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Examining cervical cancer screening adherence: how does healthism influence participation?

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Abstract

Background Cervical cancer is a major public health issue. While HPV screening and vaccination are crucial preventive measures, many countries still struggle to meet the WHO's participation targets due to a range of systemic, socioeconomic, and psychological barriers. Recent studies suggest that beyond these factors, women's decisions to attend screening are increasingly shaped by cultural norms that promote health as a personal responsibility, framing participation as both a moral obligation and an expression of a responsible lifestyle.

Methods This study examines the relationship between a healthy lifestyle and HPV screening participation using data from the European Health Interview Survey (EHIS, 2019) for Italy. We use binomial logistic regression as statistical method, with regular screening attendance (versus irregular) as dependent variable.

Results Our findings indicate that women who adopt healthier lifestyles—particularly in terms of physical activity and dietary habits—are more likely to participate in pap tests. Furthermore, younger women exhibit higher screening participation rates, with early screening initiation (before age 25) associated with greater long-term adherence.

Conclusions These results suggest that healthism, understood as the pursuit of a healthy lifestyle, plays a significant role in fostering engagement with preventive healthcare measures, although unmeasured confounders may influence both healthy behaviors and screening adherence, thereby limiting the causal interpretation of our findings. Adopting a sociological perspective on surveillance medicine, we argue that healthism is not merely a moral imperative but can serve as a mechanism for empowered agency, encouraging proactive health behaviours. Our findings may inform complementary public health strategies that promote voluntary screening participation by supporting health-oriented behaviours, rather than relying exclusively on top-down interventions. Recognising screening as a social intervention offers a broader analytical framework for addressing cultural and structural barriers to participation, ultimately contributing to more effective and inclusive public health policies.

Keywords Cervical cancer screening, Healthism, Preventive health, Public health policy, Italy

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Background

Cervical cancer is a major public health concern, ranking as the second leading cause of death among younger women (aged 15–44) [1, 2]. For this reason, regular HPV (Human Papillomavirus) screening and vaccination represent a global challenge. However, although prevention is the most effective public health strategy to combat cervical cancer, countries do not always achieve the World Health Organization's screening participation target[1].

Italy has implemented organized cervical cancer screening into its national healthcare system as part of the Essential Levels of Care (LEA) [3]. Screening programs are age-targeted, reflecting HPV's epidemiology as a sexually transmitted infection, and are promoted through organized public health initiatives that provide personalized invitations and follow-up care. Their inclusion in the LEA underscores Italy's commitment to equitable healthcare access at the national level. However, the decentralized structure of the National Health Service allows regional governments to organize and implement healthcare services autonomously, often leading to differences in how screening programs are executed. As the Fig. 1 shows, HPV screening participation in Italy varies significantly by region, with a persistent North-South divide. Screening uptake remains highest in the Northern regions, where the average participation rate declined slightly from 87.9% (2011–2014) to 85% (2022–2023). In contrast, Southern regions exhibit consistently lower participation, with only a marginal decrease from 68 to 67.1% over the same period. Friuli-Venezia Giulia recorded the highest screening coverage in 2022–2023 (90.9%), while Calabria had the lowest (58.3%).

Source: Authors' elaboration on PASSI Surveillance data (Italian National Institute of Health). Dataset available on ISS website [5].

