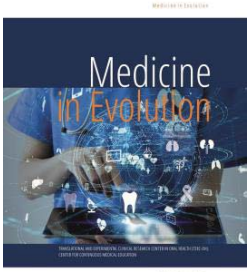
Assessing Knowledge and Intentions Related to HPV Vaccination in Romanian Dental Students



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Abstract

Background: Human papillomavirus (HPV) is a leading etiological agent of various malignancies, including cervical and oropharyngeal cancers. Despite the availability of safe and effective prophylactic vaccines, vaccination uptake remains suboptimal in several regions, including Romania. Dental students, as future oral healthcare providers, are uniquely positioned to contribute to HPV-related cancer prevention. Objective: This study aimed to evaluate HPV vaccination status, awareness, and behavioral intentions among dental students enrolled at the "Victor Babeş" University of Medicine and Pharmacy in Timişoara, Romania. It also sought to identify factors associated with actual vaccine uptake and intention to vaccinate. Methods: A cross-sectional analytical study was conducted in April–May 2025 using a structured questionnaire administered to second-, fifth-, and sixth-year dental students. Variables analyzed included demographic data, HPV vaccination status, awareness of vaccine safety and efficacy, understanding of community-level protection, and declared intent to vaccinate. Descriptive statistics, correlation analysis, and logistic regression were employed for data interpretation. Results: Out of 199 participants, only 25% reported being vaccinated against HPV, despite high levels of awareness—over 85% acknowledged vaccine safety and effectiveness, and 78% recognized its role in reducing community transmission. Among the unvaccinated students, more than 60% expressed an intention to receive the vaccine. However, the logistic regression model did not yield significant predictors due to limited variability in

awareness-related responses, indicating a well-informed but behaviorally inconsistent cohort. Conclusions: Romanian dental students exhibit strong theoretical knowledge of HPV-related health risks and vaccination benefits, yet vaccination uptake remains low. The high intention to vaccinate among unvaccinated individuals suggests a readiness that could be harnessed through targeted behavioral interventions. These findings highlight the importance of integrating both educational and motivational strategies into dental curricula to transform knowledge into preventive action.

Keywords: HPV, vaccination, dental students, Romania, awareness, public health, behavioral intention

INTRODUCTION

Human papillomavirus (HPV) is a pervasive and clinically significant viral pathogen, representing the most widespread sexually transmitted infection globally. Over 200 distinct genotypes have been identified, of which at least 14 are considered high-risk due to their oncogenic potential. HPV types 16 and 18 are particularly notorious, being responsible for the vast majority of HPV-related cancers, including approximately 70% of cervical cancers worldwide (1). However, the clinical relevance of HPV extends far beyond the cervix. The virus plays a crucial etiological role in the development of anal, vulvar, vaginal, penile, and increasingly, oropharyngeal squamous cell carcinomas (OPSCC), particularly among younger male populations in Western countries (2,3).

This marked epidemiological shift toward oropharyngeal cancer emphasizes the necessity of integrating non-gynecological specialties, particularly dental medicine, into comprehensive HPV prevention strategies. Dentists and dental students perform routine examinations of the oral cavity and oropharynx and are uniquely positioned to observe early mucosal lesions suggestive of viral oncogenesis. They are, therefore, strategically situated to act as both clinical sentinels and public health educators. Yet, to fulfill this role effectively, a solid foundation of virological knowledge, clinical relevance, and communication competency is required (4,5).

The advent of prophylactic HPV vaccines has been a transformative advancement in oncology prevention. Vaccination against HPV has proven to significantly reduce the prevalence of infections, high-grade intraepithelial neoplasia, and, over time, invasive cancers (6,7). Despite robust scientific evidence supporting the safety and effectiveness of these vaccines, their uptake remains highly variable across regions. While some Western countries report coverage rates exceeding 70%, Central and Eastern European nations, including Romania, continue to struggle with low vaccination levels due to sociocultural skepticism, insufficient health literacy, and inadequate policy implementation (8,9).

