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# A school based community randomized trial of the effect of peer health education on primary prevention knowledge, attitude and behaviours towards HPV among adolescents

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## ABSTRACT

**BACKGROUND:** This study in the prospect of promoting adherence to the primary and secondary prevention programmes will research knowledge, attitudes and behaviors of the student population attending high schools regarding HPV infections and will also promote health education sessions based on peer education.

**METHODS:** We carried out a community randomized trial regarding HPV infection, HPV vaccination, and sexual health, of students and a peer educational intervention.

To verify the effectiveness of peer educators in changing opinions and beliefs about HPV a self-completion questionnaire was made and distributed pre (T1) and post (T2) peer educator intervention. The same questionnaires were assigned to the control group.

**RESULT:** The sample consisted of 900 students, mean age was 16.6±1.4, having relationship 34.4%. At T1, 64.6% of students in experimental group said that they knew HPV, 83.4% how it is transmitted and 71.1% HPV vaccination, 54.7% perceived dangerousness with significant gender-related difference. At T2 the percentages increased. At T1, 14.1% of females were vaccinated at T2 they were 17.5%. The main factors associated with the students' propensity to vaccination were: having at least one sister; being in favour of vaccinations in general; knowing that the vaccine is aimed at preventing cervical cancer; and being aware that they could be infected by HPV.

**CONCLUSION:** Both the HPV test and HPV vaccine need effective communication and monitoring of the spread of knowledge, especially among women identified as most in need of information and included in the age group at risk, in wich it is crucial to encourage informed choices. This underlines the need to plan adequate educational programmes.

*Key words: HPV, Prevention, Adolescents, Peer education*

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## INTRODUCTION

Human papillomaviruses (HPVs) are the primary etiologic agents of Cervical Cancer Uteri (CCU), and persistent infection with high-risk HPV can also cause cancers in other genital sites as well as cancer of the anus, the oral cavity and oropharynx, and possibly the larynx and skin (1-5).

Cervical cancer is the third most common cancer in women, and the seventh overall, with an estimated 530 000 new cases in 2008.

Overall, the incidence ratio for mortality is 52%, and cervical cancer was responsible for 275 000 deaths in 2008 (6).

Genital HPV infection is the most common sexual transmitted infection (STI) among women: the number of women harboring HPV-DNA worldwide is estimated to be 291 million, and it is thought that around 105 million women worldwide will have a HPV-16 or -18 infection (the most common oncogenic types in cervical carcinomas) at least once in their lifetime.

HPV infection is very common amongst sexually active young women, with a prevalence of between 20% to 46% (7). HPV infection also appears to be very common in men, though it has not been studied as extensively as the pattern of infection in women (8).

In Italy, vaccination against HPV was introduced in the national immunization programme in 2007.

In March 2008, the Italian Ministry of Health suggested to the Vaccine Committee of the Regions to start an active, free vaccination campaign against HPV because of its link to cervical cancer, and this campaign was aimed at 12-year old girls in line with the guidelines of a number of other industrialized countries (9). The choice of this age was based on findings that HPV infection occurs almost exclusively due to sexual contact, that a large proportion of subjects are first infected during adolescence or early adulthood, and that the immune response to HPV vaccination is higher in younger subjects (10). Furthermore, the associations between numbers of new and recent sexual partners and the likelihood of detecting HPV-DNA in female genital tract specimens are strong and consistent (11).

HPV vaccination is also recommended for older teenagers and for young women (13-26 years) who have not, or have only just, started sexual activity. The introduction of the vaccine could lead women to the erroneous conviction that the Pap-test is no longer necessary, so in this context it needs a clear, comprehensive, and correct divulgation of information particularly among youth.

In order to be widely accepted by users, the implementation of a new health promotion intervention requires them to be adequately informed about its clinical importance, benefits and risks (12).

In most societies, young people often find it difficult to obtain clear and correct information on issues that concern them such as sex, sexuality, substance use, reproductive health, HIV/AIDS and STIs. This happens for many reasons: sociocultural norms and taboos, economic deprivation or lack of access to information. In many situations, information is available but it may be given in a manner that is authoritarian, judgmental, or non-adapted to the young people's values, viewpoints and lifestyles. One effective way of dealing with these issues is peer education, because this approach consists of a dialogue between equals. Peer education has been suggested as a potentially effective method of undertaking STIs prevention work with young people because of the documented influence of peers on adolescent sexual behaviour (13, 14).

Since 1990, peer education has become an increasingly popular way of carryng out health promotion work in the youth population. Peer education is defined as a process, a strategy, a communication channel, and a tool. Most commonly, youth peer education is viewed as a process whereby well trained and motivated young people undertake informal or organized educational activities with their peers (those similar to themselves in age, background, or interests). The goal is to develop knowledge, attitudes, beliefs, and skills needed to engage in healthy behaviours (15).

