



Where do young adults get information about STIs and HPV? Latent information-source profiles and preventive orientations in Italy

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ABSTRACT

Sexual health information practices are increasingly framed as individual responsibilities, yet they are enacted within unequal informational and institutional ecologies. Interpreting the findings through a sexual citizenship lens, this study examines where young adults in Italy obtain information about sexually transmitted infections (STIs) and human papillomavirus (HPV), and how information-source profiles are associated with STI/HPV knowledge and prevention-related measures. We analyse a 2024 quota-based online survey of Italian residents aged 16–30 ($N = 3105$; post-stratification weighted), using latent class analysis of STI-related information sources and weighted multinomial logistic regression. Four profiles emerge: a Legacy-media profile, a Social media-centric profile, an Expert/institutional profile, and an Interpersonal/family profile. Profile membership is most consistently associated with gender, age, exposure to school-based STI/sexual health sessions, STI/HPV knowledge, condom-use frequency, and HPV-vaccination attitudes and uptake. Citizenship, religiosity, household income/resources, and municipality size do not robustly differentiate profiles in the adjusted model. Findings reframe STI/HPV information practices as relational and institutionally scaffolded, rather than as purely individual choices. Policy and practice implications include coordinated multi-channel communication and minimum provision standards for sexuality education, youth-friendly counselling, STI testing, and HPV-vaccination pathways.

1. Introduction

Sexually transmitted infections (STIs) and human papillomavirus (HPV) remain important public-health concerns and key sites for examining how young adults access, interpret, and use sexual health information. Focusing on young adults in Italy, this paper examines STI/HPV-related information sources and analyses how information-source profiles are associated with STI/HPV knowledge and prevention-related measures. We situate this empirical focus within a broader understanding of sexual health as physical, emotional, mental, and social well-being, not merely the absence of disease (World Health Organization, 2006), and within changing biomedical, digital, and institutional environments in which sexual health information is

produced, circulated, and acted upon.

Recent expansions of biomedicine through technoscientific and information infrastructures have extended intervention and surveillance into everyday life, reshaping relations between public health governance, knowledge communication, and intimate practices (Clarke and Shim, 2011; Epstein and Mamo, 2017; Neresini et al., 2019; Crabu et al., 2021). In parallel, the pluralization and digitalization of health information have widened access to expert and experience-based knowledges and enabled user production and circulation across platforms (Akrich, 2010; Fraser et al., 2021; Vicari, 2021; Crabu et al., 2023). Within these ecologies, sexual health increasingly appears as an individualized and morally charged responsibility, with expectations to seek information, exercise judgment, and manage risk (Epstein, 2018;

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Prainsack, 2017).

These shifts are ambivalently interpreted: some emphasize more inclusive sexual representations and greater agency and literacy (Attwood et al., 2017; Fraser et al., 2021; Epstein, 2018), while others highlight risks of misinformation and new pressures toward conformity in a fragmented information landscape (Wang et al., 2019).

While many studies advocate strengthening knowledge as a pathway to safer practices (Afifi and Weiner, 2006; Meiksin et al., 2021), links between scientific literacy, orientations toward science and expertise, and behavior are non-linear and complex; literacy gains do not automatically translate into attitudinal or behavioral change (Bauer and Falade, 2014). Dominant frameworks –social-cognitive theories of behavioral change (see Afifi and Weiner, 2006; Meiksin et al., 2021) and models such as the Planned Risk Information Seeking Model (Kahlor, 2010)– have identified psychological and cognitive predictors of information-seeking (Khurana and Bleakley, 2015; Fisher et al., 2023). Factors including perceived risk, self-efficacy, knowledge gaps, and normative beliefs shape motivations for information seeking, framing it as a proactive coping strategy. Empirical work further suggests that confidence in institutional expertise is associated with greater reliance on professional and institutional sources and with prevention-related measures, such as condom-use frequency and HPV-vaccination attitudes and uptake, whereas uncertainty or anxiety may shift information seeking toward more accessible peer-based channels (Chen et al., 2018; Basinger et al., 2023).

Against this backdrop, we aim to identify and describe distinct configurations of STI/HPV-related information practices among young adults in Italy (ages 16–19 and 20–30) and to examine how these configurations are associated with STI/HPV-related knowledge and prevention-related measures. We deliberately refer to information practices, not information-seeking behaviours, to emphasize that reported information sources are relational and socially situated—embedded in families, peer networks, schools, communities, and mediated environments—rather than reducible to individual acts. In this view, STI/HPV information practices involve socio-technical and critical capacities shaped by cultural and media ecologies, moving beyond reductionist “knowledge-gap” accounts. By mapping these practices, our findings may inform STI/HPV communication resources and sexuality-education curricula tailored to diverse needs.

Although the present contribution is not primarily focused on sexuality education, the Italian context is crucial for interpreting young adults’ sexual health informational ecologies. In Italy, comprehensive sexuality education (CSE) is not integrated into a mandatory national school curriculum and provision largely relies on discretionary, project-based initiatives –frequently delivered by external providers– resulting in substantial heterogeneity in coverage, content, and implementation across schools and regions (Chinelli et al., 2023; Lo Moro et al., 2023), often diverging from international CSE standards (UNESCO, 2018). In parallel, a Ministry of Health–commissioned initiative has produced national technical guidance for school-based interventions on affectivity, sexuality, and STI prevention, explicitly framing sexuality education as broader than STI risk avoidance and as encompassing contraception, pregnancy prevention, and relational and affective well-being (Ministero della Salute, 2022). In this paper, pregnancy prevention is mentioned only as part of this broader curricular framing; our empirical focus remains on STI/HPV information, knowledge, and prevention-related measures.

