3)	17 (19.8)	
Former smokers	48 (19.9)	34 (21.9)	14 (16.3)	
Never smokers	160 (66.4)	105 (67.7)	55 (63.9)	
Use of ENDS products^a				0.015
Current users	22 (9.1)	11 (7.1)	11 (12.8)	
Former users	20 (8.3)	18 (11.6)	2 (2.3)	
Never users	199 (82.6)	126 (81.3)	73 (84.9)	
Use of other tobacco products^b				0.806
Current users	9 (3.7)	5 (3.2)	4 (4.6)	
Former users	37 (15.4)	23 (14.8)	14 (16.3)	
Never users	195 (80.9)	127 (81.9)	68 (79.1)	

have been at their current dental institution for about 9 years. Only 5% of the participants were either a dean or a director. The demographic characteristics of the dental faculty members are described in Table 1.

Tobacco use

The overall prevalence of current cigarette smoking, ENDS use, and other tobacco use was 13.7%, 9.1%, and 3.7%, respectively. Compared to those from Northern Italy, Southern Italian dental faculty members have a higher prevalence of current cigarette use (19.8% *vs* 10.3%, $p=0.041$) and ENDS use (12.8% *vs* 7.1%, $p=0.015$) (Table 1). Dental faculty members from Southern Italy had 2.14 times the odds of being current cigarette smokers (95% CI 1.02–4.49, $p=0.044$) and 1.92 times the odds of being current ENDS users (95% CI 1.01–4.63, $p=0.020$) compared with those from Northern Italy.

Knowledge and attitudes toward tobacco use

Approximately half of the respondents agreed that faculty members need specific training to teach students how to avoid or stop using tobacco. Specifically, 62.7% supported this for cigarettes, 52.7% for ENDS, and 50% for other tobacco products (Table 2).

Regarding institutional policy, 93.9% of respondents believed that universities should have policies that prohibit students from using cigarettes on university premises or properties, with support also evident for ENDS (80.1%) and other tobacco products (77.2%). When asked about concerns over the use of tobacco among students, 66.0% of respondents expressed concern about their students' cigarette use, 49.4% about ENDS, and 31.5% about other tobacco products. Approximately 63.1% of respondents indicated that they have advised a student to stop using cigarettes, whereas

fewer respondents reported doing so for ENDS (37.8%) and other tobacco products (25.7%). (Table 2).

School policy and dental school training/curriculum

Approximately half (48.9%) of the participants were not aware if their dental school had a policy or rule prohibiting the use of any forms of tobacco (including electronic nicotine delivery systems such as electronic cigarettes, eCigs, vaporizers, etc.) by school personnel, visitors, and students in all school buildings, on school grounds, and at school-sponsored events. Only 29.9% were aware of such a policy. Less than half of the respondents indicated that tobacco prevention is included somewhere in their dental school's curriculum (39.8% for cigarettes, 15.8% for ENDS, and 12.5% for other tobacco products. When asked if they teach students in their dental or dental hygiene programs about tobacco use and cessation, 48.6% of the dental faculty members participating in the study said they do for cigarettes, 31.1% for ENDS, and 24.5% for other tobacco products (Table 2).

TUPAC competencies

Overall, the dental faculty members agreed that the TUPAC competencies are essential for dental education and training (mean 4.09; $SD \pm 0.81$). The highest score was observed in the TUPAC competencies related to ask (mean 4.33; $SD \pm 0.81$), followed by advise (mean 4.10; $SD \pm 0.87$), arrange (mean 4.03; $SD \pm 0.94$), assess (mean 3.99; $SD \pm 0.89$), and assist (mean 3.98; $SD \pm 0.92$) (Table 3). Age, being male, and years at the current institution were statistically associated with an increase in the overall TUPAC competencies score (Table 4).