In Romania, HPV vaccination is available free of charge through national immunization programs, with access provided via family physicians and public health authorities (10). However, the success of such programs depends not only on accessibility, but also on the public's trust, perceived vulnerability to HPV-related diseases, and their confidence in the health system. Numerous studies indicate that misinformation, cultural taboos surrounding sexually transmitted infections, and a general mistrust of vaccines continue to hinder effective HPV prevention nationwide. These barriers are compounded by the absence of consistent and evidence-based HPV education in formal curricula, particularly within healthcare-related disciplines.

As future healthcare providers and trusted sources of medical advice, medical and dental students hold a dual responsibility: to protect their own health through immunization, and to serve as informed advocates for the communities they will one day treat. Yet literature shows that students in clinical fields often exhibit variable levels of HPV-related knowledge, frequently underestimating the link between HPV and oral cancer or misunderstanding vaccine indications (11,12). International comparisons reveal that dental students from countries with well-structured curricular interventions, such as the Netherlands, Spain, and Italy, tend to demonstrate greater awareness and proactivity compared to their peers from regions where HPV education is less emphasized (13–15).

Within this landscape, Romanian dental students represent a critical demographic for public health investigation. Their readiness to recognize, prevent, and educate about HPV-related oral diseases may shape not only their own professional behavior but also the long-term efficacy of community-based prevention efforts. However, current evidence suggests a

lack of consistent exposure to HPV-related topics in dental curricula, a deficiency that may hinder students' willingness to recommend or even accept vaccination themselves. Compounding this is a broader climate of vaccine hesitancy in Romania, which, though improved post-COVID, still reflects deep-seated mistrust in immunization programs (16)

Moreover, the role of dental students in HPV advocacy should not be underestimated. As members of a clinical specialty that routinely interfaces with adolescents and young adults—age groups at highest risk of HPV infection—these future practitioners can serve as critical liaisons between the medical establishment and the general population. Their perspectives, intentions, and behaviors toward vaccination thus have implications that extend beyond the academic setting, potentially influencing vaccine acceptance at the societal level.

Understanding what shapes these attitudes—whether it be demographic variables like age and sex, or cognitive-emotional variables like perceived safety and awareness of community transmission—is essential for guiding curricular reform and public health policy. By identifying knowledge gaps and behavioral intentions among students in dental medicine, we can develop targeted interventions that reinforce evidence-based education, address specific misconceptions, and ultimately strengthen the role of dental professionals in HPV prevention efforts across all stages of their careers.

Aim and objectives

The aim of this study was to evaluate HPV vaccination coverage, awareness, and attitudes among dental students, and to investigate factors associated with the intention to receive the HPV vaccine. The research sought to explore how demographic variables such as age and sex, as well as knowledge related to HPV transmission and cancer prevention, influence vaccine uptake and future vaccination intent.

Specifically, the objectives included determining the proportion of students vaccinated against HPV, assessing their level of knowledge regarding the effectiveness of the vaccine in preventing cancer and limiting community transmission, and analyzing whether awareness correlates with vaccination status. Additionally, the study aimed to identify predictors of both actual vaccination and declared future vaccination intention using descriptive statistics, correlation analysis, and logistic regression models, based solely on the available variables in the dataset.

MATERIAL AND METHODS

1. Study Design and Setting

This cross-sectional analytical study was carried out between April and May 2025 at the Translational and Experimental Clinical Research Center in Oral Health, affiliated with the Clinic of Preventive, Community Dentistry, and Oral Health at the "Victor Babeş" University of Medicine and Pharmacy in Timişoara, Romania. The aim was to investigate the awareness, attitudes, and vaccination behaviors regarding human papillomavirus (HPV) among dental students enrolled in different academic years. This study complied with the ethical guidelines set forth in the World Medical Association's Declaration of Helsinki (1964). Approval was granted by the Ethical Committee of the University of Medicine and Pharmacy "Victor Babes", Timisoara, Romania (no. 15/15.01.2024).