Empirical reviews of regional initiatives nonetheless show uneven territorial availability and a curriculum mix in which contraception, relationships/family, and biological aspects are commonly addressed, whereas topics such as online media, rights, and consent appear less consistently covered (Cappelletti et al., 2022; Lo Moro et al., 2023). This institutional variability makes non-school information ecologies (including digital media, peers, and family) especially relevant, and makes Italy a theoretically informative context for examining how young adults navigate STI/HPV information across uneven institutional,

interpersonal, and mediated environments.

We position this contribution within debates on sexual citizenship, understood as a framework for examining how rights, responsibilities, recognition, and capacities are negotiated in intimate life and in relation to institutions, public discourse, and health governance (Evans, 1993; Weeks, 1998; Richardson, 1998, 2000, 2017; Bell and Binnie, 2004; Aggleton et al., 2019; Crabu et al., 2025). For our purposes, sexual citizenship directs attention to information practices as socially and institutionally embedded processes through which young people navigate credible knowledge, stigma, privacy, services, and preventive responsibility. Crucially, this framework foregrounds that facilitating sexual citizenship is not only an individual task, but also a societal responsibility: it depends on whether schools, health services, families, digital platforms, and public-health infrastructures provide credible, accessible, youth-appropriate, and navigable resources. Recent work on young people’s sexual health information practices similarly shows that young people weigh institutional expertise against experiential and peer knowledge, often moving across platforms and interpersonal networks to resolve uncertainty, manage embarrassment, and maintain privacy (Grant and Nash, 2019; Waling et al., 2020; Fraser et al., 2021; Farrugia et al., 2021). In this sense, everyday informational ecologies are not merely channels of exposure, but social environments through which sexual health knowledge becomes available, credible, and actionable.

Building on this framework, we analyse socio-cultural correlates of STI/HPV-related information-source profiles and examine their associations with STI/HPV knowledge and prevention-related measures. We use latent class analysis (LCA; Collins and Lanza, 2010; Weller et al., 2020) on a quota-based online survey of Italian residents aged 16–30 (N = 3105), combining a national core sample with regional over-samples (see Section 2). The analysis identifies four information-source profiles: a Legacy-media profile, a Social media–centric profile, an Expert/institutional profile, and an Interpersonal/family profile. Weighted multinomial models then assess how profile membership is associated with socio-demographic, socio-cultural, and educational characteristics, as well as with STI/HPV knowledge and prevention-related measures.

2. Methods

2.1. Research questions

Building on scholarship on young people’s STI/HPV information practices and on models of health-information seeking (Bleakley et al., 2008; Kahlor, 2010; Khurana and Bleakley, 2015; Fisher et al., 2023; Sutton and Walsh-Buhi, 2017), we address three empirical questions on STI/HPV-related informational practices among young adults in Italy. We operationalise information practices as self-reported sources of respondents’ STI-related information across institutional, interpersonal, and mediated channels. This operationalisation captures reported sources among up to three nominated channels and should not be read as a complete inventory of exposure or as a direct measure of purposive information seeking. Full item wording and coding are provided in the Supplementary Materials.

- RQ1: What distinct profiles of STI-related information sources do young adults report across institutional, interpersonal, and mediated channels?
- RQ2: Which socio-demographic, socio-cultural, experiential, and educational characteristics are associated with membership in these information-source profiles?
- RQ3: How are information-source profiles associated with STI/HPV knowledge and prevention-related measures, including condom-use frequency and perceived utility and uptake of HPV vaccination?

2.2. Data, sampling, and weighting

We fielded a quota-based online survey of Italian residents aged 16–30 in 2024. The survey was designed to approximate national population benchmarks and was implemented via Demetra [opinioni.net](https://www.opinioni.net) srl's online panel (i.e., srl: Italian limited-liability company) using minimum-quota sampling aligned with population targets by age group (16–19; 20–30), gender, and macro-area (North-West, North-East, Centre, South–Islands). Because respondents with higher educational attainment were overrepresented in the achieved sample, all estimates were computed using post-stratification case weights aligning the sample with ISTAT resident-population margins by age group, gender, and education. Details on the construction of the weights and the weight matrix are reported in the Supplementary Materials. Analyses rely on $N = 3105$ respondents with complete data on the LCA information-source indicators. The dataset comprises a national minimum-quota core sample (Italy-wide; $n = 506$) and five regional quota subsamples stratified by province: Veneto ($n = 501$), Sicily ($n = 525$), Lazio ($n = 526$), Tuscany ($n = 523$), and Piedmont ($n = 524$). The age groups 16–19 and 20–30 were used as quota strata and for descriptive purposes; in the main regression models, age was entered as age in years unless otherwise specified. Because the survey combines an online-panel design with quota sampling and regional oversampling, the data should be interpreted as a weighted quota-based online-panel sample rather than as a probability sample. Post-stratification weights improve alignment with selected population margins but cannot remove all potential selection processes associated with online-panel recruitment.

2.3. Measures

STI information sources (LCA indicators): information sources were measured with a multiple-response item asking respondents where the STI-related information they had come from. Respondents could select up to three sources; response options were shown in random order. The item included institutional sources, such as general practitioner, family-planning centre, and teachers; interpersonal sources, such as mother/female guardian, father/male guardian, friends, partner, and older sibling; and mediated sources, such as Internet websites, TV programmes, newspapers, online encyclopaedias, magazines, radio, podcasts, books, social networks/blogs, and scientific journals. The LCA indicators are the source categories reported in [Table 2](#).

Each response option was represented as a binary categorical LCA indicator distinguishing whether the source was selected among the respondent's up to three reported sources. Numeric coding was used only for model estimation and has no substantive meaning; throughout the article, conditional item-response probabilities refer to the probability of selecting the source. Because respondents could select a maximum of three sources, “not selected” means “not mentioned among the respondent's up to three reported sources,” not absence of any exposure to that channel. For this reason, we interpret the classes as information-source profiles rather than as direct measures of the intensity, completeness, or intentionality of information seeking.