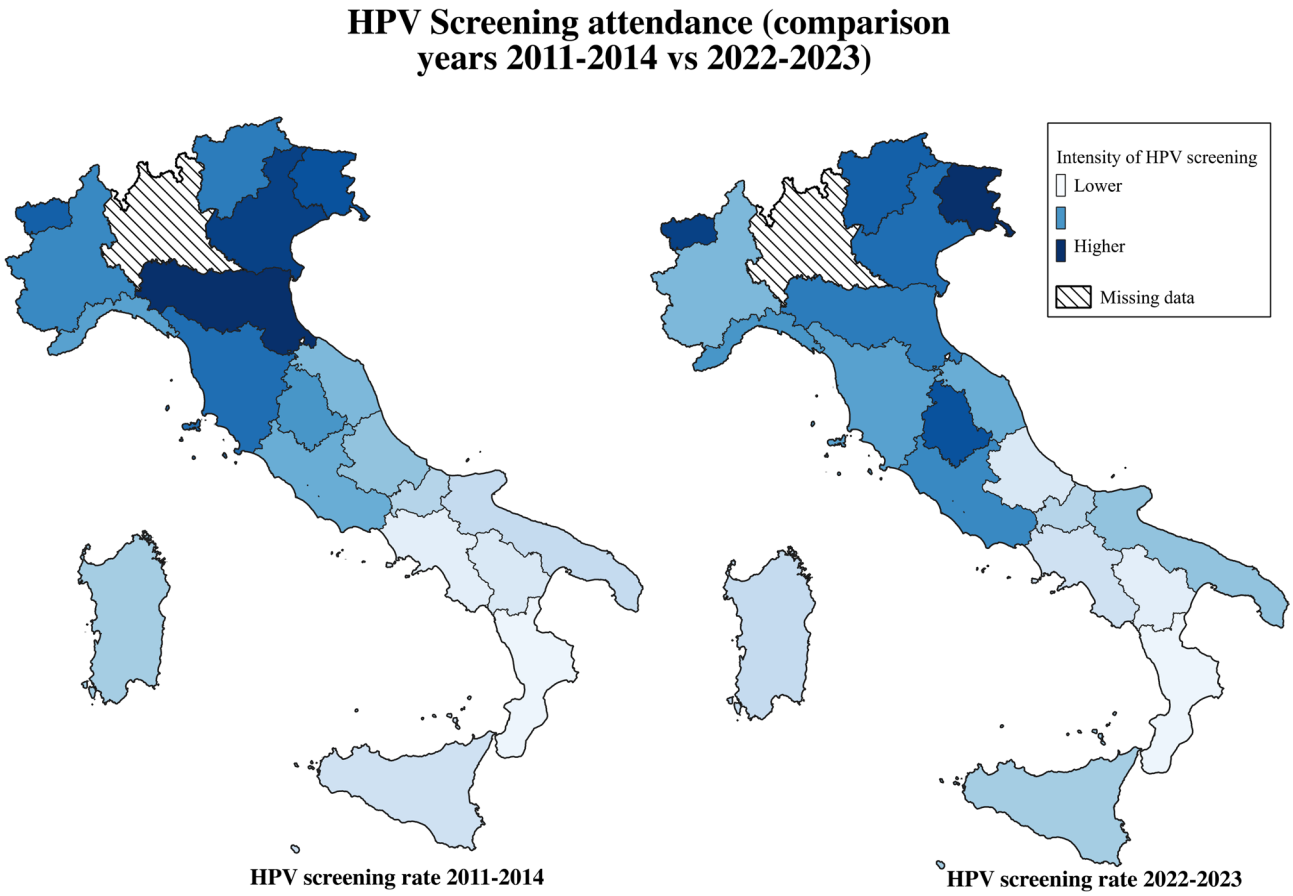

Fig. 1 HPV screening attendance in Italy (Pap smear and/or HPV test) – regional differences

Please note: the intensity of blue (from light blue to dark blue) indicates the percentage of voluntary HPV screening at regional level (Pap smear and/or HPV test).

[1] The target, as part of the WHO strategy, is for at least 70% of women to be screened with a high-performance HPV test by age 35 and again by age 45 to ensure progress toward cervical cancer elimination by 2030. This strategy also includes 90% of girls being fully vaccinated against HPV by age 15 and 90% of women diagnosed with cervical disease receiving appropriate treatment—90% of those with precancer treated and 90% of those with invasive cancer managed [4].

Lombardy data were not available in the dataset and not are reported.

The literature has extensively investigated factors that may facilitate or hinder HPV screening attendance at both systemic and individual levels. At a systemic level, organisational factors can influence screening uptake, including variations in the methods used for sending invitations and the content of informational leaflets (such as details about the costs and benefits of screening) to support informed decision-making [6, 7]. Beyond these, socioeconomic and cultural factors represent another significant barrier to HPV screening. Educational level and income appear to be the most significant correlates of HPV compliance [8–10]. Notably, health literacy [11] and specific knowledge about HPV risks and consequences [12, 13] emerge as important determinants of undergoing a pap-test. Moreover, research highlights that unequal access to screening could be driven by ethnic disparities and insurance coverage [12].

At the individual level, several studies have examined predictors of screening participation by investigating the role of affective factors (such as fear and anxiety related to screening procedures) alongside cognitive factors (such as beliefs and attitudes toward health and screening). Undergoing a cancer screening test is an emotional experience [14]. In fact, health psychologists have explored the anxiety linked to receiving abnormal test results and the need to undergo additional testing [15–18].

Regarding cognitive predictors, personal beliefs about the utility, safety, or appropriate frequency of cancer screenings may represent barriers to participation [19]. According to Bish et al. [20], who compared two theoretical models of individuals' intentions to undergo screening, a positive attitude toward undergoing an HPV test is a significant predictor of actual participation. Moreover, positive attitudes were found to be more influential than perceived health threats or social pressure. Similarly, a study by Bianchi et al. [21], conducted in Italy, identified subjective norms and self-identity as key predictors of the intention to participate in screening.