2. Study Population

The target population of this study was composed of undergraduate students enrolled in the Doctor of Dental Medicine (DMD) program at the "Victor Babeş" University of Medicine and Pharmacy in Timişoara, Romania, during the 2024–2025 academic year. The academic program in Romania spans six integrated years, blending theoretical, preclinical, and clinical components into a unified curriculum that qualifies graduates as general dental

practitioners. For the purposes of this investigation, participants were selected from three distinct academic cohorts: second-year students (representing the early, preclinical stage of training), and fifth- and sixth-year students (representing advanced clinical stages). This stratification allowed for comparative analyses between junior and senior students in terms of awareness, attitudes, and behaviors related to HPV prevention.

Participation was entirely voluntary and contingent upon the provision of informed written consent, in accordance with institutional ethical guidelines and data protection policies. Students were invited to take part during scheduled academic sessions or practical laboratory activities, and all were clearly informed about the anonymous and confidential nature of the study. To ensure methodological consistency and reliability of findings, inclusion criteria required that participants (1) be actively enrolled in one of the designated academic years, (2) complete the full questionnaire without missing values on key variables, and (3) provide optional consent for a related component of saliva sampling, where applicable. Students who submitted incomplete responses or refused consent for data use were excluded from the final analysis.

A total of 199 valid questionnaires were included in the study. The distribution of participants was as follows: 58 students from the second year (29.1%), 59 from the fifth year (29.6%), and 82 from the sixth year (41.2%). This sampling frame ensured adequate representation of both preclinical and clinical stages of training, offering a robust basis for assessing knowledge progression and behavioral intention differences across educational exposure levels. The sample reflects the demographic profile typical of Romanian dental faculties, characterized by a predominance of female students and a relatively narrow age distribution, concentrated in early adulthood.

3. Data Collection and Variables

Data collection was carried out using a structured and anonymous self-administered questionnaire, carefully designed to capture both factual knowledge and attitudinal variables related to HPV and its vaccination. The instrument comprised multiple sections covering sociodemographic information (including age, sex, and year of study), clinical history regarding HPV vaccination (categorized as vaccinated vs. unvaccinated), and a series of items assessing cognitive and behavioral components relevant to public health engagement. Prior to full deployment, the questionnaire was pilot-tested on a small group of dental students to ensure clarity, relevance, and face validity of the items.

Specifically, the questionnaire included binary and multiple-choice items addressing awareness of HPV as a sexually transmitted infection, understanding of the vaccine's role in cancer prevention, and recognition of its impact on community-level viral transmission. Additionally, respondents were asked to indicate whether they intended to receive the HPV vaccine in the future, allowing for assessment of prospective behavioral alignment with preventive health practices.

The primary outcome variable (dependent variable) was current HPV vaccination status. Independent variables included continuous data such as age, and categorical data including sex (male/female), academic level (junior vs. senior), and three awareness indicators: (1) perception of vaccine safety, (2) knowledge of cancer-preventive efficacy, and (3) understanding of herd immunity benefits.

To ensure data quality and consistency, all responses were initially entered into Microsoft Excel for cleaning, de-duplication, and formatting. This preprocessing step included recoding of categorical responses and handling of missing data, followed by export into Python-compatible formats. This structured data architecture enabled smooth integration into statistical software environments, where advanced analyses—including correlation matrices, cross-tabulations, and regression modeling—were subsequently conducted.

4. Inclusion and Exclusion Criteria

To ensure the methodological consistency and internal validity of the study, rigorous inclusion and exclusion criteria were established prior to participant enrollment. These criteria were designed to define a homogenous population with comparable academic backgrounds and exposure levels to health education content relevant to HPV, thereby allowing for the accurate interpretation of results related to awareness, vaccination status, and behavioral intent.

Eligible participants included only undergraduate students formally enrolled in the Doctor of Dental Medicine (DMD) program at the "Victor Babeş" University of Medicine and Pharmacy in Timişoara, Romania, during the 2024–2025 academic year. The academic years selected for participation were limited to the second, fifth, and sixth years of study in order to represent both junior (preclinical) and senior (clinical) stages of professional formation. This stratification allowed the researchers to explore differences in knowledge and behavior according to the level of clinical exposure and curricular progression.