Peer education typically involves training and supporting members of a given group to effect change among members of the same group. Peer education is often used to effect changes in knowledge, attitudes, beliefs, and behaviours at the individual level. However, peer education may also create change at the group or societal level by modifying norms and stimulating collective action that contributes to changes in policies and programmes.

Approaches range from formal didactic strategies to informal approaches that utilize everyday communication within social groups as a vehicle for behaviour change (16).

Peer education is often undertaken because it is thought to be an easy and convenient way to reach a large number of people with information, using inexpensive, volunteer staff. But when done well, peer education requires intensive planning, coordination, supervision, and resources (15).

The aims of this study are twofold: both to promote adherence to the primary and secondary prevention programmes, and to actively inform about the potential and limits of the vaccine. The investigation is based on research of the knowledge, attitudes and behaviours (KAB)

of the student population regarding HPV infections and the promotion of health education sessions for the prevention of Cervical Carcinoma through the application of educational models based on peer education. It is thought that this approach can be an effective strategy, even if there is little research evidence to substantiate this (15, 17). Furthermore this research aims to verify the effectiveness of peer educational intervention as a tool for the prevention of HPV infection and, finally, to measure whether it yielded changes in knowledge of HPV, in the propensity to undertake HPV vaccination, and whether it promoted sexual risk reduction behaviours in order to reduce transmission of HPV. The choice of students attending high schools was based on findings that a large proportion of subjects are first infected during adolescence or early adulthood (12, 1). Moreover, these youths had not participated in the active offer of HPV vaccination and screening which was easily accessible through school channels and can, therefore, be subjected to structured interventions for health promotion.

## METHODS

Between September 2010 and December 2011, we carried out a cross-sectional KAB survey regarding HPV infection, HPV vaccination, and sexual health, of students attending high-school which was followed by peer educational interventions.

### Design and sample

The schools involved were a convenience sample chosen on the basis of contacts of the authors with school boards. Two technical schools and two high schools in Cassino, Italy, were invited to participate in this research. Only high schools specializing in classical and scientific studies, that in previous years had already collaborated with the university in health promotion activities among adolescents, joined (18 - 23).

In September 2010, the authors contacted the boards of each school before the implementation of educational interventions in order to assure the best compliance of teachers to the survey. The study was approved by the boards of each school and the representatives for the parents. Both received information about the content of the programme, its method and it's design, implying that participation would involve random allocation to either the experimental or the control group.

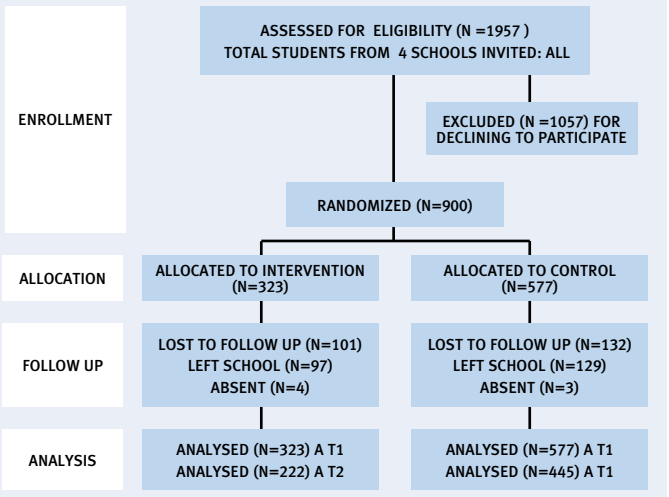
A sample of 900 students was selected by random extraction from the classical and scientific high schools, thus representing 65.2% of the students attending the two institutes involved. The research team assigned a sample of 323 students to the experimental condition and 577 students to the control condition (Figure 1) through the method of extracting cluster randomization. To verify the effectiveness of peer educators in changing opinions and beliefs about HPV, a self-completion questionnaire was developed and distributed pre and post peer educator intervention (Time 1, T1 - baseline, and Time 2, T2 - follow-up). The same questionnaires, T1 and T2, were assigned to the control group.

Because of the age of the students attending the schools (14-20 years), an introductory letter describing the aims of the study was presented, which outlined the explanation of the questionnaire and contained contact details of the researchers who carried out the study.

Informed consent to participate was obtained from the students (for those aged 18 years or over 18) or their parents (for those under the age of 18) using a specific form.

FIG. 1

THE CONSORT FLOW DIAGRAM ON RANDOMIZATION PROCESS




*From: Moher D et al. The CONSORT Statement: revised recommendations for improving the quality of reports of parallel group randomised trials.*

More detailed information on the research and the compilation of the questionnaire was administered to the students when it was administered for compilation.

## Procedure

The pretest questionnaire was first administered in December 2010, when peer educators administered it to all students during class time.