While extensive research has examined the systemic and individual determinants influencing HPV screening participation, less is known about the broader social factors influencing women's engagement with preventive care. In particular, the concept of healthism has recently emerged as a useful sociological lens for understanding participation in other screening programmes, such as breast cancer screening [22, 23].

In sociological literature, medical screening has been understood through the theoretical framework of surveillance medicine, which supplanted the pathological medicine model in the late 20th century [24, 25]. During this period, medical attention has increasingly shifted toward the risk factors associated with conditions like diabetes, cardiovascular diseases, and cancer [26–29]. Particularly, surveillance medicine focuses on promoting health interventions (e.g., medical screening) aimed at observing and monitoring an apparently healthy population considered potentially "at risk" [24].

Because of this medical approach, in the late 1970s, a new health consciousness among individuals emerged, crystallized in the cultural belief of health as a "super value" [30] and reflected in the growth of popular health movements and self-care habits. Crawford first proposed the concept of healthism to encapsulate this ideology, meaning "the preoccupation with personal health as a primary – often the primary – focus for the definition and achievement of well-being; a goal which is to be attained primarily through the modification of lifestyles, with or without therapeutic help" [30: 368].

Crawford and subsequently other authors [23, 31, 32] have attributed a negative connotation to healthism. On one hand, health consciousness was seen as a perverse effect of the prevailing medicalization of life [33], manifesting in individuals as a form of obsession with physical exercise, dieting, and "health religions" (e.g., yoga, alternative and non-standard medicine, etc.). Within this framework, poor health became increasingly linked to individual "moral laxity" [32]. On the other hand, framing healthism within a "risk factor model" [27–29] has led public policies to progressively focus on lifestyle changes as a preventive tool, thereby placing the modification of individual behaviours at the core of public health initiatives.

Empirical research on healthism has highlighted how the adoption of health-promoting behaviours (such as abstaining from alcohol, not smoking, engaging in physical activity, consuming fruits and vegetables, etc.) is associated with better health conditions [34, 35]. These virtuous behaviours are believed to have a cumulative beneficial effect: individuals consistently engaged in these behaviours reported perceiving and experiencing positive health outcomes [36–38].

From another perspective, emerging evidence shows that participation in organized cancer screening programs can indirectly foster broader health-promoting behaviours and awareness, even among individuals not directly targeted by the intervention [39]. This positive "spillover effect" may manifest in improved lifestyle choices (such as increased physical activity, dietary changes, or smoking cessation) [40], particularly when the screening process functions as a "teachable moment" [39, 41]. Furthermore, the presence of well-structured, population-based screening systems may enhance public trust in healthcare services and promote secondary engagement with other preventive practices, contributing to reduced disparities in health outcomes [42]. Conversely, non-participation or irregular participation in

cervical cancer screening is linked to unhealthy behavioural factors [43]. Limited access to these programs may exacerbate social inequalities, especially in underserved populations [44].

However, this individualistic approach risks overlooking the social constraints that may limit personal choices regarding health [30]. Alongside explanations based on the medicalization thesis – which frame healthism and medical surveillance as "moral imperatives" imposed on individuals to fuel medical expansionism [45] – it is also possible to interpret these practices as an expression of human agency. Health empowerment, understood as the process through which individuals are enabled to gain greater control over choices concerning their lives and health [46], can emerge as an alternative framework for understanding healthism and screening practices.

Building on this perspective, the term healthism is adopted in a restricted, behavioural sense, to indicate engagement in actions commonly regarded as health-promoting (e.g., maintaining a healthy diet, avoiding smoking, and engaging in regular physical activity). While healthism may also refer to a broader ideology emphasizing personal responsibility for health [30, 31], our operationalization focuses exclusively on observable behaviours rather than underlying beliefs or discursive frameworks. This behavioural interpretation aligns with prior empirical studies that quantify healthism through lifestyle indicators [32; 40].

Hence, the present study aims to explore the relationship between health-related behaviours and participation in HPV screening. Drawing on data from the 2019 European Health Interview Survey (EHIS) for Italy, we explore whether women who adhere to "healthy lifestyles" are more likely to undergo screening. Italy offers a critical setting for analysing the interplay between universal screening policies and persistent inequalities in uptake, within a context that formally ensures free and equal access. As noted above, following the 2003 European Commission recommendation on organised cervical cancer screening, Italy integrated these programmes into its National Health Service under the LEA. The 2014–2019 National Prevention Plan required all regions to align with these guidelines, thereby guaranteeing universal and free access to eligible women[2]. However, despite this formal universalism, screening uptake shows marked territorial and social disparities, with higher participation in northern regions compared to the south, and greater adherence among women with higher levels of education, greater economic resources, Italian citizenship, and those who are married or cohabiting [5]. These patterns suggest that, even within a system designed to guarantee equal access, participation in cervical screening is still shaped by broader social and cultural factors.