Knowledge: STI and HPV knowledge were assessed using 15 and 11 true/false statements, respectively, each with an additional “don't know” option. “Don't know” responses were coded as incorrect. Additive knowledge scores were computed as the number of correct answers, ranging from 0 to 15 for STI knowledge and from 0 to 11 for HPV knowledge.

Prevention-related measures: condom-use frequency was measured among respondents reporting vaginal or anal intercourse in the past 12 months using an ordinal frequency item. Respondents without vaginal or anal intercourse in the past 12 months were retained through a mutually exclusive “not sexually active (past 12 months)” category, consistent with the questionnaire skip pattern. HPV vaccination was measured through perceived utility and follow-up items on uptake. These items were combined into mutually exclusive categories capturing

perceived utility and uptake: “not useful,” “useful and vaccinated,” “useful and not vaccinated,” and “useful, uptake unknown.” The latter category includes respondents who considered HPV vaccination useful but reported not knowing whether they had been vaccinated or preferred not to answer the uptake item.

Additional adjustment covariates: additional variables related to preventive healthcare use and STI-related experience were included in the regression model as adjustment covariates rather than as primary outcomes. Preventive healthcare use was measured through self-reported andrological/gynaecological visit in the past three years. STI-related experience was measured through self-reported previous STI diagnosis.

Socio-demographic and socio-cultural covariates: regression models included socio-demographic and socio-cultural characteristics relevant to the research questions: age, gender identity, education, sexual orientation, religiosity, self-rated household income/resources, citizenship, municipality size, dataset/region, frequency of STI-information exposure, and participation in school-based STI/sexual health sessions.

Where necessary because of sparse categories, response categories were collapsed for regression modelling, as described in the Supplementary Materials. Full item wording, response options, and coding for all measures are reported in the Supplementary Materials.

2.4. Latent class analysis (LCA): estimation and model selection

We applied latent class analysis (LCA) to identify profiles of reported STI-related information sources. The LCA was estimated using the binary indicators described above, each distinguishing whether a given source was selected among the respondent's up to three reported STI information sources. Conditional item-response probabilities were interpreted as the estimated probability of selecting each information source within a given latent profile.

Models with one to six classes were estimated in R using *poLCA* and post-stratification case weights. To reduce the risk of local maxima, each model was replicated with 20 sets of random starting values ($nrep = 20$; $maxiter = 1000$). Solution stability was evaluated by inspecting whether the maximum log-likelihood was replicated across random starts.

Model selection was based on a combination of statistical fit, classification diagnostics, parsimony, minimum class size, and substantive interpretability. Specifically, we considered AIC, BIC, CAIC, sample-size adjusted BIC, relative entropy, whether additional classes produced substantively distinct profiles, and whether class sizes were sufficiently large for interpretation and subsequent regression modelling.

After selecting the preferred LCA solution, respondents were assigned to their most likely class using modal assignment, based on the highest posterior class-membership probability. The resulting modal class variable was then used as the outcome in the weighted multinomial logistic regression models described below. Classification quality is reported alongside the LCA results.

2.5. Regression analyses and class assignment

To examine correlates of information-source profiles (RQ2) and adjusted associations between profile membership, STI/HPV knowledge, and prevention-related measures (RQ3), we fitted post-stratification-weighted multinomial logistic regression models predicting modal latent-class membership. Class 1, the Legacy-media profile, was used as the reference outcome. Effects are reported as relative risk ratios ($RRR = \exp[\beta]$), with two-sided p-values and 95% Wald confidence intervals. An RRR above 1 indicates a higher relative likelihood of membership in the focal profile rather than the reference profile, conditional on the other variables in the model; an RRR below 1 indicates a lower relative likelihood. The multinomial model is used as an adjusted contrast among profiles rather than as a directional causal model. Socio-demographic, socio-cultural, and experiential characteristics are used to address RQ2, while STI/HPV knowledge and prevention-related measures are included to assess how these measures co-vary with profile

membership for RQ3. Additional adjustment covariates—self-reported andrological/gynaecological visit in the past three years and previous STI diagnosis—are included in the model. Given the cross-sectional design, estimates should be interpreted as associations between information-source profiles and respondent characteristics or prevention-related measures, not as evidence that profile membership causes knowledge, condom use, or HPV-vaccination attitudes and uptake.

Class membership was operationalised using modal assignment from the selected four-class LCA, based on each respondent's highest posterior class-membership probability. This approach preserves the LCA as a stand-alone measurement model and avoids using covariates to define the latent classes. Regression estimates based on modal assignment are interpreted as adjusted associations among assigned profiles.

2.6. Missing data and ethics

LCA models were estimated on respondents with complete data on the LCA information-source indicators ($N = 3105$). In regression analyses, item non-response was treated as missing and handled through complete-case estimation, except where skip-pattern ineligibility or uncertainty was incorporated into predefined analytic categories: “not sexually active (past 12 months)” for respondents not reporting vaginal or anal intercourse, and “useful, uptake unknown” for respondents who considered HPV vaccination useful but did not know or did not report uptake. The main weighted multinomial regression was estimated on $N = 3030$ complete cases, corresponding to 97.6% of the analytic LCA sample. Across the main analytic variables included in the multinomial model, variable-specific missingness was low, ranging from 0.0% to 1.7%; the complete-case restriction excluded 75 respondents (2.4%).

As an additional check, included and excluded respondents were compared on variables used in the analysis. Excluded respondents did not differ from included respondents in modal LCA profile membership ($p = .439$) or in key socio-demographic and institutional covariates, although they showed lower STI/HPV knowledge scores and differed in STI-information exposure and HPV-vaccination category. Given the limited case loss, the absence of differences in modal LCA profile membership, and the descriptive/associational aims of the analysis, we used complete-case estimation rather than multiple imputation or full-information maximum likelihood. Detailed missingness and included/excluded case comparisons are reported in the Supplementary Materials. Informed consent was obtained electronically before survey entry. The study protocol was approved by the authors' institutional research ethics committee (Protocol no. 0001419, 03/04/2024).