Between February and May 2011, educational interventions took place in randomized samples from the two schools .

Between June and November 2011, peer educators administered post-questionnaires to the students again, either to the experimental or the control group.

Students were asked not to write their names on questionnaires but rather to ensure anonymity. Pre and post questionnaire were "mated" on the basis of a list generated by nick names suggested by the pupils, who proceeded to write their nickname on pre and post questionnaires. In this way, neither teachers nor the researchers could identify them.

The teachers were present in the classroom during data collection, but they stayed in the front of the class and were not involved in questionnaire collection.

## Questionnaires

A four-page questionnaire was developed. Most of the questions were structured in a defined set of possible answers or in check boxes (often/always/sometimes/never or yes/no/I don't know).

The questionnaire consisted of 30 closed questions, divided into different themes and grouped in three sections as follows:

1) Socio-demographic section: age, gender, municipality of residence, religion, number of siblings, parental educational level and occupation;
2) HPV infection and vaccination section: to define the individual knowledge of HPV infection and HPV vaccination, and their attitudes towards vaccination;
3) the third section was designed to assess attitudes and practices towards sexual health issues.

The questionnaires were pilot-tested on a convenience sample of adolescents attending the high school. Piloting also ensured that the questionnaires were relevant and acceptable to participants, and that the level of language was appropriate. Only minor changes were made to the layout of the questionnaire as a result of the pilot. It was self-completed at school.

## Peer educational interventions

The project concerning peer educational interventions involved:

- Selection and training of 15 peer educators among students attending the first year classes of the second cycle degree programme in Social Policy and Social Service at the University of Cassino and Southern Lazio (Central Italy)
- A series of meetings were attended by representatives of the health education teachers of the schools involved, during which the goals were explained and discussed, the methods of recruitment from the extracted classrooms developed, the experimental group target for peer education intervention decided upon, other issues regarding how to conduct the investigation discussed and a deadline set.

Those students who expressed an interest were asked to attend a peer educator training course which included a series of meetings and workshops conducted by the researchers of the Laboratory of Hygiene of the University of Cassino and Southern Lazio, the physician responsible for the Coordination Center Programmes of screening, and the physician responsible for Pediatric counseling at the Local Health Agency (LHA) of the province of Frosinone (District B).

The peer educators' training was compulsory for all peer educators, and it was designed, organized and managed by the authors of this article.

A peer educator must have knowledge, skills and personal development (15, 17, 24).

The training course for peer educators involved the following topics: peer education, HPV, routes of transmission, HPV vaccination, HPV test, Pap smear, risk behaviours/practices, safe behaviours, symptoms and treatment, group work, facilitation, communication, basic counselling, methods of delivering information (presentation, personal development communication, empathy and non-judgmental attitude, assertiveness, self-confidence and selfworth, group dynamics, sensitivity, gender issues, socio-cultural and economic dynamics.

The educational intervention proposed was divided into two 2-hour sessions.

The activities were coordinated by the research managers, who identified ways to intervene in the classrooms, defined the means and the articulation of interventions, and decided on the assessment tools.

The intervention on the prevention of HPV provided information about the principles of health education, particularly on issues related to risk behaviours in young people and their relationship to HPV. The topics specifically touched aspects related to: epidemiological data on infection by HPV in Italy and around the world, routes of transmission of HPV, HPV vaccination, HPV tests, Pap smear, risk behaviours/practices, safe behaviours.

The significance of these topics was presented in all stages and the importance of the involvement of adolescents in planning prevention initiatives addressed to them was stressed, with the aim of motivating youth towards an active participation in the later stages of the intervention.

The peer educators summarized the topics several times, and stimulated informal discussion and comments, responded to and asked questions, and worked through the information that was provided.

The content of the group discussions was guided by giving specific indications to the peer educators on how to pilot the discussion group.

The teachers that were present during the lessons stimulated the students to participate.

Teachers received an information session before the beginning of the activities, which contained information about the content and the characteristics of the programme.

The peer educators had meetings with the teachers in order to monitor the development of the project, its implementation, the difficulties that arose and to evaluate the effectiveness of their intervention. The supervision and exchange of experiences, and the introduction of corrective measures enabled a more effective continuation.

Finally, we carried out an evaluation process in order to collect both qualitative and quantitative information on the route-learning which students were involved in and the various phases of the intervention.

### Data Analysis

The responses were analysed by means of descriptive statistics. Normally distributed continuous data were described using means and standard deviations. Categorical data were described using frequencies and percentages, and the groups (mothers vs fathers among parents and females vs males among students) were compared using the $\chi^2$ or Fisher's exact test as appropriate. All of the analyses were two tailed, and p values of 0.05 or less were considered significant. Odds Ratios (OR) and 95% Confidence Intervals (CI) were calculated in order to measure the associations between selected factors, chosen on the basis of literature review, and the students' propensity to undergo HPV vaccination themselves. The ORs were obtained by means of unconditional multiple logistic regression adjusted for:

1) age, gender and religion of the student, education of the parents and presence, age and gender of their siblings (brother/sister),
2) Mean age of first sexual intercourse, having had two or more partners, using condoms. The analyses were carried out using EpiInfo (version 3.5, 2008).