Table 2 Tobacco use, knowledge, attitude, and school curriculum

Knowledge and attitude	Cigarettes	ENDS	Other tobacco products
	Yes n (%)	Yes n (%)	Yes n (%)
Do the faculty members need specific training to teach students how to avoid or stop using...	151 (62.7)	127 (52.7)	118 (50.0)
Should University have policy or rule that prohibits students in the premises or spaces owned by the University from using	226 (93.9)	193 (80.1)	186 (77.2)
Should University have policy or rule that prohibits university staff on the premises/properties of the University from using	221 (91.7)	192 (79.7)	118 (50.0)
Are you concerned about the use of _____ among students in your school?	159 (66.0)	119 (49.4)	76 (31.5)
Have you ever advised a student to stop using...	152 (63.1)	91 (37.8)	62 (25.7)
School curriculum	Cigarettes	ENDS	Other tobacco products
	Yes n(%)	Yes n(%)	Yes n(%)
Is the prevention of _____ included somewhere in your school curriculum?	96 (39.8)	38 (15.8)	30 (12.5)
Do you teach your dental students or dental hygiene students the use and cessation of _____?	117 (48.6)	75 (31.1)	59 (24.5)

Table 3 Factors associated with overall TUPAC competencies

Characteristics	Coefficients ^a	95% CI	P value
Age	0.017	0.004–0.029	0.009
Site			
Northern (<i>Ref</i>)			
Southern	−0.020	−0.221 to 0.202	0.862
Gender			
Female (<i>Ref</i>)			
Male	−0.272	−0.491 to −0.054	0.015
Role			
Faculty members	−0.116	−0.619 to 0.387	0.648
Dean/Director (<i>Ref</i>)			
Year at current institution	−0.022	−0.039 to −0.005	0.011
Current smoker			
Yes	0.091	−0.241 to 0.422	0.591
No (<i>Ref</i>)			
Current ENDS user			
Yes	−0.248	−0.639 to 0.142	0.212
No (<i>Ref</i>)			
Current other tobacco products user			
Yes			
No (<i>Ref</i>)	0.05	−0.505 to 0.598	0.869

^aR² 0.46

Barriers

The most important barriers the dental faculty members encounter for teaching TUPAC education to their dental students included lack of TUPAC materials/resources (mean 3.13), lack of sufficient class and clinic time (mean 2.91), and lack of skills to teach motivational interventions (mean 2.69) (Fig. 1).

Factors associated with the need for specific training among faculty members to teach dental students how to avoid or stop using tobacco products

Being a current smoker is inversely associated (aOR 0.33, CI 0.14–0.77, $p < 0.01$) with the faculty members' belief in the need for specific training to teach their dental students on tobacco prevention and cessation. On the other hand, the higher the level of TUPAC competencies, the higher the participants' belief in the need for this specific training (aOR 1.49, CI 1.05–2.12, $p < 0.01$) (Table 5).

Table 4 Factors associated with the need for specific training among faculty members to teach dental students how to avoid or stop using tobacco products

Characteristics	Cigarette ^a aOR (95% CI)	ENDS ^b aOR (95% CI)	Other tobacco ^c aOR (95% CI)
Age	1.03 (0.99–1.05)	1.02 (0.99–1.06)	1.02 (0.99–1.05)
Site			
Northern (<i>ref</i>)			
Southern	1.33 (0.75–2.49)	1.08 (0.61–1.92)	1.17 (0.66–2.09)
Gender			
Female (<i>ref</i>)			
Male	1.38 (0.76–2.51)	1.03 (0.58–1.83)	0.91 (0.51–1.64)
Role			
Faculty members	1.48 (0.39–6.05)	1.08 (0.29–4.00)	0.78 (0.21–2.94)
Dean/Director (<i>ref</i>)			
Year at current institution	0.98 (0.93–1.03)	0.97 (0.93–1.02)	0.96 (0.92–1.1)
Current smoker			
Yes	0.33 (0.14–0.77)**	0.36 (0.15–0.88)**	0.36 (0.15–0.91)*
No (<i>ref</i>)			
Current ENDS user			
Yes	0.83 (0.29–2.34)	0.67 (0.24–1.93)	0.63 (0.21–1.89)
No (<i>ref</i>)			
Current other tobacco products user			
Yes	1.00 (0.22–4.57)	1.09 (0.25–4.77)	0.81 (0.17–3.84)
No (<i>ref</i>)			
TUPAC competencies	1.49 (1.05–2.12)*	1.45 (1.02–2.05)*	1.53 (1.06–2.19)*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ^apseudo-R² 0.33, ^bpseudo-R² 0.37, ^cpseudo-R² 0.29