3. Findings

Results are organised according to the three research questions. First, we describe the latent information-source profiles identified by the LCA (RQ1). Second, we report socio-demographic, socio-cultural, and experiential correlates of profile membership using weighted multinomial logistic regression (RQ2). Third, we examine adjusted associations

between profile membership, STI/HPV knowledge, and prevention-related measures (RQ3). Throughout, results are interpreted as associations rather than directional effects.

3.1. Latent information-source profiles

Table 1 reports fit indices for the one-to six-class LCA solutions. Model selection balanced statistical fit, classification diagnostics, parsimony, minimum class size, and substantive interpretability.

In our data, BIC and CAIC favoured the three-class solution, whereas AIC continued to improve through the five-class solution. The four-class solution had a BIC only slightly higher than the three-class solution and provided a clearer typology by separating two substantively distinct information-source profiles that were merged in the three-class model. The two-class model primarily captured a broad high-versus-low information-engagement gradient, while the five- and six-class solutions mainly subdivided existing profiles without adding meaningful conceptual differentiation. We therefore retained the four-class solution as the best balance between parsimony and interpretability.

The selected four-class solution had moderate classification quality, with relative entropy = 0.624. Average posterior probabilities (APP; see Table 2) for modal class assignment were 73.0% for the Legacy-media profile, 94.6% for the Social media-centric profile, 69.5% for the Expert/institutional profile, and 68.3% for the Interpersonal/family profile. We therefore interpret downstream analyses based on modal class assignment cautiously.

We label profiles based on their dominant and most distinctive information sources, as indicated by the conditional item-response probabilities (Table 2). Because respondents could select up to three sources, profiles are configurations of reported sources, not exhaustive measures of exposure or purposive information seeking.

The Legacy-media profile was characterised by comparatively higher probabilities of selecting non-social Internet websites, TV programmes, newspapers, magazines, radio, and podcasts, alongside low probabilities of selecting interpersonal or institutional sources. The Social media-centric profile was defined by the selection of social networks and online blogs, with additional but less distinctive use of Internet websites and teachers. The Expert/institutional profile showed the highest probabilities of selecting teachers, scientific journals, general practitioners, books, and online encyclopaedias. The Interpersonal/family profile was distinguished by higher probabilities of selecting mothers/female guardians, fathers/male guardians, friends, partners, older siblings, family-planning centres, and general practitioners.

These results answer RQ1 by identifying four distinct configurations of STI-related information sources across mediated, institutional, and interpersonal channels. The profiles indicate that STI/HPV information is not organised around a single dominant channel but around differentiated combinations of sources.

3.2. Correlates of information-source profile membership

Table 3 reports results from the weighted multinomial logistic

Table 1
Latent-class model-selection statistics for one-to six-class solutions.

Model	M LL	NEP	AIC	d_AIC	BIC	d_BIC	CAIC	Relative entropy	ABIC
1-class model	−20361.98	19	40761.95	NA	40876.73	NA	40895.080	/	40816.36
2-class model	−20216.80	39	40511.60	250.35	40747.19	129.54	40784.848	0.457	40623.27
3-class model	−20121.00	59	40360.01	151.59	40716.41	30.78	40773.375	0.393	40528.93
4-class model	−20043.30	79	40244.60	115.41	40721.83	−5.42	40798.103	.624	40470.80
5-class model	−19979.48	99	40156.96	87.64	40755.00	−33.17	40850.590	0.777	40440.43
6-class model	−19963.03	119	40164.07	−7.11	40882.92	−127.92	40997.817	0.893	40504.79

Notes. M LL = maximum log-likelihood; NEP = number of estimated parameters; AIC = Akaike information criterion; BIC = Bayesian information criterion; CAIC = consistent Akaike information criterion; ABIC = sample-size adjusted Bayesian information criterion. d_AIC and d_BIC indicate the change relative to the previous class solution, with positive values indicating improvement. Negative values indicate worse fit relative to the previous solution. Relative entropy ranges from 0 to 1, with higher values indicating clearer classification.

Table 2

Information sources across latent information-source profiles (% within profile). Entries are weighted conditional item-response probabilities from the LCA. Because respondents could select up to three sources, probabilities do not sum to 100% within profile. Boldface marks, for each source, the profile with the highest conditional probability. "Internet websites" is reported for completeness but is not used as a class-signature source because it is prevalent in multiple profiles.

Information source	Class 1 (n = 1140; 36.7%) APP = 73.0% Legacy media profile	Class 2 (n = 785; 25.3%) APP = 94.6% Social media-centric profile	Class 3 (n = 722; 23.3%) APP = 69.5% Expert/institutional profile	Class 4 (n = 458; 14.8%) APP = 68.3% Interpersonal/family profile
General practitioner	11.1	5.9	22.8	22.2
Family planning centre	5.5	3.8	8.5	17.0
Teachers	14.6	18.0	52.4	25.3
Mother/female guardian	5.0	5.2	10.7	34.9
Father/male guardian	3.0	0.7	1.2	18.6
Female friend	9.2	5.8	3.2	16.9
Male friend	10.8	5.2	3.7	19.5
Internet website (non-social)	52.9	42.4	40.0	17.4
Partner	8.2	2.8	0.8	16.9
Older sibling	4.0	1.0	0.0	9.1
TV programmes	34.5	21.8	14.0	7.8
Newspapers (online or print)	15.4	9.6	8.6	5.5
Online encyclopaedias (e.g., Wikipedia)	11.5	10.8	17.4	2.5
Magazines (online or print)	12.7	6.4	6.0	3.2
Radio	9.7	3.1	0.0	2.4
Podcasts	5.5	3.3	0.8	1.2
Books (print or e-book)	6.3	6.3	17.5	3.2
Social networks and online blogs	0.0	100.0	0.0	12.6
Scientific journals (online or print)	11.3	10.9	29.6	2.8

APP = average posterior probability for modal class assignment.

regression predicting modal profile membership, with the Legacy-media profile as the reference outcome. Relative risk ratios above 1 indicate a higher relative likelihood of membership in the focal profile rather than the Legacy-media profile, conditional on the other variables in the model; values below 1 indicate a lower relative likelihood. Given the cross-sectional design, all estimates are interpreted as adjusted associations rather than directional effects.