## RESULTS

At T1, December 2010, the sample consisted of 900 students and at T2 the number of respondents was 667. The sample at T1 consisted of 323 subjects in the experimental group and 577 in the control group, who participated in both measurements. At follow up 4 months later, 233 students had been lost, the reason for not completing the study being that they had left school (n = 226) or were absent (n = 7). The dropout rates were similar (p = 0.05) in both conditions.

### Sample description

The mean age of the sample was 16.6±1.4 SD years and did not differ significantly between the experimental and control groups. The conditions regarding gender distribution also did not differ significantly (70.8% girls in the experimental group versus 65.7% in the control group).

Responses from 15 (1.7%) students who did not indicate their sex were excluded from gender analysis but included in analysis by sexual experience.

### Socio-demographic section

Demographic data including students' gender, age, number of siblings, religion, and parents' educational level and occupation are shown in Table 1.

TABLE 1

DISTRIBUTION OF STUDENTS BY GENDER, AGE, NUMBER OF SIBLINGS AND RELIGION AND OF PARENTS EDUCATIONAL LEVEL AND OCCUPATION

| | n | % |
|---|---|---|
| Total sample size | 900 | 100 |
| **Gender** | | |
| Male | 298 | 33.1 |
| Female | 587 | 65.2 |
| Missing | 15 | 1.7 |
| Means age±ds | 16.6±1.4 sd | |
| **Religion** | | |
| Catholic | 780 | 86.7 |
| Atheist | 94 | 10.4 |
| Other | 5 | 0.6 |
| Missing | 21 | 2.3 |
| **Number of siblings** | | |
| 0 | 387 | 43 |
| 1 | 418 | 46.4 |
| 2 | 70 | 7.8 |
| ≥ 3 | 25 | 2.8 |
| **Educational level of fathers** | | |
| Primary school | 7 | 0.8 |
| Junior high school | 74 | 8.2 |
| High school | 455 | 50.5 |
| College Degree | 337 | 37.5 |
| Missing | 27 | 3 |

| | n | % |
|---|---|---|
| Total sample size | 900 | 100 |
| **Educational level of mothers** | | |
| Primary school | 11 | 1.2 |
| Junior high school | 61 | 6.8 |
| High school | 481 | 53.4 |
| College Degree | 332 | 36.9 |
| Missing | 15 | 1.7 |
| **Work activity of fathers** | | |
| White collar worker | 263 | 29.2 |
| Self employed | 317 | 35.2 |
| Other | 298 | 33.1 |
| Missing | 22 | 2.5 |
| **Work activity of mothers** | | |
| White collar worker | 210 | 23.3 |
| Housewives | 235 | 26.1 |
| Other | 435 | 48.4 |
| Missing | 20 | 2.2 |

We found that fathers were older than mothers: respectively 49.3% and 33.2% were aged ≥50 years. 37.5% of fathers and 36.9% of mothers were graduates and over 50% had a high school diploma (50.5% father and 53.4% mother). The professions most represented were self-employed (35%) and blue collar worker (29.2%) for fathers, and housewives (26.1%) and blue collar worker (23.3%) for mothers.

Most had only one sibling (46.4%; 55.8% brother and 59.3% sisters), 39.9% had at least one sister or brother aged >18 years. With regard to religious beliefs, most of the sample was Catholic (86.7%) with a small percentage reporting to be atheist (10.4%).

## Personal knowledge of HPV and attitudes to vaccination

### Experimental Group

At T1, most students, both females and males (64.6%; 95% CI 58.9%-70%), said that they knew about HPV, with a statistical difference seen for gender (73.6% female vs 43% male; p<0.01). In the post-test, statistical differences for gender were confirmed, though the proportion of males who said that they knew about HPV increased (25%, p= 0.01), as did the overall percentage in both females and males (84.4%; 95% CI 79.3%-88.7%). 67.4 % of students who had already had sexual intercourse knew about HPV, compared with 32.6% of students who had not had sexual intercourse (p=0.01) and no significant differences were found by gender and age.