Data and methods

Study design and study population

The data used in this study are drawn from the European Health Interview Survey (EHIS). EHIS is a large, representative dataset collecting cross-national information on key aspects of the health conditions of the European population, as well as the use of healthcare services across national contexts [47]. The third wave (2019) of the EHIS represents the most recent available dataset for Italy. The survey was conducted on a sample of approximately 30,000 households residing in 840 Italian municipalities, which vary in population size. Data collection occurred in two periods: April–June and September–December 2019. The data were collected by the Italian National Institute of Statistics (ISTAT) using the PAPI (Paper and Pencil Interviewing) technique.

This study focuses on determinants that predict attendance at HPV screening for women. To this aim, the dataset was restricted to female respondents aged 25 to 64 years old, which corresponds to the recommended age for HPV screening according to the Italian guidelines for the prevention of cervical cancer [48]. Cases with missing information were excluded from the analyses.

Measures

This subsection describes the survey items included in the analyses. Table 1 shows the socio-demographic characteristics of the sample.

Cervical cancer screening

The EHIS asked respondent when they last had a Pap smear (within the past 12 months, 1 to less than 2 years ago, 2 to less than 3 years ago, more than 3 years ago or never). Following the Italian screening guidelines which recommend a Pap test every 3 years from 25 years of age [45], we created a binary variable that measures the HPV screening attendance[3]. The variable is coded as 1 if the respondent has had a Pap smear within three years prior to the interview and 0 if the test was performed more than three years before or never. For ease of interpretation of the study results, we distinguish individuals as

[2] In Italy, cervical cancer screening programs are differentiated by age group, in accordance with the epidemiological characteristics of HPV. Among younger women, where infections are more common but usually resolve spontaneously, the Pap smear is recommended to detect early cellular abnormalities. In older age groups, where the risk of persistent infections is higher, HPV testing is preferred as a more effective preventive strategy [5]. These screenings are implemented through organised public health programs that include personalised invitations and structured follow-up care.

[3] EHIS data refers to 2019 and are not completely aligned with the actual screening policies in Italy. Before 2019 the screening program offered active and free Pap test every three years to all women aged 25–64. Starting from 2020 the HPV test is offered to women over 30/35 up to 64 years of age every five years, with the Pap test used as a primary-level test only for younger women aged 25–30/35 years, every three years.

Table 1 – Descriptive statistics

	Column 1 Total sample		**Column 2 Regular Cervical Cancer Screening**		**Column 3 Irregular Cervical Cancer Screening**	
	N	%	N	%	N	%
Cervical Cancer Screening						
Never	4921	20,4	-	-	-	-
More than 3 years ago	5796	24,1	-	-	-	-
2 to < 3 years ago	2929	12,2	-	-	-	-
1 to < 2 years ago	5237	21,8	-	-	-	-
Within the past 12 months	4825	20,0	-	-	-	-
Missing	370	1,5	-	-	-	-
Age group						
age_25_34	2351	9,8	1435	11,0	854	8,0
age_35_44	3238	13,4	2345	18,1	858	8,0
age_45_49	2154	8,9	1713	13,2	421	3,9
age_50_54	2260	9,4	1773	13,6	471	4,4
age_55_59	2098	8,7	1546	11,9	536	5,0
age_60_64	1933	8,0	1355	10,4	567	5,3
Missing	0	0,0	0	0,0	0	0,0
Healthism						
Healthism_zero	353	1,5	168	1,3	173	1,6
Healthism_low	2166	9,0	1179	9,1	943	8,8
Healthism_medium_low	7017	29,1	3782	29,1	3146	29,4
Healthism_medium_high	12,885	53,5	6805	52,4	5919	55,2
Healthism_high	1546	6,4	1019	7,8	509	4,7
Missing	111	0,5	38	0,3	27	0,3
No Chronic diseases	15,484	64,3	8834	68,0	6528	60,9
Chronic diseases	8316	34,5	4104	31,6	4149	38,7
Missing	278	1,2	53	0,4	40	0,4
Marital status (Single; widowed; divorced)	11,574	48,1	5067	39,0	6254	58,4
Marital status (Married)	12,501	51,9	7923	61,0	4461	41,6
Missing	3	0,0	1	0,0	2	0,0
Age of first cervical cancer screening (> 25 years old)	13,597	56,5	8822	67,9	4775	44,6
Age of first cervical cancer screening (< 24 years old)	4380	18,2	3585	27,6	795	7,4
Missing	6101	25,3	584	4,5	5147	48,0
Education						
Primary	4821	20,0	1265	9,7	3462	32,3
Lower secondary	6832	28,4	3465	26,7	3248	30,3
Upper secondary	8498	35,3	5454	42,0	2937	27,4
University	3927	16,3	2807	21,6	1070	10,0
Missing	0	0,0	0	0,0	0	0,0
Income (quintiles)						
First quintile	4423	18,4	2067	15,9	2274	21,2
Second quintile	4980	20,7	2475	19,1	2418	22,6
Third quintile	4840	20,1	2583	19,9	2188	20,4
Fourth quintile	5096	21,2	2886	22,2	2139	20,0
Fifth quintile	4739	19,7	2980	22,9	1698	15,8
Missing	0	0,0	0	0,0	0	0,0
Employment status (Unemployed)	15,664	65,1	6627	51,0	8748	81,6
Employment status (Employ)	8414	34,9	6364	49,0	1969	18,4
Missing	0	0,0	0	0,0	0	0,0
Regional group						
North-West	5617	23,3	3213	24,7	2315	21,6