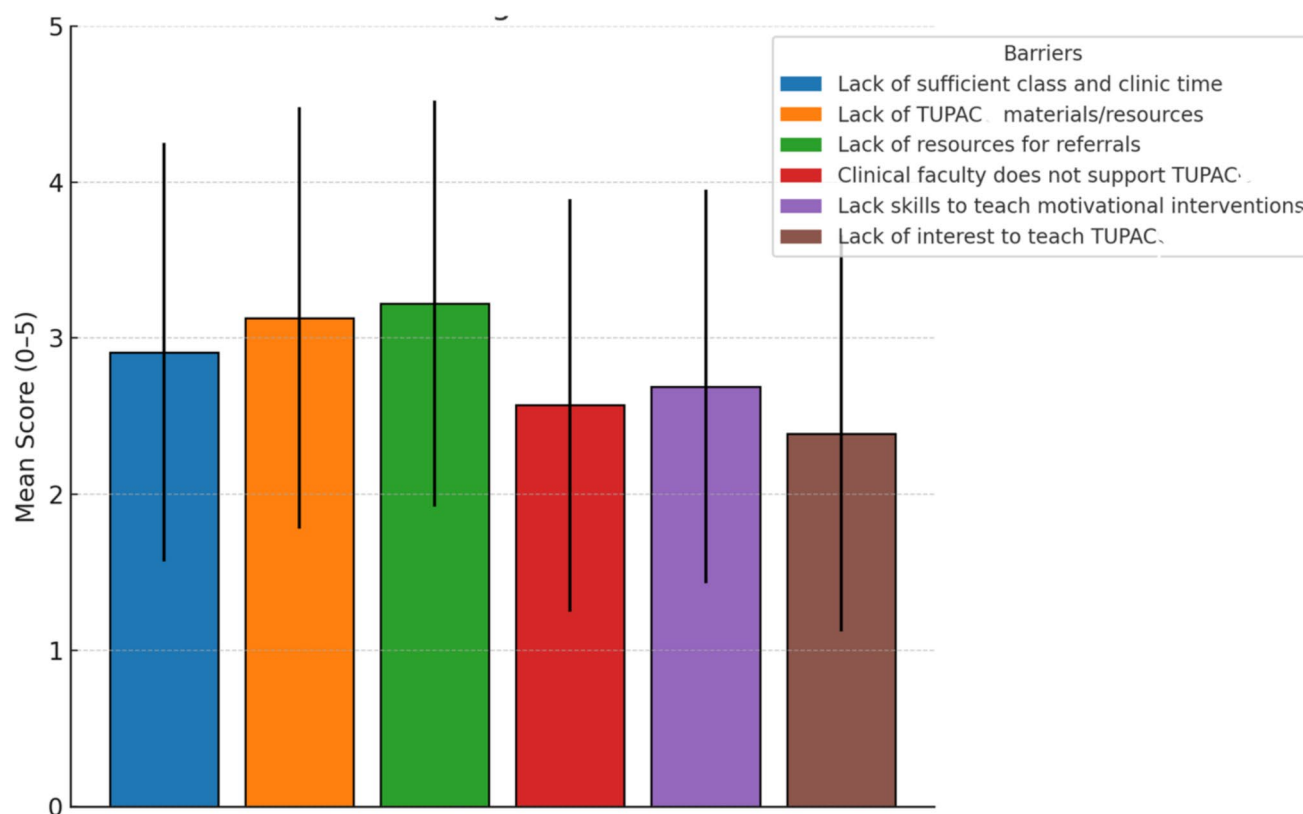


Fig. 1 Barriers to providing tobacco and nicotine education

Table 5 TUPAC competencies based on the 5A's model

TUPAC competencies	Mean ($\pm$ SD)
Ask	4.33 ($\pm$ 0.81)
Advise	4.10 ($\pm$ 0.87)
Assess	3.99 ($\pm$ 0.89)
Assist	3.98 ($\pm$ 0.92)
Arrange	4.03 ($\pm$ 0.94)
All 5 competencies	4.09 ($\pm$ 0.81)

Discussion

The present study provides one of the first multi-institutional insights into tobacco and nicotine use, knowledge, and attitudes among dental faculty members in Italy. Overall, the prevalence of current cigarette smoking (13.7%) and ENDS use (9.1%) in the analyzed sample appears lower than that observed in the general Italian population (22.3%) (World Health Organization 2022) but remains comparable to international estimates among HCPs (Nilan et al. 2019). Notably, faculty members in Southern Italy showed significantly higher smoking and ENDS use rates compared with the Northern counterparts, suggesting

the persistence of regional disparities in tobacco-related behaviors that follow broader epidemiological trends in Italy (Colaprico et al. 2025). Specifically, faculty in Southern Italy were about twice as likely to be current smokers and ENDS users compared with their Northern colleagues. These differences mirror broader national epidemiological trends, where higher smoking prevalence has consistently been reported in Southern regions of Italy compared with Northern ones, particularly among healthcare workers and young adults (Colaprico et al. 2025; World Health Organization 2022). These findings underscore that even within academic healthcare environments, such as Dental Schools, tobacco consumption remains a relevant issue, carrying direct implications for both professional role-modeling and public health promotion.