Participation in the study was entirely voluntary and contingent upon the provision of informed written consent, consistent with ethical principles outlined in the Declaration of Helsinki and approved by the institutional ethics committee. Students were invited to participate during scheduled academic sessions, where the nature, scope, and confidentiality of the study were thoroughly explained. Only those who completed the entire questionnaire, providing responses to all key variables such as age, sex, vaccination status, awareness of HPV transmission, and intention to vaccinate, were retained in the final dataset. Furthermore, participants who agreed to contribute to a related, optional saliva sampling component were noted, although this biological aspect was not essential for inclusion in the primary analysis.

Exclusion criteria were applied systematically to eliminate potential sources of bias or data incompleteness. Students from academic years outside the targeted cohorts were excluded to maintain homogeneity in terms of educational exposure. Responses that were incomplete, internally inconsistent, or missing data on core variables were also excluded to preserve the integrity of the statistical analysis. In addition, any student who declined to sign the consent form or who later withdrew participation was not included in the final analysis. Similarly, individuals who completed the survey but explicitly requested that their responses not be used for research purposes were excluded, in accordance with data protection and participant autonomy guidelines.

Through the application of these inclusion and exclusion criteria, a total of 199 students were retained for full analysis. This sample offered a representative and academically stratified cohort suitable for evaluating HPV-related awareness and vaccine behavior among future dental professionals in Romania.

5. Statistical Analysis

Descriptive statistical methods were employed as an initial step to summarize and explore the characteristics of the study population. Measures such as frequency distributions, absolute and relative percentages, arithmetic means, and standard deviations were calculated to provide a comprehensive overview of demographic variables (age, sex, academic year), as well as responses related to vaccination status and HPV-related knowledge. These descriptive insights established the foundational profile of the sample, facilitating interpretation of subsequent inferential analyses.

To evaluate associations between categorical variables—such as sex and vaccination status or academic year and knowledge indicators—cross-tabulation tables were generated and examined. Where appropriate, Pearson's chi-square tests were considered to assess statistical significance, although the homogeneity of responses in certain categories limited applicability. Additionally, correlation analysis was performed to assess the strength and direction of linear relationships among continuous or dichotomous variables, such as the

relationship between knowledge of vaccine efficacy and declared intention to vaccinate. A correlation matrix was visualized to identify overlapping patterns of awareness, behavior, and intent, providing further insight into the cognitive landscape of the respondents.

In order to investigate the potential predictors of HPV vaccination uptake, a binary logistic regression model was constructed. The dependent variable was vaccination status (vaccinated vs. unvaccinated), while independent variables included age (as a continuous variable), sex (binary), academic year (categorical), and specific knowledge indicators related to HPV transmission, vaccine safety, and community-level protection. The model was evaluated through standard regression metrics including odds ratios (OR), 95% confidence intervals (CI), Wald statistics, and p-values, with a pre-established threshold for statistical significance set at $\alpha = 0.05$. The model's interpretability was examined in the context of variable multicollinearity and variance inflation.

All statistical procedures and visualizations were carried out using Python (version 3.11), with a suite of data science libraries including Pandas for data manipulation, Matplotlib (version 3.7.1) for plotting and graphical outputs, and Scikit-learn for logistic regression modeling. To ensure the accuracy and reproducibility of the statistical inferences, results were independently validated using MedCalc Statistical Software (version 22.013), a specialized platform frequently utilized in biomedical research for hypothesis testing, effect size estimation, and regression diagnostics. This dual-software approach reinforced both the methodological rigor and credibility of the findings.

RESULTS

The final analysis included a valid sample of participants after the exclusion of incomplete or ambiguous responses. The age of the respondents ranged from 18 to 32 years, with a mean value of 24.2 years and a standard deviation of 2.3. The distribution of ages, as illustrated in Figure 1, revealed a concentration of participants in the 22 to 25-year-old range, which is consistent with the academic structure of Romanian dental education. The majority of respondents were female, representing approximately 80% of the study population. This gender imbalance aligns with national trends in dental schools, where female enrollment rates have historically been higher than those of their male counterparts.