Table 1 (continued)

	Column 1 Total sample		Column 2 Regular Cervical Cancer Screening		Column 3 Irregular Cervical Cancer Screening	
North-East	4872	20,2	2939	22,6	1884	17,6
Center	4587	19,1	2643	20,3	1884	17,6
South	6353	26,4	2960	22,8	3282	30,6
Islands	2649	11,0	1236	9,5	1352	12,6
Missing	0	0,0	0	0,0	0	0,0

having regular screening attendance (coded as 1) versus irregular screening attendance (coded as 0).

Healthism

This variable is an index created by summing four dummy variables indicative of healthy behaviours: no smoking (1 = non-smoker), frequent consumption of sugar beverages (1 = never), frequent fruit consumption (1 = from every day to six times per week), and participation in aerobic and muscle-strengthening activities (1 = yes). The index ranges from 0 to 4, with higher scores indicating healthism. Given the multidimensional nature of this concept, Principal Component Analysis (PCA) was conducted to examine whether the healthy behaviour items loaded onto a common underlying factor. To achieve a simple structure, Varimax rotation was applied, with PCA as the extraction method. The results revealed a one-factor solution explaining approximately 30% of the total variance (cumulative variance from factor 1 = 54.58%).

Chronic diseases

A binary variable indicating whether the respondent has been diagnosed with chronic diseases (1 = yes, 0 = no).

Marital status

A binary variable indicating whether the respondent is married or cohabiting (1 = yes, 0 = no spouse/partner including single, widowed and divorced).

Age at First Cervical Cancer Screening

This binary variable captures the respondent's age at the time of their first cervical cancer screening test (i.e., Pap test and/or HPV test). It is derived from the survey question: "At what age did you have your first Pap test or HPV test? If you had both, please indicate the age at your first test." The variable is coded as 1 if the test was performed before the age of 25 (range 17 to 24 years old), and 0 if performed at age 25 or older. The threshold of 25 years was chosen based on national screening guidelines recommending first screening participation at this age.

Education Level

A categorical variable measuring the highest level of education attained by participants. The variable is coded as follows: 1 = primary education, 2 = lower secondary education, 3 = upper secondary education, and 4 = university level.

Income level (Quintiles)

Respondents are ranked by their equivalent income and divided into five groups (quintiles). The first quintile includes the 20% of individuals with the lowest incomes, the second quintile includes those with lower-middle incomes, and up to the fifth quintile, which includes the 20% of individuals with the highest incomes.

Employment status

A binary variable indicating whether the respondent is employed or not (1 = employed, 0 = not employed).

Regional group

A categorical variable indicating the respondent's area of residence. This variable is classified according to the NUTS 1 level of Italy (i.e., North-West; North-East; Centre; South and Islands).

Method

To explore the potential association between healthism and the attendance of HPV screening, we use a binomial logistic regression model. Logistic regression is a statistical method used to model the relationship between one or more independent variables and a binary outcome by estimating the log-odds of the probability that the event of interest occurs. This is achieved by transforming the linear combination of predictors using the logistic function, which converts values into probabilities ranging between 0 and 1. In this study, the event is defined as regular (versus irregular) screening attendance according to the Italian screening guidelines (i.e., every three years following the initial screening).

In all estimations, we applied the post-stratification weight variable provided in the 2019 Italian EHIS dataset. This weight corrects for potential non-response bias and aligns the sample with known population margins for key demographic variables through a calibration process,

ensuring the representativeness of survey estimates. The use of weighted data accounts for the complex survey design and enhances the validity of the population-level inferences[4].

Results

Results from the logistic regression analysis (Table 2) confirm that both socio-demographic characteristics and health-related behaviours significantly influence compliance with cervical cancer screening recommendations. The analysis includes weighted estimates to correct for sample distortion and controls for regional fixed effects. The Nagelkerke R^2 value of 0.082 indicates that the model explains a modest—but acceptable—proportion of variance in screening compliance, which is reasonable given the complexity of health behaviour determinants in large-scale population surveys.