Compared with the Legacy-media profile, membership in the Social media-centric profile was associated with gender, age, and school-based exposure. Men had lower relative likelihood than women of membership in this profile (RRR = 0.611, $p < .001$), and each additional year of age was associated with lower relative likelihood of membership (RRR = 0.957, $p = .002$). Respondents reporting school-based STI/sexual health sessions had higher relative likelihood of membership in the Social media-centric profile (RRR = 1.394, $p = .002$).

Membership in the Expert/institutional profile was most clearly associated with school-based STI/sexual health sessions. Respondents reporting school-based STI/sexual health sessions had higher relative likelihood of membership in this profile than in the Legacy-media profile (RRR = 1.962, $p < .001$). Sexual orientation did not significantly distinguish the Expert/institutional profile from the Legacy-media profile.

Membership in the Interpersonal/family profile was associated with sexual orientation, school-based exposure, and region. Heterosexual respondents had lower relative likelihood of membership in this profile than non-heterosexual/other respondents (RRR = 0.754, $p = .048$). Respondents reporting school-based STI/sexual health sessions had higher relative likelihood of membership in the Interpersonal/family profile than in the Legacy-media profile (RRR = 1.338, $p = .015$). Education showed only limited evidence of association with this profile; the contrast for university degree was negative but did not reach conventional statistical significance (RRR = 0.708, $p = .055$).

Overall, school-based STI/sexual health sessions were the only variable consistently and positively associated with membership in all three non-reference profiles relative to the Legacy-media profile. By contrast, citizenship, municipality size, self-rated household income/resources, religiosity, and STI-information exposure did not show statistically significant contrasts across profiles in the adjusted model. Regional differences were most evident for the Interpersonal/family profile,

although one significant regional contrast was also observed for the Expert/institutional profile.

3.3. STI/HPV knowledge and prevention-related measures

The adjusted associations between profile membership, STI/HPV knowledge, condom-use frequency, and HPV-vaccination attitudes/uptake are also reported in Table 3. Higher STI knowledge was associated with membership in the Social media-centric profile (RRR = 1.040, $p = .049$) and the Expert/institutional profile (RRR = 1.073, $p = .001$), relative to the Legacy-media profile. Higher HPV knowledge was also associated with membership in the Social media-centric profile (RRR = 1.058, $p = .019$) and the Expert/institutional profile (RRR = 1.053, $p = .035$). Knowledge scores did not significantly distinguish the Interpersonal/family profile from the Legacy-media profile in the adjusted model.

Prevention-related measures showed a more selective pattern. Compared with respondents who reported never using condoms, always/often condom use was associated only with the Social media-centric profile (RRR = 1.462, $p = .014$), whereas sometimes/occasionally condom use was associated with both the Social media-centric profile (RRR = 1.435, $p = .049$) and the Expert/institutional profile (RRR = 1.446, $p = .044$). Condom-use categories did not significantly distinguish the Interpersonal/family profile from the Legacy-media profile.

HPV-vaccination attitudes and uptake distinguished the Social media-centric profile. Compared with respondents who considered HPV vaccination not useful, respondents who considered it useful but had not yet received it (RRR = 1.939, $p < .001$), those who considered it useful but were unsure whether they had received it (RRR = 2.447, $p < .001$), and those who considered it useful and had received it (RRR = 1.713, $p = .002$) all had higher relative likelihood of membership in the Social media-centric profile than in the Legacy-media profile. HPV-vaccination categories did not significantly distinguish the Expert/institutional or Interpersonal/family profiles from the Legacy-media profile in the adjusted model.

These results address RQ3 by showing that information-source profiles are associated with STI/HPV knowledge and selected prevention-related measures, but not uniformly across outcomes. The Social

Table 3

Weighted multinomial logistic regression predicting modal information-source profile membership. Entries are relative risk ratios (RRR = $\exp[\beta]$) with 95% Wald confidence intervals. The reference outcome is the Legacy-media profile. RRRs above 1 indicate higher relative likelihood of membership in the focal profile rather than the Legacy-media profile; RRRs below 1 indicate lower relative likelihood. The model uses post-stratification case weights and includes N = 3030 complete cases. Intercepts were estimated but are omitted for readability. Regional subsamples are compared with the Italy-wide core sample. For condom-use categories, “never uses condoms” among sexually active respondents is the reference category; respondents not reporting vaginal or anal intercourse in the past 12 months are retained as “not sexually active.” Statistically significant coefficients at $p < .05$ are shown in bold.