Among those who were aware of HPV, there was significant gender-related difference in its perceived dangerousness (54.7%; 95% CI 48.9%-

60.4% in both sexes; 75.8% female v's 40.2% male; p=0.05) and how it is transmitted (83.4%; 95% CI 78.8%-85.7%; 76% female vs 34 % male; p=0.01). At post-test, the percentage of those who assessed that the health effects of infection can be severe increased to 64.8% (95% CI 58.5%-70.7%), and there was an increase in the percentage of those who affirmed that sexual intercourse is the main way of HPV transmission (89.1%; CI 84.6% -93.7%), with no differences by gender. Furthermore, 14.7% of the sample reported to be 'aware of the risk of being infected by HPV' alone (95% CI 10.9% -19.2%), though when stratified by gender, this perception of risk was much higher in women (90.7% female vs 49.3% male; p=0.01) and confirmed in the post tests (19.2% ; 95% CI 14.69% -24.9%; 79.1% female vs 32.9 % male; p=0.01).

Regarding knowledge of HPV vaccination, 71.1% (95% CI 64.9%-77.4%) of students in the pre tests and 83.9% (95% CI 75.6%-87.8%) of students in the post tests knew that the HPV vaccine is aimed at preventing cervical cancer and, once again, girls were more aware (72.4%) than boys (47.8%) (p= 0.01).

Most students who knew about HPV learned about it in the family setting (40%; 95% CI 33.2%-47.1%), in school classes (21.5%; 95% CI 16%-27.7%), from friends (19%; 95% CI 13.9%-25.1%) and from their doctor (17.1%; 95% CI 13.2%-2.1%). Girls were more likely to have known about HPV from their mothers, friends and doctor; no men knew about HPV from these sources, but only through public media (internet, tv, ecc…19%; 95% CI 12.7%-24.2%). The students said that they needed more information about HPV vaccination (86.5%, 95% CI 81.9% -90.3%), and this attitude was more evident in girls (75.2%, p= 0.01). More than half (54.6%, 95% CI 49% -60.1%) expressed that they would like more information through interviews with experts, and this was particularly affirmed by the girls (69.4%, p= 0.05). We also found youth that did not consider it necessary to have more information per se (13.5%, 95% CI 9.7% -18.1%), because not interested in the topic. At T1, more than half of students (52.6%, 95% CI 48.4% -60.6%) thought that the HPV vaccine also protects against other sexually transmitted infections, and this conviction was more common among women (33.7 %, p=0.01). At T2 this percentage decreased to 32.9% (67.9%, 95% CI

TABLE 2

MAIN DIFFERENCES IN THE KNOWLEDGE OF AND ATTITUDE TO HPV INFECTION AND HPV VACCINATION BETWEEN EXPERIMENTAL GROUP AND COMPARISON GROUP AT T1(BASELINE) AND AT T2 (FOLLOW-UP)

| | Intervention group (323) | | Comparison group (577) | | *p |
|---|---|---|---|---|---|
| | T1 (%) | T2 (%) | T1 (%) | T1 (%) | |
| **Knowledges of HPV infection and vaccination** | | | | | |
| Have you ever heard about HPV? (Yes) | 64.6 | 84.4 | 72.6 | 73.9 | 0.02 |
| Do you think that HPV could be dangerous? (Yes) | 54.7 | 64.8 | 64.5 | 63.8 | NS |
| How is HPV infection transmitted? (Sexually) | 83.4 | 89.1 | 80.3 | 81.6 | 0.02 |
| Do you think HPV infection might concern you? | 14.7 | 19.2 | 20.1 | 19.9 | 0.05 |
| Have you ever heard of HPV vaccination? (Yes) | 71.1 | 89.3 | 72.2 | 73.7 | 0.001 |
| Which is the main aim of HPV vaccination? (Prevention of cervical cancer) | 52.6 | 67.9 | 40.6 | 39.7 | 0.01 |
| When is HPV vaccination recommended? (Before beginning of sexual activity) | 68.1 | 79.2 | 73.3 | 74.6 | 0.02 |
| **Personal attitudes towards HPV vaccination (Only female)** | (225=70.8%) | | (374=65.7%) | | |
| Have you been vaccinated? (Yes) | 14.1 | 17.5 | 11.9 | 12.1 | 0.03 |
| Do you want to have HPV vaccination? (Yes) | 41.6 | 59.7 | 40.1 | 40.5 | 0.001 |
| If you wanted to have HPV vaccination, what would be your reason? (Prevention of CCU) | 38.6 | 66.6 | 35.4 | 36.7 | 0.03 |

** Significant differences in knowledge, attitude and behaviour between intervention and comparison group (p)*
*NS non significant*

63.4%-70.8%), though boys appeared to be less informed (22.9% , p= 0.01).

In the pre-test, 14.1% of females said they had been vaccinated, and 71.8% of them belonged to the group of girls who had not yet had sexual intercourse. The educational intervention improved the practice of vaccination and , in fact, changed the proportion of those vaccinated from 14.1% to 17.5%.

Significant associations emerged with high/medium level of maternal education (84.6%, p=0.05) and with having one sister aged 10-16 years (36.1%, p= 0.01).