A critical finding of our study is that nearly half of the faculty expressed the need for specific training to teach students about tobacco prevention and cessation, with particular interest in cigarette-related interventions. This aligns with previous research showing that dental professionals often report low confidence and limited engagement in tobacco cessation counseling (Duaso et al. 2014; Pizzo et al. 2013). Importantly, we found that current smokers among faculty members were significantly less likely to endorse the need for training, a result that reflects how personal tobacco use

can challenge both professional attitudes and the likelihood of engaging in patient counseling (Duaso et al. 2014). Conversely, higher scores in TUPAC competencies were associated with a stronger recognition of the importance of training, highlighting that competence-building efforts can positively reinforce faculty members' preventive role.

Limited awareness of institutional tobacco- and vaping-free policies emerged as an additional area of concern. Only one-third of participants were aware of such policies at their Universities, while nearly half were uncertain about their existence. This suggests either limited communication of existing regulations or an absence of systematic enforcement. Previous literature indicates that strong, visible institutional policies are essential for shaping norms, protecting students and staff from secondhand smoke exposure, and reinforcing health-promoting behaviors (Costantino et al. 2024). Universities should therefore not only adopt comprehensive tobacco- and vape-free policies but also ensure that they are clearly communicated, consistently enforced, and embedded into the broader institutional culture. National efforts led by the Center for Disease Prevention and Control (CCM), under the Italian Ministry of Health and coordinated by the Istituto Superiore di Sanità (ISS), supports the implementation of anti-smoking initiatives, including professional training and the establishment of cessation centers (Istituto Superiore di Sanità (ISS) 2023; Ministero della Salute 2012). While these efforts further underscore the public health relevance of strengthening tobacco prevention and control initiatives, additional action is needed within academic dental settings.

Curricular integration of tobacco- and nicotine-related content was found limited. Fewer than half of the respondents indicated that tobacco prevention and cessation were included in their programs, with particularly low inclusion rates for ENDS (15.8%) and other tobacco products (12.5%) education. This mirrors global trends in dental education despite recommendations from WHO, FDI, and European dental education guidelines emphasizing the importance of equipping future clinicians with cessation counseling skills. Structured, competency-based integration of the 5A's model into dental training is therefore urgently needed, not only to enhance student preparedness but also to normalize tobacco cessation counseling as an integral part of oral healthcare. In the Italian academic context, curricular reform is a complex and lengthy process, often requiring ministerial or national level approvals, which may hinder rapid integration of structured tobacco cessation training. As a more immediate strategy, Italian dental institutions could offer continuing medical education (CME) opportunities for faculty and the development of standardized Italian toolkits for Tobacco Use and Nicotine Addiction Prevention and Control.

Our analysis of demographic factors revealed that age, gender, and years of professional practice were found to

influence TUPAC scores, suggesting that counseling competence may be shaped by both professional maturity and social role expectations. These insights could inform the tailoring of training approaches—for instance, emphasizing motivational interviewing and communication strategies for younger or less experienced faculty, and leveraging senior faculty as campaigners of best practices.

Faculty members also identified several barriers to implementing tobacco education, with lack of resources, insufficient teaching time, and limited skills in motivational interventions being the most frequently reported. These challenges are not unique to Italy and have been widely documented across dental education contexts (Tamí-Maury et al. 2014). To overcome these obstacles, institutions could develop or adapt standardized cessation toolkits, integrate cessation counseling into existing clinical encounters rather than as standalone modules, and provide short, accessible training in motivational interviewing techniques, potentially through online platforms. Interestingly, lack of resources was perceived as a stronger barrier than lack of time or teaching skills, suggesting that structural deficiencies, such as the absence of standardized educational materials or limited institutional support, may play a more decisive role than individual motivation. Addressing these systemic gaps may therefore represent the most effective strategy to enhance tobacco education.