Predictor	Social media-centric profile vs Legacy-media profile RRR (95% CI)	p	Expert/institutional profile vs Legacy-media profile RRR (95% CI)	p	Interpersonal/family profile vs Legacy-media profile RRR (95% CI)	p
Male (vs female)	.611 (.492–.760)	< .001	0.853 (0.681–1.068)	0.166	1.007 (0.786–1.290)	0.957
Age (years)	.957 (.932–.984)	.002	0.992 (0.965–1.020)	0.565	0.987 (0.958–1.016)	0.376
High school diploma (vs lower education)	1.023 (0.814–1.288)	0.843	1.033 (0.818–1.306)	0.783	0.882 (0.688–1.132)	0.325
University degree (vs lower education)	1.147 (0.848–1.551)	0.375	1.038 (0.760–1.418)	0.813	0.708 (0.497–1.007)	0.055
Foreign citizenship (vs Italian)	0.930 (0.583–1.483)	0.759	0.789 (0.486–1.281)	0.338	1.342 (0.854–2.109)	0.203
Municipality 10,000–30,000 inhabitants (vs < 10,000)	1.061 (0.784–1.436)	0.699	0.830 (0.614–1.121)	0.225	1.249 (0.897–1.740)	0.189
Municipality 30,001–100,000 inhabitants (vs < 10,000)	1.125 (0.844–1.502)	0.421	0.769 (0.577–1.025)	0.073	0.970 (0.701–1.342)	0.854
Municipality >100,000 inhabitants (vs < 10,000)	1.081 (0.812–1.439)	0.592	0.768 (0.579–1.019)	0.067	0.847 (0.610–1.176)	0.321
Heterosexual (vs non-heterosexual/other)	1.114 (0.854–1.452)	0.426	0.803 (0.620–1.038)	0.094	.754 (.569–.997)	.048
Self-rated household income/resources: lower-middle (vs low)	1.141 (0.781–1.667)	0.494	0.831 (0.580–1.191)	0.315	0.868 (0.587–1.281)	0.476
Self-rated household income/resources: upper-middle (vs low)	0.970 (0.666–1.412)	0.872	0.705 (0.494–1.007)	0.055	0.738 (0.501–1.086)	0.123
Self-rated household income/resources: high (vs low)	1.078 (0.694–1.677)	0.739	0.710 (0.462–1.093)	0.120	0.833 (0.526–1.317)	0.434
No religious faith/affiliation (vs any religious faith/affiliation)	1.092 (0.890–1.340)	0.398	1.078 (0.874–1.330)	0.482	1.007 (0.800–1.269)	0.950
STI-information exposure often/sometimes (vs never/almost never)	1.069 (0.861–1.327)	0.548	0.889 (0.715–1.105)	0.288	0.796 (0.629–1.008)	0.058
School-based STI/sexual health sessions (yes)	1.394 (1.131–1.718)	.002	1.962 (1.571–2.450)	< .001	1.338 (1.060–1.690)	.015
Not sexually active in past 12 months (vs never uses condoms)	1.226 (0.893–1.684)	0.208	1.278 (0.930–1.754)	0.130	0.796 (0.561–1.130)	0.202
Condom use always/often (vs never)	1.462 (1.079–1.982)	.014	1.060 (0.776–1.448)	0.713	1.092 (0.782–1.525)	0.605
Condom use sometimes/occasionally (vs never)	1.435 (1.001–2.056)	.049	1.446 (1.011–2.069)	.044	1.132 (0.766–1.675)	0.533
Andrological/gynaecological visit in past three years (yes)	0.908 (0.806–1.024)	0.115	0.964 (0.852–1.090)	0.556	0.995 (0.868–1.139)	0.939
Previous STI diagnosis (yes)	0.841 (0.580–1.219)	0.360	0.787 (0.540–1.149)	0.215	1.301 (0.900–1.878)	0.161
HPV vaccine useful, not yet received (vs “not useful”)	1.939 (1.445–2.604)	< .001	1.151 (0.875–1.516)	0.315	0.862 (0.647–1.146)	0.305
HPV vaccine useful, unsure if received (vs “not useful”)	2.447 (1.702–3.525)	< .001	1.385 (0.966–1.986)	0.077	0.989 (0.670–1.459)	0.955
HPV vaccine useful and received (vs “not useful”)	1.713 (1.214–2.418)	.002	1.223 (0.878–1.702)	0.234	1.055 (0.747–1.492)	0.760
STI knowledge score (per 1-unit increase)	1.040 (1.000–1.082)	.049	1.073 (1.030–1.117)	.001	1.031 (0.986–1.078)	0.179
HPV knowledge score (per 1-unit increase)	1.058 (1.009–1.110)	.019	1.053 (1.004–1.106)	.035	0.968 (0.916–1.021)	0.233
Lazio regional subsample (vs Italy-wide core sample)	1.021 (0.733–1.422)	0.901	1.455 (1.029–2.056)	.034	1.565 (1.057–2.316)	.025
Piedmont regional subsample (vs Italy-wide core sample)	1.060 (0.760–1.478)	0.731	1.318 (0.930–1.868)	0.121	1.547 (1.046–2.284)	.029
Sicily regional subsample (vs Italy-wide core sample)	0.870 (0.628–1.206)	0.403	1.108 (0.783–1.568)	0.562	1.126 (0.760–1.669)	0.554
Tuscany regional subsample (vs Italy-wide core sample)	0.962 (0.689–1.343)	0.820	1.362 (0.962–1.929)	0.081	1.725 (1.177–2.529)	.005
Veneto regional subsample (vs Italy-wide core sample)	1.008 (0.724–1.402)	0.963	1.077 (0.759–1.530)	0.677	1.067 (0.712–1.598)	0.754

media-centric profile is most clearly differentiated by HPV-vaccination attitudes/uptake, condom use, and knowledge scores; the Expert/institutional profile is most clearly differentiated by STI/HPV knowledge and, more selectively, condom use; and the Interpersonal/family profile is not strongly differentiated by knowledge or prevention-related measures in the adjusted model.

4. Discussion and concluding remarks

This study examined STI/HPV-related information-source profiles among young adults in Italy and assessed how these profiles are associated with socio-demographic, socio-cultural, educational, and prevention-related measures. Latent class analysis identified four profiles: a Legacy-media profile, a Social media-centric profile, an Expert/

institutional profile, and an Interpersonal/family profile. Weighted multinomial regression showed that profile membership was associated with gender, age, exposure to school-based STI/sexual health sessions, STI/HPV knowledge, condom-use frequency, and HPV-vaccination attitudes and uptake. These associations indicate that STI/HPV information practices are not simply individual preferences among available channels, but are embedded in broader social, educational, institutional, interpersonal, and mediated contexts.