There were also significant associations between their knowledge on HPV infection (YES 92.3% vs NO 7.7%; p=0.01) and between HPV vaccination and gender (75% of female and 63% of male students knew that the HPV vaccine is aimed at preventing cervical cancer; p=0.01).

About 70% of female students in the pre-test and 82.3% in the post-test knew that the HPV vaccine should be administered before the onset of sexual activity, and this percentage decreased to 55.6% of male students in pre-test and 64.6 % in the post-test, with significant differences by gender (p=0.01).

At T1, among the reasons expressed by those who were not vaccinated were the fear of side-effects (10.5%, 95% CI 7.5% -14.5%) and lack of knowledge about the purposes of HPV vaccination (9%, 95% CI 6.2% -12.7%). At T2, after educational intervention, these percentages decreased (respectively 8%, 95% CI 5.2% -11.7% and 7.7%, 95% CI 5.1% -11.3%).

The percentage of girls who wanted to be vaccinated against HPV was 41.6% (95% CI 34.7% -48.7%) at T1 and 59.7% (95% CI 52 , 6% -64.6%) at T2.

The prevention of CCU represented the most important factor in the decision to be vaccinated (pre-test 38.6%, 95% CI 33.3% -44.1%; post-test 66.6%, 95% CI 60.6% -71.2%). Therefore, it was also considered important that the information regarding the prevention of HPV infection should be given in the age range 10-13; these remarks showed differing percentages between pre and post test (respectively 39.7%, 95% CI 34.1% -45.4% and 43.9%, 95% CI 37.5% -50.3%) and were statistically different by gender (43.8% female vs. 29.8 % male, p= 0.05).

The results of the analysis of the group (experimental and control) differences between pre-and post-test at T1 and a T2, in relation to knowledge, behaviours and attitudes of students are shown in Table 2.

TABLE 3

ASSOCIATIONS BETWEEN SELECTED SOCIO-DEMOGRAPHIC FACTORS, PERSONAL BELIEFS AND ATTITUDES OF STUDENTS TO VACCINATING THEMSELVES AGAINST HPV^

| Independent variables | OR (95% CI) |
|---|---|
| **Educational level of mother** | |
| Mother high/medium level | 3.7 (1.9-7.1) * |
| Mother low level (reference group) | 1 |
| **Student's religion** | |
| Other | 0.6 (0.4-0.9)* |
| Catholicism (reference group) | 1 |
| **The gender and age of the siblings (at least one sister aged between 10-16 years)** | |
| Yes | 1.6 (1.4-1.9) * |
| No (reference group) | 1 |
| **The propensity to vaccinations in general** | |
| Yes | 13.1 (9.7-17.8)* |
| No (reference group) | 1 |
| **Knows that HPV vaccine is aimed at preventing cervical cancer** | |
| Yes | 3.3 (2.6-4.1) |
| No (reference group) | 1 |
| **Thinks that HPV might concern you?** | |
| Gender | |
| Female | |
| Yes | 2.8 (1.6-3.9) |
| No (reference group) | 1 |
| Male | |
| Yes | 3.2 (2.6-4.1) |
| No (reference group) | 1 |

** p < 0.05*
*CI, Confidence Interval; OR = Odds Ratio.*
*^ ORs from multivariate logistic regression models, adjusted for gender and religion of the student, education of the parents and presence, age and gender of their brothers and / or sisters*

Table 3, instead, shows the results of the logistic regression analysis. The educational level of parents, religion of the students, and having a sister were associated with a major propensity to HPV vaccination. We also found significant associations between the educational level of the mother and wanting to be vaccinated against HPV (high/medium level of maternal education 84.6%; OR = 3.7; 95% CI;1.9-7.1; p= 0.05).

The students professing a religion other than Catholicism or atheists were less in favour

of HPV vaccination (OR = 0.6, 95% CI 0.4-0.9; p=0.05 compared with Catholics). Significant associations with the propensity to have the HPV vaccine were seen with gender of the siblings (36.1 %; OR = 1.6, 95% CI 1.4-1.9; p= 0.05, at least one sister aged between 10-16 years), the propensity towards vaccinations in general (OR = 13.1, 95% CI 9.7-17.8, p= 0.05), and the knowledge that HPV vaccine is aimed at preventing cervical cancer (OR = 3.3, 95% CI 2.6-4.1; p= 0.05).

The students who were aware that HPV infection could affect them personally were more in favour of HPV vaccination, regardless of whether they were male (OR=3.2; 95% CI; 2.6-4.1; p= 0.05) or female (OR=2.8; 95% CI; 1.6-3.9; p=0.05).

### Control Group

In the control group no substantial differences relative to knowledge between T1 and T2 were registered.

72.6% students included in the control group claimed to know about HPV (95% CI; 67.8%-77.9%) when sampled at T1, and a similar percentage was evidenced at T2 (73.9%; 95% CI; 65.9%-82.1%).