This study has several limitations that should be acknowledged. The use of a non-probability voluntary convenience sample introduces a risk of selection bias, limiting representativeness across all Italian dental faculties. The response rate, although reported, may affect external validity and should be interpreted with caution. Voluntary response bias is also plausible, as faculty members involved in clinical disciplines where the impact of tobacco use is more evident (e.g., periodontology, oral medicine) may have been more motivated to participate than those in preclinical or basic science fields. Social desirability bias may have led to under-reporting of tobacco use, although the anonymous nature of the survey likely mitigated this effect. Additionally, the lack of data on participants' specialties or the proportion of time spent in clinical versus academic roles limits our ability to assess how professional background influences attitudes and behaviors. Finally, the findings cannot be generalized beyond the eight universities included in this study. These results should therefore be viewed as a foundational step, underscoring the need for larger, nationally representative studies that integrate both quantitative and qualitative methodologies to further explore barriers, facilitators, and the long-term impact of faculty-led tobacco prevention and cessation initiatives.

Despite these limitations, the present study has several strengths, including the multi-institutional sample, which enhances representativeness across the Italian academic

landscape, and its focus on a pressing public health concern that directly intersects with dental education. Furthermore, by identifying specific training and policy gaps, our findings provide actionable insights for curriculum planners and university leaders.

Future research should include longitudinal studies to monitor changes in faculty members' tobacco use and preventive practices following targeted interventions, as well as qualitative research to capture in-depth perspectives on barriers and facilitators to integrating cessation training. In addition, the design and evaluation of tailored educational interventions, particularly those focused on the 5A's and motivational interviewing, will be critical to strengthen both faculty capacity and student training in this area.

In conclusion, while tobacco use among Italian dental faculty members is lower than in the general population, it remains a significant concern with implications for professional role-modeling and preventive education. Limited awareness of institutional policies, insufficient curricular integration of tobacco use and vaping prevention and cessation content, and faculty-reported barriers indicate an urgent need for coordinated action. Strengthening faculty competencies through structured training, ensuring robust policy implementation, and embedding tobacco prevention into the dental curricula are essential steps toward positioning dental schools as leaders in tobacco use and vaping prevention and control, and overall oral health promotion. After all, isn't the oral cavity among the first tissues to suffer the harmful effects of tobacco and nicotine products?

Acknowledgements We sincerely thank the faculty members from the eight participating dental schools for their participation in this study. We also gratefully acknowledge Marie Compaore Oubda, MPH, Research Assistant at UTHealth Houston and a member of Dr. Tamí-Maury's Health Equity Research Group, for her dedicated contributions to study management and coordination.

Authors' contributions Authors IT and ST share first authorship in this manuscript. Conceptualization: IT; Protocol development and investigation: IT, ST, ODF; Methodology: IT, ST, ODF; Participant recruitment, data collection: All authors; Supervision: IT; Data analysis: ST, IT; Writing—original draft preparation: DM, CB, GO, ST, IT; Review of original draft: All authors; Final review and editing: All authors.

Funding None.

Data availability The data supporting this research cannot be made available for privacy or other reasons.

Declarations

Ethical approval This study was conducted in accordance with ethical standards for research involving human participants. Institutional Review Board (IRB) approval was obtained where required. For institutions where IRB review was not necessary, this was due to the anonymous nature of the survey and local policies exempting such studies from formal review and protocol assignment. The study was approved by the Institutional Review Boards of the University of Palermo, Italy

(Protocol No. AGT009510), Alma Mater Studiorum University of Bologna (Protocol No. 80–2024-OSS-AUSLB), Magna Græcia University, Catanzaro (Protocol No. 194/13–06-2024), University of Insubria (Protocol No. 0128804/23112023), University of Campania Luigi Vanvitelli, Napoli Vanvitelli (Protocol No. 0020787/i-2024), Amedeo Avogadro University of Eastern Piedmont, Novara (Protocol No. 684/CE-2024), University of Trieste (Protocol No. 137_2024), and the University of Texas Health Center at Houston, Texas, USA (Protocol No. HSC-SPH-22–0858). At the University of Padua, Padova, the study was considered low-risk and anonymous; therefore, it is “exempt.”

Consent to participate Owing to the anonymity of the online survey, obtaining informed consent was not necessary. Participants were, however, asked to accept or decline participation in the study in the introductory statement of the online survey.

Conflict of interest The authors declare that they have no competing financial interests or personal relationships that influenced the work reported in this paper.

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