Table 2 – Logistic regression analysis: compliance with cervical cancer screening (Pap test) as dependent variable

	Odds-ratio	95% C.I.		S.E.
		Lower	Upper	
Age group (ref. cat. Age_60_64)				
age_25_34	2,212***	2,200	2,225	0,003
age_35_44	2,078***	2,068	2,088	0,002
age_45_49	2,142***	2,130	2,153	0,003
age_50_54	1,982***	1,972	1,993	0,003
age_55_59	1,233***	1,227	1,239	0,002
Healthism (ref. cat. Null)				
Healthism_low	1,802***	1,785	1,820	0,005
Healthism_medium_low	1,998***	1,980	2,016	0,005
Healthism_medium_high	2,091***	2,072	2,110	0,005
Healthism_high	2,438***	2,412	2,464	0,005
Chronic diseases (1 = Yes)	1,236***	1,232	1,240	0,002
Marital status (1 = Married or cohabitant)	0,949***	0,946	0,952	0,002
Age of first cerv. canc. screening (1 = < 25 years old)	1,232***	1,228	1,236	0,002
Education (ref. cat. Primary school)				
Lower secondary	1,203***	1,195	1,211	0,003
Upper secondary	1,500***	1,490	1,510	0,003
University	1,563***	1,552	1,575	0,004
Income (ref. cat. 1th quintiles)				
2nd quintile	1,262***	1,256	1,267	0,002
3rd quintile	1,448***	1,441	1,454	0,002
4th quintile	1,522***	1,515	1,529	0,002
5th quintile	1,505***	1,498	1,513	0,002
Employment status (1 = Employed)	1,245***	1,241	1,249	0,002
Regional fixed effect (YES)				
Constant	0,615***			0,006
Obs. (11,862)				

Note: All the parameters have been standardized. p-value = ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All cases are weighted. (R-Square Nagelkerke 0.082)

Findings show that younger women are significantly more likely to adhere to screening guidelines compared to the reference group (ages 60–64). Specifically, women aged 25–34 show odds of compliance that are 121% higher (OR = 2.21), while similar increases are observed among those aged 35–44 (OR = 2.08), 45–49 (OR = 2.14), and 50–54 (OR = 1.98). However, adherence declines progressively with age: women aged 55–59 have only 23% higher odds of compliance (OR = 1.23) relative to the reference group, suggesting reduced preventive engagement as women approach the upper age limit of the target population.

The timing of the first HPV screening appears to be a predictor of long-term screening behaviours. Women who began screening before the age of 25 have 23% higher odds of current compliance (OR = 1.23) compared to those who started later, suggesting that early initiation of preventive care may establish habits that persist over time.

Consistent with our main hypothesis, healthism – measured as a composite index of health-oriented behaviours – is strongly associated with screening adherence. Compared to women reporting no health-promoting behaviours, those with high levels of healthism have 144% higher odds of compliance (OR = 2.44). Women with medium-high (OR = 2.09), medium-low (OR = 2.00), and low (OR = 1.80) healthism also display progressively elevated odds of adherence. These findings support the notion that preventive attitudes and self-care orientations contribute positively to timely participation in screening programs.

Having at least one chronic disease is associated with 24% higher odds of having had a recent Pap test (OR = 1.24), which may reflect more frequent interactions with the healthcare system and greater medical awareness. Interestingly, marital status shows a small but statistically significant negative association with screening: married or cohabiting women exhibit 5% lower odds of compliance (OR = 0.95) compared to single or non-cohabiting women.

Education plays a critical role in preventive behaviours. Compared to women with only primary education, those with a university degree have 56% higher odds of screening compliance (OR = 1.56), and those with upper secondary education have 50% higher odds (OR = 1.50). Even lower secondary education is associated with improved adherence (OR = 1.20), highlighting the potential influence of health literacy and educational attainment.

Household income is another determinant. Women in the highest income quintile show 50% higher odds of

[4] Full details of the weighting procedure can be found in the EHIS Italy 2019 Methodological Note at: https://www.istat.it/fascicoloSidi/553/Nota%20metodologica.pdf (last access June 2025).