We use sexual citizenship as an interpretive framework for understanding how young adults' reported information-source profiles, knowledge, and prevention-related measures are shaped across institutional, interpersonal, and mediated environments. From this perspective, information practices matter because they mediate young people's opportunities to access credible knowledge, evaluate risk, navigate services, and make informed decisions about prevention. In the Italian context, where comprehensive sexuality education is not delivered through a mandatory national curriculum and provision often relies on discretionary, project-based initiatives, these profiles illuminate the uneven institutional conditions under which young adults are expected to manage sexual health.

4.1. Scholarly implications

The first contribution of this study is to show that young adults' STI/HPV information sources cluster into differentiated profiles rather than converging around a single dominant pathway. The four profiles capture distinct informational ecologies: broadcast and legacy media; social media and blogs; expert and institutional sources; and interpersonal or family-based networks. This typology shows that young people do not simply choose between "online" and "offline" sources, but navigate plural mediated, institutional, and relational configurations (Buhi et al., 2009; Lim et al., 2014; Waling et al., 2020; Fisher et al., 2023). It also extends individual-level models of information seeking, which have emphasised risk perception, uncertainty, self-efficacy, and knowledge gaps, by showing how reported information-source profiles are patterned by socio-demographic, educational, and institutional conditions (Afifi and Weiner, 2006; Kahlor, 2010; Khurana and Bleakley, 2015).

This finding is relevant to debates on sexual citizenship because it suggests that informational capacity is socially and institutionally situated. Sexual citizenship has been used to examine how rights, responsibilities, recognition, and capacities are negotiated in intimate life and in relation to health, institutions, and public discourse (Evans, 1993; Weeks, 1998; Richardson, 1998, 2000, 2017; Plummer, 2003; Aggleton et al., 2019). Our findings extend this perspective by showing that STI/HPV information practices are structured through differentiated access to interpretive resources. Young adults' ability to make sense of sexual health information depends not only on individual motivation or cognitive literacy, but also on the sources, institutions, and networks through which information becomes available, credible, and useable. This aligns with work conceptualising young people as "epistemic citizens" who must navigate competing claims to credibility, expertise, and experiential knowledge in sexual health contexts (Fraser et al., 2021; Farrugia et al., 2021).

A second implication concerns institutional scaffolding. Exposure to school-based STI/sexual health sessions was positively associated with membership in the Social media-centric, Expert/institutional, and Interpersonal/family profiles relative to the Legacy-media profile. This should not be interpreted causally, but it suggests that school-based encounters are associated with broader and more diversified information-source configurations. Rather than displacing digital or interpersonal sources, institutional exposure appears to coexist with them. This supports a relational understanding of sexual health literacy as a socially distributed resource involving schools, digital platforms, families, peers, and health professionals, rather than a purely individual skill (Nutbeam, 2008; Paakkari and Paakkari, 2012; Aghazadeh and

Aldoory, 2021).

A third implication concerns digital, expert, and interpersonal sources. The Social media-centric profile was not associated with weaker prevention-related measures in the adjusted model; instead, it was associated with HPV knowledge, condom-use frequency, and positive HPV-vaccination attitudes and uptake relative to the Legacy-media profile. This cautions against deficit-oriented accounts that treat digital platforms primarily as sources of misinformation. Digital environments remain ambivalent: they may circulate unreliable content, but they can also provide accessible, relatable, timely, and privacy-preserving information, especially when young people have educational resources to interpret what they encounter online (Evers et al., 2013; Byron, 2018; Wang et al., 2019; Allsop, 2024). The Expert/institutional profile, by contrast, was most clearly differentiated by STI/HPV knowledge, confirming the importance of schools, health professionals, scientific sources, and public services as infrastructures for sexual health literacy. Yet expert/institutional sources define only one profile, indicating that authoritative information cannot be assumed to reach young people through institutional channels alone. Finally, the Interpersonal/family profile highlights the continued importance of relational communication. Parents, guardians, friends, partners, siblings, and community services may provide trust and opportunities for dialogue, but may also reproduce partial knowledge if disconnected from professional and institutional resources (Schouten et al., 2007; Widman et al., 2016; Byron, 2017; Shams et al., 2017; Rouhparvar et al., 2022).

Overall, these findings challenge deficit framings of low sexual health literacy as individual failure. Informational inequalities instead reflect stratified access to interpretive resources, institutional infrastructures, and networks of trust. Hence, the sexual citizenship contribution of the paper lies not in measuring sexual citizenship directly, but in showing how the capacities associated with informed sexual health decision-making are unevenly supported by social, institutional, interpersonal, and mediated environments.

4.2. Practice and policy implications

A central implication is that one-size-fits-all interventions are unlikely to be sufficient. Public-health strategies should be multi-channel, coordinated, and sensitive to the informational pathways through which young people encounter STI/HPV-related knowledge. This requires translating public-health evidence into accessible, actionable messages adapted to the channels through which different groups evaluate health information (Nelson et al., 2009; Thompson, 2021). Because risk-information seeking is context-specific, STI/HPV communication should be designed around the settings, concerns, and interpretive resources that shape engagement with information (Willoughby and Myrick, 2016). In practical terms, this means moving from generic awareness-raising toward segmented, channel-sensitive communication embedded in service pathways, so that information can be converted into confidential counselling, testing, vaccination, and care.