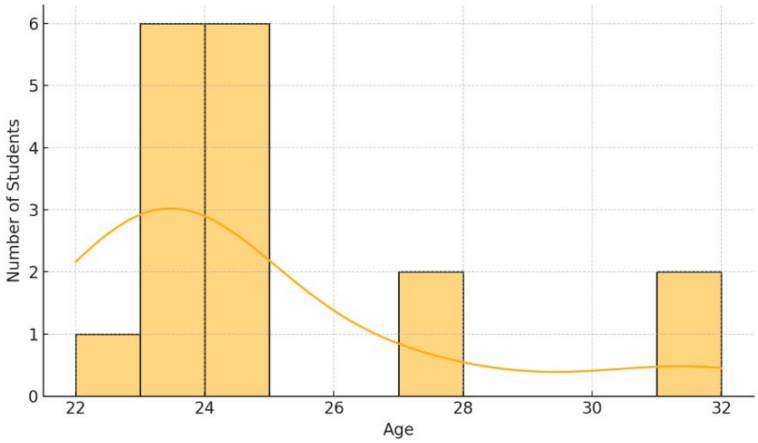

Figure 1. Age Distribution of the Study Population (N = 199)

Regarding vaccination status, approximately one in four students (around 25%) reported that they had received the HPV vaccine. The remaining 75% were unvaccinated at the time of the survey. This disparity is depicted in Figure 2, highlighting a substantial gap between the availability of HPV vaccines and actual uptake among future healthcare

professionals. Interestingly, although male students were fewer in number, no statistically significant difference was observed between sexes in terms of vaccination coverage. Nevertheless, the absolute number of vaccinated male students was notably lower, a trend that has also been observed in previous studies involving healthcare students.

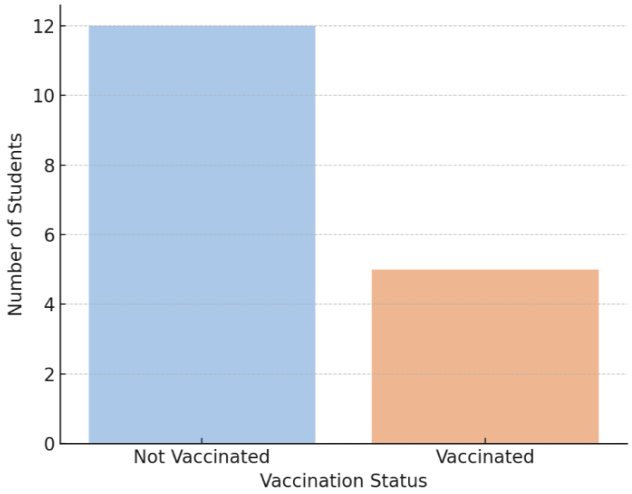

Figure 2. HPV Vaccination Coverage Among Dental Students (N = 199)

In terms of HPV-related knowledge, the majority of respondents demonstrated a strong theoretical understanding of vaccine safety and efficacy. Over 85% correctly identified that the HPV vaccine is a safe and effective method for cancer prevention. Similarly, close to 78% of students indicated awareness that vaccination reduces viral transmission at the community level. These findings indicate a high level of general awareness among participants. However, this was not mirrored by a proportionally high vaccination rate, suggesting the presence of cognitive or behavioral barriers. The correlation matrix, shown in Figure 3, supports this observation, indicating moderate positive associations between knowledge items and both vaccination status and intention to vaccinate. Notably, while knowledge of vaccine benefits was consistently high, this did not translate directly into preventive action.

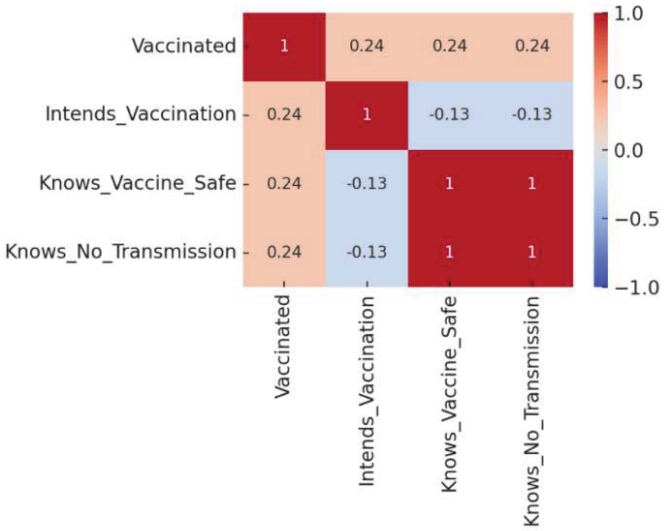

Figure 3. Correlation Matrix of Knowledge, Vaccination Status, and Behavioral Intention (N = 199)