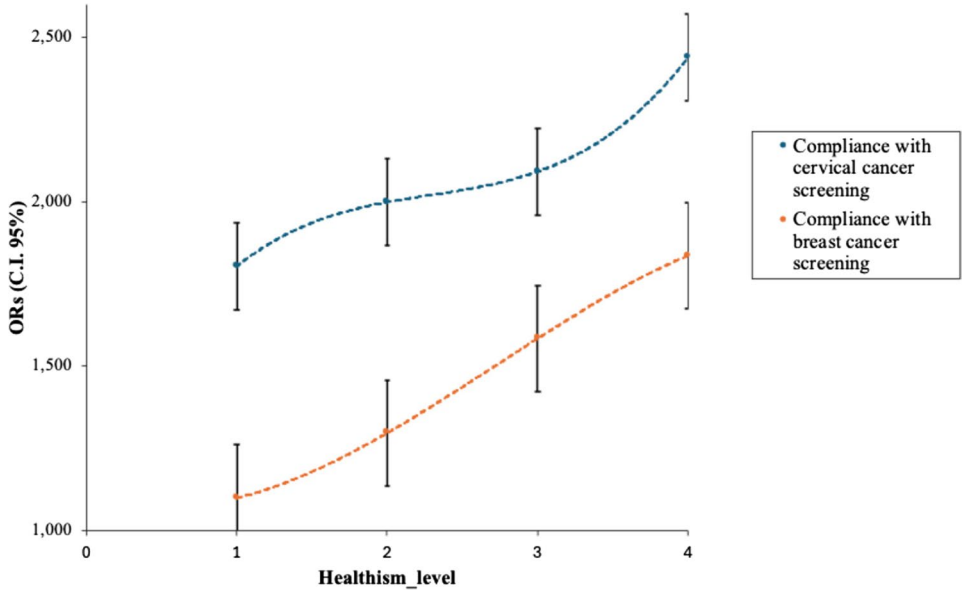

Fig. 2 Predicted values of screenings compliance by healthism level. Note: Predicted values of logistic regression models (ORs 95% C.I.) with cervical cancer screening (pap test) and breast cancer screening (mammography test) as dependent variables. Healthism levels coded as (0 = Baseline; 1 = Low; 2 = Medium low; 3 = Medium high; 4 = High).

compliance (OR = 1.50) compared to those in the lowest. Similar effects are observed across the fourth (OR = 1.52), third (OR = 1.45), and second (OR = 1.26) quintiles, suggesting that socioeconomic advantage – either directly or indirectly – facilitates access to and utilization of preventive services.

Finally, employment status emerges as a positive predictor of screening participation. Employed women show 25% greater odds of compliance (OR = 1.25) compared to unemployed women, likely reflecting the supportive role of income, access to workplace health information, or time flexibility in facilitating preventive care.

Robustness checks

To further assess the robustness of our findings, we conducted two additional analyses. The first aimed to test whether the association between healthism and screening adherence extended to other preventive behaviours, while the second addressed concerns related to the dichotomisation of the outcome variable in the main specification model.

First, we re-estimated the baseline logistic regression using mammography attendance as the dependent variable. This allowed us to test whether the observed relationship between healthism and screening adherence is consistent across different types of preventive screenings. Following Italian breast cancer screening guidelines, we constructed a binary variable coded as 1 if the respondent (aged 50–69) reported having a mammogram within the past two years, and 0 otherwise. The results, shown in Table A1, confirm the main pattern: higher levels of healthism are associated with significantly greater likelihood of mammography adherence.

Figure 2 displays predicted probabilities (ORs) from the model. Second, to address the information loss potentially introduced by dichotomising the cervical screening variable, we ran the analysis treating the outcome as an ordinal variable with five ordered categories: never, more than 3 years ago, between 2 and 3 years ago, between 1 and 2 years ago, or within the past 12 months. Using an OLS specification, we estimated the association between healthism and screening frequency. Results are reported in Table A2, and they remain consistent with those obtained through the main logistic model, reinforcing the validity of our findings. Full model specifications and estimates for both robustness checks are provided in the Supplementary Materials (see Tables A1 and A2).

Discussion

This study examines factors predicting cervical cancer screening adherence, focusing on the potential relationship between healthism and screening participation. Previous research has framed medical screenings within the context of surveillance medicine, characterized by population monitoring and the construction of all individuals as potentially "at risk" [22, 24, 49]. Cultural expectations to "stay healthy," together with public health emphasis on individual responsibility, are embodied in practices of self-surveillance and bodily control [13], often making screening attendance a moral obligation, as it can be interpreted as a response to normative expectations [45].

Participation, however, can also reflect empowered agency, grounded in the internalization of a positive notion of healthism and encompassing both health-promoting and disease-preventing behaviours. In this study, healthism emerged as a predictor of cervical cancer screening compliance, with high levels associated with adherence to recommended screenings and other preventive behaviours, including mammography. These findings suggest that internalized orientations toward personal health responsibility may facilitate proactive engagement in preventive care.