80 .3% of the students in the pre-test and 81 .6% in the post-test identified sexual intercourse as the main way that HPV is transmitted. Regarding the question on risk perception at T1, 79.9% (95% CI; 74.6%-84.8%) of respondents answered that they did not consider themselves at risk of HPV infection. At T2, there was a similar situation with 80.1% of students not considering themselves to be at risk (95% CI; 73.2%-87.4%). Almost half of the students of the control group knew that HPV can cause cervical cancer (48.6% vs. 49.2% pre-test). In total, 11 .9% of students in the pre- and 12.1 in the post-tests, claimed to have been vaccinated.

## Sexual behaviours

### Experimental Group

34.4% (95%, CI, 28.9-40.3) of these students affirmed having had a sexual relationship (41.4% female v's 18.5% male) and 31.0% (95%, CI 25.9%-36,7%) reported having sexual activity and were classified as sexually experienced. In all, 68.9% (95% CI 63.3%-74.1%) of students denied current sexual activity and were classified as sexually inexperienced. More men (73.3%) than women (26.7%) reported having had sexual intercourse (p=0.05). Students who were sexually experienced (93.3%) were more knowledgeable about HPV than sexually inexperienced (84%) students (p=0.01). Knowledge of HPV infection was better among women (80.8%) than men (19.2%), p=0.01). Among sexually experienced students, 39% (95% CI; 29%-49%) perceived themselves to be at risk. Among the sexually inexperienced, 9% (95% CI; 5%,-12%) perceived themselves to be at risk of contracting HPV infection.

The mean age of the first sexual intercourse was 14.9±1.02 years, with statistically significant differences by gender (male 14.6±1 years v's female 15.1±1.03 years; p=0.05).

Most of the sexually active students said that they had had just one partner (67.9%, CI 56.8%-77.6%), 16.7% had two and 9.5% more than three. In the pre test, males affirmed that they had had more than three partners (83.3%) whilst females, instead, only one partner (43.8%). Even in this case, there was a statistically significant difference between gender (p=0.05). Around 66.7% (95% CI; 57.7%-75.9%) used contraceptives, mainly condoms (97.5%; 95% CI; 91.4%-97.5%).

67.9% (95% CI 62.5% -73%) usually spoke of issues concerning their sexuality with friends while

TABLE 4

ASSOCIATION BETWEEN SEXUAL BEHAVIOURS AND ATTITUDES OF STUDENTS (FEMALE) TO BEING VACCINATED AGAINST HPV^

| Independent variables | OR (95% CI) |
|---|---|
| Has a boyfriend/girlfriend? | |
| Yes | 0.3 (0.1-0.6) * |
| No (reference group) | 1 |
| Has had sexual intercourse? | |
| Yes | 0.7 (0.4-0.9)* |
| No (reference group) | 1 |
| How many persons have you had sexual intercourse with? | |
| 1 partner (reference group) | 1 |
| 2 partner | 1.7 (0.7-3.8)* |
| ≥ 3 partner | 2.4 (1.1-4.9)* |
| Do you use condom? | |
| Yes | 0.5 (0.3-0.6) * |
| No (reference group) | 1 |

** p < 0.05*
*CI, Confidence Interval; OR = Odds Ratio.*
*^ ORs from multivariate logistic regression models, adjusted for gender, mean age of the first sexual intercourse, to have two o more partners, using condoms*

almost half the sample never spoke with their parents, or spoke to them only if the argument was introduced by the parents in 36.5% of cases (95% CI 30.8% -42.5%) or if there were specific problems in 14.2% of cases (95% CI 10.3% -18.9%).

The female students who declared they had a boyfriend (OR=0.3, 95% CI 0.1-0.6; p=0.05), and were having sexual intercourse (OR=0.7, 95% CI 0.4-0.9; p=0.05) were less in favour of HPV vaccination, whereas these factors were not associated with the propensity to undergo vaccination among male students. Instead, girls who had had 3 partners (9.8%, OR = 2.4; 95% CI 1.1-4.9; p=0.05) were more likely to accept HPV vaccination, while women who reported not using condoms (36.9%, OR = 0.5; 95% CI 0.3-0.6; p=0.05) were more likely to not accept HPV vaccination (Table 4).

## Discussion

This study of an upper-middle class population in a small area of Central Italy (Cassino-FR) found that teenagers still have a significant knowledge gap in reference to HPV infection and its prevention by means of vaccination, as evidenced in the experimental group at T1, and in the control group both at T1and T2. In particular, they seemed to underestimate the likelihood of HPV infection and were therefore less likely to view HPV vaccination favourably. This is an important indication for future HPV training programmes designed to increase the acceptance of HPV vaccination.