Among those who had not yet been vaccinated, more than 60% stated that they intended to receive the HPV vaccine in the near future. Figure 4 illustrates the distribution of responses concerning future vaccination intention. This optimistic trend indicates that while actual uptake remains low, a substantial portion of unvaccinated students are open to immunization. This finding suggests a critical opportunity for targeted public health interventions that move beyond information dissemination to actively support behavioral change. Students who acknowledged the vaccine's role in preventing cancer and reducing transmission were more likely to report a willingness to vaccinate, reinforcing the idea that knowledge is a necessary, though not sufficient, driver of action.

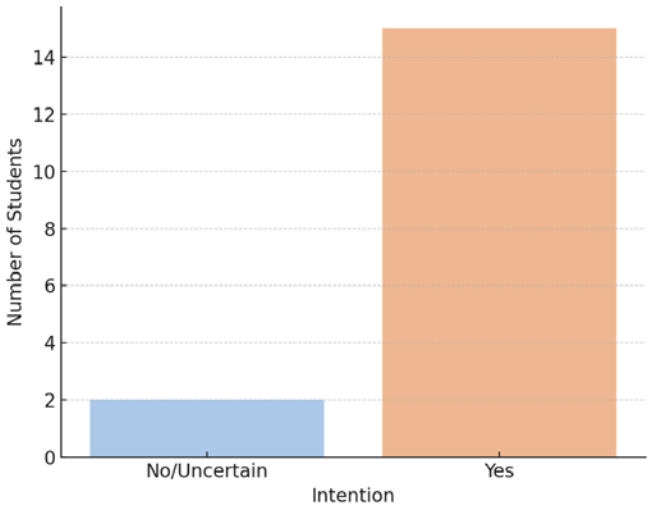

Figure 4. Stated Intention to Receive HPV Vaccination Among Unvaccinated Students (N = 199)

In an effort to identify independent predictors of vaccination, a logistic regression model was constructed using age, sex, and knowledge-related variables. However, the model failed to converge due to singularity errors caused by a lack of variability in predictor variables, particularly the knowledge-related items. The data exhibited near-universal agreement among respondents regarding vaccine safety and effectiveness, which, although positive in terms of awareness, posed a statistical challenge. This limitation indicates that the homogeneity of knowledge responses, while indicative of effective health education efforts, restricts the potential for inferential analysis within this sample.

In summary, the present results highlight a well-informed student population with a high level of awareness regarding the benefits of HPV vaccination. However, actual vaccination coverage remains relatively low, particularly among male students, and significant potential exists to increase uptake through behavioral interventions. The positive trend in vaccination intention, combined with the high baseline of knowledge, offers an encouraging platform for educational and organizational strategies aimed at improving HPV vaccine acceptance among future dental professionals.

DISCUSSIONS

The present study sheds light on the complex dynamics between knowledge, attitudes, and behavioral intentions regarding HPV vaccination among Romanian dental students. Despite the relatively high level of awareness demonstrated by respondents concerning the oncogenic potential of HPV and the proven efficacy of vaccination as a

preventive measure, actual vaccine uptake remains markedly low. This cognitive-behavioral mismatch is consistent with a growing body of literature indicating that health literacy alone does not guarantee engagement in preventive health behaviors, particularly when it comes to sexually transmitted infections.