Consistent with prior studies [7, 50, 51], younger women participate more frequently in screening programs, and early initiation (before age 25) predicts regular follow-up adherence. This pattern may result from effective communication campaigns and improved access to health information, particularly online [52, 53]. The growth of digital health technologies, such as health apps and wearable devices, further enables individuals to self-determine health behaviours and internalize preventive practices, reinforcing healthism as a framework supporting proactive health orientations.

Despite these positive trends, structural inequalities persist in screening uptake. Socio-economic status and education are positively correlated with adherence to cervical cancer screening programs [54]. Regional variability also contributes to disparities, with lower adherence reported in Southern Italy and the Islands [55]. Such differences may reflect socio-cultural factors, the presence of opportunistic screening, and organizational variations in invitation methods. Centralized approaches in northern regions, as highlighted by Giordano et al. [51], appear to achieve higher engagement among target populations.

From a policy perspective, these findings underscore the need for multifaceted interventions that simultaneously address individual behaviours, structural barriers, and social determinants. Public health campaigns often emphasize specific lifestyle behaviours—healthy nutrition, physical activity, smoking cessation, and alcohol moderation [34, 59]—while preventive practices such as screening can be overlooked. Our results suggest that linking lifestyle promotion with screening participation may generate positive spillover effects, influencing both direct outcomes like early diagnosis and broader behavioural changes [39–41]. Age-specific strategies are particularly important: older women often perceive cervical cancer screening as unnecessary, despite continued risk [60–62], whereas early participation improves long-term adherence and reduces stigma associated with sexually transmitted infection testing [63]. Tailored communication strategies are needed to address these age-related misconceptions and reinforce the value of preventive care across the lifespan.

Interventions should also focus on social groups with limited socio-cultural resources, as these populations face greater barriers to accessing information and may develop sceptical attitudes toward medical practices such as screening [64]. Strengthening health risk communication at public, organizational, and interpersonal levels can enhance informed decision-making and promote equitable uptake of preventive services.

This study offers insights into the social and behavioural determinants of cervical cancer screening compliance, yet several limitations must be acknowledged. Firstly, healthism was operationalized through a composite behavioural index—physical activity, dietary habits, smoking, and sugary drink consumption—capturing its practice-oriented dimension and aligning with prior research conceptualizing it as a lifestyle-based orientation toward personal health responsibility. While this proxy enables robust analysis in a large-scale survey, it may not fully represent broader ideological or discursive dimensions, including the internalization of self-regulation norms and alignment with neoliberal discourses of personal responsibility. Future research could employ qualitative or mixed-method designs to explore how individuals construct meaning around preventive behaviours across social and cultural contexts.

The cross-sectional design precludes causal inference, and observed associations may reflect unmeasured individual or contextual factors absent from the dataset, such as knowledge, attitudes, or beliefs about screening. HPV vaccination status was unavailable in our data, which could influence health behaviours and partially account for unexplained variance. Although regional fixed effects were included, findings remain specific to the Italian context, where program implementation is uneven across regions. Structural and institutional factors—such as access barriers, invitation methods, and local policies—may influence adherence but are not fully captured by individual-level predictors. Finally, secondary analyses were not pre-registered; reporting them here aligns with best practices for transparency and reproducibility.

Conclusion

The primary contribution of the present study is the identification of a positive association between the adoption of healthy lifestyles and increased participation in cervical cancer screening among Italian women. Moreover, the influence of healthism seems to extend beyond this particular screening and encompasses greater compliance with breast cancer detection. Another key finding of this study is that younger women are more likely to participate in screening programs than older women. Age also emerges as a critical factor in sustaining screening adherence over time: women who initiate screenings at an earlier age (before 25) are more likely to maintain

regular follow-ups compared to those who begin later in life. This pattern may be explained by the success of cervical cancer prevention campaigns and the younger generation's improved access to health information, particularly through digital media and social networks. Despite that, results from this study are not sufficient to establish a direct and generalizable association between healthy behaviours and compliance with the two types of screenings analysed.

Abbreviations

EHIS European Health Interview Survey
HPV Human Papillomavirus
LEA Essential Levels of Care

Supplementary Information

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Supplementary Material 1

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Authors' contributions
MC: Conceptualization; Data curation; Formal analysis; Literature review (supporting); Writing – original draft. AB: Supervision; Literature review (Lead); Funding acquisition; Writing – original draft; VQ: Literature review (supporting); Writing – original draft; Resources. All authors reviewed, edited, and approved the final version.

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Data availability
The data that support the findings of this study are publicly available as microdata files from the European Health Interview Survey (EHIS) at the following link: https://www.istat.it/microdati/european-health-interview-survey-ehis-public-use-micro-stat-files/. All analyses were conducted using IBM SPSS Statistics (Version 29). The syntax used for data filtering, variable recoding, and statistical modelling is available from the authors upon reasonable request.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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