Among our adolescent population, appropriately comparable by gender, 73.6% of females and 43% of the males did not know HPV, and 72.4% of the former and 47.8% of the latter knew about the aim and mode of HPV vaccination (25). These findings are in accordance with those obtained in similar national and international studies (26, 27). Furthermore, the proportion of women who were aware that HPV vaccination was aimed at preventing cervical cancer was low, as was also seen in others studies (28, 29). Our findings indicated that only 45% of female teenagers perceived themselves at risk of HPV infection and this might be explained by a lack of awareness of the high prevalence of HPV infection, as has been previously found in other studies (28, 30, 31, 32). Furthermore, in addition to having less knowledge of HPV, a large proportion of male students thought that it did not concern them. This is maybe not surprising as HPV infection and vaccination has almost exclusively been publicized in relation to, and targeted at, the prevention of cervical cancer, and it is still being discussed whether males should also be vaccinated (33).

Although knowledge does not represent a certain predictor of behaviour change in health care, it is, however, an essential prerequisite and is crucial to the identification of the age group most in need of information (26).

Those girls that reported never or rarely to use condoms would submit to vaccination against HPV. Paradoxically it appears as though the girls that showed more propensity to HPV vaccination would benefit less from vaccination. In fact, in the light of the evidence available about the HPV vaccine, they may already had been infected by HPV through higher risk sexual behaviours.

The main factors associated with the students' propensity to accept HPV vaccination were: 1) having at least one sister; 2) being in favour of vaccinations in general; 3) knowing that the vaccine is aimed at preventing cervical cancer; and 4) being aware that they themselves could be infected by HPV (this association was particularly strong). As found by other studies, there was also a positive association between the perceived likelihood of HPV infection and the propensity of both male and female students to undergo vaccination (34). This supports the view that the first target for the success of a HPV vaccination campaign should be to increase adolescents' awareness of and knowledge about this topic, particularly underlining the frequency of HPV. In addition to their awareness of possible HPV infection, a few other factors were also associated with the propensity of students to undergo vaccination. In particular, having a boyfriend or having already had sexual intercourse (35) were associated with a decreased propensity among female students, possibly because of the high proportion who knew that the vaccination should be given before the onset of sexual activity. However, this highlights the need for a training programme focused on the epidemiology of HPV infection in different age groups and the risk factors associated with acquiring it, in order to show that vaccination can also be useful even after the beginning of sexual activity, provided that the infection has not already been acquired (30, 31).

From the overall analysis of the data, it seems to emerge that the intervention produced some positive effects: the experimental group (and only that) changed their perception of causality relating to health. At the end of the intervention, more than before, the protection of health was

more closely linked to their behaviours, lifestyles, and their own choices. This finding was related to the specific objectives of the peer education intervention, and was evaluated and compared to the expected changes after intervention .

The limitations of this study include the randomized controlled trial and the representativeness of the sample in terms of external validity of the study. In fact, the randomized controlled trial can yield biased results if it lacks methodological rigour (18). Recruitment was limited to a single province, and to a convenience sample of schools, consisting of mainly an upper-middle class population. Though the number of respondents to the survey was satisfactorily high, and the study schools that participated had principals and teachers who were interested in HPV and health promotion, we cannot exclude a selection bias due to the different socio-demographic characteristics of those schools that participated respect to those that did not join the project.

Our findings underline that the peer education approach was well accepted by students, and this may facilitate the adoption of similar projects in the future.

The results discussed in this study are based on short-term assessment. Therefore, future research should also include a long-term evaluation of the programme to see whether the results persist, decrease or increase over time. In fact, maintenance of these effects over time is important. Therefore, an assessment of this is further needed and how this can be accomplished, for instance, by using booster sessions.

On the contrary, the major strengths of the study are its large size, the availability of information to students, and the inclusion of both male and female subjects (39).

## Conclusions

Our data highlight that a better understanding of HPV infection and the possibility of preventing cervical cancer through HPV vaccination, can increase the acceptance of vaccination by youth.

In conclusion, both the HPV test and HPV vaccine need effective communication and monitoring in terms of the spread of knowledge, especially among women identified as most in need of information and included in the age group at risk, where it appears to be crucial to encourage informed choices (30). This underlines the need to plan adequate educational programmes.

The topic of peer education is currently of considerable relevance, especially as applied to young people's risk–behaviours.

The results of this survey, and others carried out in our country, confirm the urgent need for access to evidence-based clear and complete communication, aimed at the entire target population, particularly at young women, and divulgated by health professionals appropriately updated. As already seen from several years various studies of peer education, there have been substantial changes in knowledge gains and attitude amongst peer educators and those reached by the intervention (34, 35, 36). It is important to realize that the trainer's role is to give information, and let young people make their own decisions.

When choosing the communication channels for sexual behavioural-change messages, it is important to know which ones can most effectively reach the target population and which channel is most suited for achieving the most successful targeted interventions by peer educators.

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