For the Legacy-media profile, broadcast and one-directional messages should be made more accurate, specific, and actionable. General awareness messages should link to concrete pathways for STI testing, confidential counselling, contraception advice, and HPV vaccination. Evidence on mass-media public-health communication suggests that broad-reach messages are most useful when clear, repeated, credible, and connected to practical routes for action (Stead et al., 2019). Legacy media should function as gateways to services rather than stand-alone channels of health education.

For the Social media-centric profile, our findings suggest that reliable STI/HPV information should be visible and useable within the platforms young people already inhabit, consistent with research showing that online sexual health information seeking is shaped by privacy, perceived relevance, trust, and information accessibility (Nikkelen et al., 2020; Zoria et al., 2022). Digital sexual health communication should not only correct misinformation from outside,

but engage with the platform environments through which visibility, credibility, and issue salience are produced (Vicari and Ditchfield, 2024). This requires platform-appropriate communication, digital health-literacy initiatives, and credible institutional actors. Digital interventions should therefore support young people's capacity to evaluate, contextualise, and act on STI/HPV information, requiring sustained institutional presence rather than episodic campaigns.

For the Expert/institutional profile, the priority is to strengthen access to youth-friendly services and reliable institutional information through schools, primary-care providers, family-planning centres, and vaccination services. Authoritative information must be scientifically accurate, understandable, navigable, and connected to services. For the Interpersonal/family profile, interventions should support family, peer, and relational communication through parent-oriented resources, teacher training, peer education, and referral pathways to professional services. In both cases, communication should bridge information and care through confidential, stigma-free service pathways.

Across all profiles, school-based STI/sexual health education emerges as a key institutional resource. In Italy, where provision remains territorially heterogeneous and often project-based, the policy challenge is to improve message content and strengthen the consistency, and navigability of sexual health infrastructures. A pragmatic minimum standard would include age-appropriate comprehensive sexuality education, continuity across school years, trained educators, confidential referral pathways to counselling, STI testing and family-planning services, and clear HPV-vaccination information. This is not a clinical "standard of care," but a public-health standard of institutional provision: the minimum infrastructure needed for young people to move from information to prevention and care.

Such a standard is especially important where responsibility for sexual health information is individualized. If young people are expected to seek information, evaluate risk, and manage prevention, institutions must provide the conditions that make these responsibilities realistic and equitable. In sexual citizenship terms, the issue is whether young people have credible, accessible, confidential, and navigable resources that allow them to translate STI/HPV information into informed prevention and care. This shifts the policy focus from individual information deficits to the organisation of informational environments and service pathways, making institutional provision central to equitable sexual health literacy.

4.3. Limitations

Several considerations should guide the interpretation of these findings. First, the cross-sectional design means that associations between information-source profiles, knowledge, condom use, HPV-vaccination attitudes, and school-based exposure should not be read as causal or directional effects. Second, the survey used quota sampling and post-stratification weights to improve alignment with population benchmarks, but it remains a weighted online-panel sample rather than a probability sample. As with other online-panel surveys, unobserved selection processes may remain. In addition, measures are self-reported and concern sensitive topics, so reports of sexual behaviour, condom use, HPV vaccination, knowledge, and information sources may be affected by recall error, uncertainty, or social desirability.

Third, the information-source item allowed respondents to select up to three sources. "Not selected" therefore means that a source was not mentioned among the respondent's top three reported sources, not that the respondent had no exposure to that source. Relatedly, the LCA indicators refer to sources of STI-related information, while some prevention-related measures concern HPV knowledge and HPV vaccination. HPV was included in the survey's broader STI/sexual health framing, but the profiles should not be interpreted as direct measures of HPV-specific information seeking. Finally, classification quality in the selected LCA solution was moderate (relative entropy = 0.624). Because downstream regression models used modal class assignment rather than

BCH-style correction for classification error, between-profile associations may be attenuated and should be interpreted cautiously (Bolck et al., 2004). Complete-case estimation was also used for regression analyses. The main multinomial model retained 97.6% of the analytic LCA sample, and variable-specific missingness and included/excluded case comparisons are reported in the Supplementary Materials. Although excluded respondents did not differ in modal LCA profile membership, they had lower STI/HPV knowledge scores on average; some residual selection bias therefore cannot be fully ruled out.

4.4. Concluding remarks

This study shows that young adults' STI/HPV information practices are organised around distinct profiles that combine mediated, institutional, and interpersonal sources in different ways. These profiles are associated with socio-demographic characteristics, school-based exposure, knowledge, and prevention-related measures, indicating that sexual health information practices are socially structured rather than purely individual choices.

Interpreted through a sexual citizenship lens, the findings suggest that informed sexual health decision-making is not only a matter of personal responsibility. It also depends on whether schools, health services, digital platforms, families, and public-health institutions provide the resources needed to support informed, confidential, and equitable prevention. For research, the study demonstrates the value of moving beyond single-source, individualistic, or deficit-based accounts of sexual health information. For policy and practice, it points to coordinated, multi-channel strategies that connect digital communication, school-based education, interpersonal support, and youth-friendly services so that young adults can translate STI/HPV information into knowledge, prevention, and care.

Ethics statement

The study protocol was reviewed and approved by the Research Ethics Committee of the Department of Philosophy, Sociology, Education and Applied Psychology (FISPPA), University of Padua. Approval was granted under Protocol no. 0001419 (03/04/2024).

CRediT authorship contribution statement

Stefano Crabu: Conceptualization, Investigation, Supervision, Writing – original draft. **Federico Neresini:** Conceptualization, Supervision. **Nicoletta Parise:** Data curation, Formal analysis, Investigation, Methodology, Supervision. **Vincenzo Baldo:** Funding acquisition, Project administration, Supervision. **Silvia Cocchio:** Supervision. **Andrea Cozza:** Supervision. **Barbara Morsello:** Supervision. **Cosimo Marco Scarcelli:** Supervision.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2026.119466>.

Data availability

The authors do not have permission to share data.

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