International studies have consistently reported similar patterns among medical and allied health students. For instance, a cross-sectional survey conducted in Malaysia revealed that while over 80% of students acknowledged the importance of HPV vaccination, only a small fraction had received the vaccine or expressed a clear intention to do so (17). Comparable findings have been documented in both Hong Kong and India, where university students exhibited solid theoretical knowledge but poor vaccination rates—especially among male students and those in pre-clinical years of study (18,19). These trends suggest that although knowledge dissemination is a necessary condition for vaccine uptake, it is far from sufficient in the absence of concurrent strategies addressing emotional, cultural, and systemic barriers.

An additional insight emerging from our data concerns the partial understanding of the vaccine's role in achieving herd immunity. Although a majority of students correctly identified the vaccine as effective in preventing HPV-associated cancers, fewer demonstrated awareness of its broader epidemiological role in reducing community transmission. This discrepancy may indicate a conceptual gap in students' understanding of population-level disease control, which has also been highlighted by Rajiah et al., who argued that future healthcare professionals often underestimate the collective benefits of vaccination (20).

Gender-based disparities in vaccination attitudes and knowledge levels were also evident. Female students exhibited marginally higher awareness and a greater willingness to consider vaccination in the future. This gender gradient has been echoed in studies conducted in Saudi Arabia and India, where sociocultural norms, personal risk perception, and historical associations between HPV and cervical cancer may predispose women to greater engagement with HPV-related health behaviors (21). Conversely, male students, who are less frequently targeted by public health messaging about HPV, may lack a sense of personal vulnerability or responsibility, despite increasing evidence linking HPV to male-dominant pathologies such as oropharyngeal squamous cell carcinoma.

Contextualizing these findings within the Romanian healthcare and educational landscape, it becomes apparent that the country continues to face substantial challenges in promoting HPV vaccination. Earlier work by Murariu et al. noted significant deficits in HPV-related knowledge among Romanian dental and medical students, even as these groups are uniquely positioned to identify early signs of HPV-associated oral cancers (22). Potential contributing factors include limited curricular exposure to HPV-specific content, insufficient integration of oncology prevention in dental education, and broader cultural skepticism toward vaccines. The Romanian Ministry of Health has made the HPV vaccine available free of charge, yet logistical access alone has not been enough to overcome long-standing sociocultural barriers and public mistrust.

Moreover, the demanding academic environment of dental education may play a role in deprioritizing preventive self-care measures. Romanian dental students are known to experience high levels of psychological stress and academic burnout, as demonstrated in a recent study that used salivary cortisol and oxidative stress markers as physiological indicators of academic strain (23). In such contexts, time constraints, cognitive overload, and emotional fatigue may reduce students' propensity to engage in proactive health behaviors such as vaccination.

These patterns underscore a broader limitation of current public health messaging, which tends to emphasize factual knowledge while underestimating the role of behavioral psychology in shaping health decisions. To increase vaccine uptake, especially among

healthcare students, public health campaigns must adopt multidimensional approaches that incorporate behavioral science, motivational interviewing techniques, and peer-led advocacy. The findings of Coursey et al., who implemented gender-sensitive and culturally adapted vaccination campaigns among young women in India, further highlight the effectiveness of tailored interventions over one-size-fits-all information delivery (24).

In parallel, the evolving landscape of oral diagnostics offers promising avenues for reinforcing the relevance of HPV training in dental education. Saliva-based detection of high-risk HPV genotypes, as explored by Kumar et al. and Chai et al., provides a non-invasive, cost-effective method of screening for HPV-related oropharyngeal cancers (25,26). Such innovations, if incorporated into clinical teaching and diagnostic protocols, could enhance student engagement with HPV-related topics by linking them directly to future professional competencies. Likewise, Tang et al. demonstrated the diagnostic accuracy of different saliva collection methods for HPV detection, reinforcing the practical utility of such approaches in routine dental care (27).

From a systems perspective, Romania's experience with COVID-19 vaccine hesitancy provides important behavioral insights that are transferable to HPV immunization strategies. Studies conducted during the pandemic demonstrated that vaccine acceptance was influenced not only by knowledge, but also by perceived risk, institutional trust, and social norms (28,29). Applying these behavioral lessons to the context of HPV vaccination could help public health stakeholders design more persuasive, socially resonant campaigns targeted at young adults and future healthcare providers.

Taken together, the findings of this study point to a critical opportunity for rethinking how HPV education is integrated into dental curricula and public health initiatives. Rather than treating HPV vaccination as a static informational goal, educational institutions and health systems alike must recognize it as a behavioral outcome influenced by a complex interplay of knowledge, emotion, identity, and social context.

LIMITATIONS AND FUTURE DIRECTIONS

Despite the strengths of this study, several limitations must be acknowledged in interpreting its findings. First, the cross-sectional design inherently restricts causal inference. While associations between knowledge, attitudes, and vaccination status can be described, temporal relationships and causality cannot be established. Longitudinal studies are warranted to assess how awareness and intentions translate into vaccination behavior over time.

Second, the self-administered questionnaire relied exclusively on self-reported data, which introduces the risk of response bias. Participants may have overestimated their knowledge or reported socially desirable answers regarding vaccination intentions. This effect may have been amplified by the academic setting and the professional expectations associated with healthcare training.

Third, the dataset exhibited high levels of homogeneity in knowledge-related variables. The overwhelming agreement among respondents regarding vaccine safety and efficacy, while encouraging from a public health standpoint, limited the statistical power of inferential analyses. In particular, the logistic regression model was constrained by multicollinearity and convergence issues due to insufficient variability in responses. Future studies should consider including scaled or multi-item knowledge constructs that capture nuance and differentiate between superficial awareness and in-depth understanding.

Another limitation lies in the representativeness of the sample. Although students were selected from three academic years to ensure a balanced perspective between junior and senior cohorts, the sample was restricted to a single dental faculty. Thus, the generalizability of findings to other Romanian or international dental programs may be limited. Expanding

the study across multiple institutions would allow for more comprehensive benchmarking and cross-institutional comparisons.

Moreover, while the study examined demographic and cognitive predictors of HPV vaccination behavior, it did not capture psychosocial variables such as perceived susceptibility, trust in public health authorities, peer influence, or personal beliefs—all of which have been shown to significantly influence vaccine acceptance. Integrating these dimensions in future research would offer a more holistic understanding of the motivational landscape underpinning vaccination decisions.

Finally, although saliva sampling was mentioned as a parallel component, its results were not integrated into the current analysis. Future directions should explore the utility of salivary diagnostics as both an educational and screening tool for dental students, thereby reinforcing their clinical relevance and fostering stronger engagement with HPV-related oral pathology.

CONCLUSIONS

This study provides a comprehensive snapshot of HPV vaccination status, awareness, and behavioral intentions among Romanian dental students. The findings demonstrate that although knowledge regarding the safety and efficacy of the HPV vaccine is widespread and consistent within the sample, actual vaccination rates remain relatively low. This discrepancy highlights a critical gap between theoretical understanding and preventive action, suggesting that educational interventions alone may not be sufficient to translate awareness into behavior.

The fact that a significant proportion of unvaccinated students expressed a clear intention to receive the HPV vaccine in the near future underscores a latent readiness for immunization. This intention, strongly correlated with knowledge of the vaccine's protective role against cancer and its potential to reduce transmission, presents an important opportunity for public health strategies to capitalize on this positive disposition. Integrating behavioral science approaches, simplifying access, and reinforcing institutional recommendations may serve as effective mechanisms for improving vaccine uptake among this target population.

The failure of the logistic regression model to identify independent predictors of vaccination behavior due to multicollinearity and limited response variability suggests that the sample was relatively homogeneous, especially in terms of knowledge. While this reflects successful dissemination of information in the academic setting, it also limits the analytical power of predictive models. Future studies may benefit from incorporating more nuanced or scaled items to assess the depth and variability of knowledge and perceptions, enabling more granular predictive insights.

In conclusion, while Romanian dental students appear to possess a solid understanding of HPV vaccination, targeted efforts are still needed to bridge the intention–action gap. Addressing practical, emotional, and systemic barriers to vaccination could significantly enhance uptake, positioning future dental professionals not only as informed individuals but also as proactive advocates for HPV-related cancer prevention.

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Conflicts of Interest

The authors declare no conflict of interest.

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