

Boosting HPV Vaccination Rates: Study Protocol for a Randomized Controlled Trial of Awareness Interventions in Reunion Island

Julie Duclaud, Antoine Bertolotti, Emmanuel Chirpaz, Jessica Sambourg, Kevin Diallo, Phuong Lien Tran, Vincent Balaya

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Abstract

Background: Human papillomavirus (HPV) is the most common sexually transmitted infection worldwide. In 2019, HPV was responsible for approximately 620,000 cases of cancer in women and 70,000 in men. HPV vaccination is highly effective against genital warts and cancers. However, only 14,1 % of girls et 1,2 % of boys under 16 years old are fully vaccinated in Reunion Island.

Objective: The main objective was to assess the impact of two awareness-raising strategies to increase HPV vaccination rate among middle school students by involving them directly in the process.

Methods: This protocol reports the design of a randomized, open-label, controlled trial which aims to evaluate the effectiveness of two awareness-raising interventions: peer learning and card escape game, in improving HPV vaccination rate among middle school students in Reunion Island. This study will span an entire school year, starting in August. Approximately, 3600 students from twenty-four middle-schools in Reunion Island will be included, with schools randomized in three groups of eight middle-schools each (a/ escape game vs b/ ambassafor classes with peer learning vs c/ control with existing national vaccination campaign initiated by the national French public health institute). Different awareness tools will be implemented during class facilitated by science teachers from randomly selected colleges. The primary outcome will be the proportion of teenagers who initiate vaccination process, compared across the three groups using appropriate statistical methods. Teenagers' knowledge of HPV will be assessed both before and three months after each intervention. Satisfaction will also be evaluated after intervention for each group.

Results: We expect to have higher vaccination rates among intervention groups as compared to control group, though it is difficult to anticipate which intervention strategy will be more efficient.

Conclusions: This study aims to improve HPV vaccination rate among teenagers in Reunion Island and will evaluate the impact of two awareness-raising strategies with innovative and engaging tools. If successful, the approach could be adapted and implemented in other regions of France or internationally.

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Original Manuscript

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Keywords: Human papillomavirus; HPV vaccine; Primary prevention; Teenagers; Middle School; Escape Game; Peer Learning; Randomized controlled trial; Reunion Island.

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1. Introduction

Background and rationale

Human papillomavirus (HPV) is a sexually transmitted infection that affects more than one in five people worldwide [1]. With 31% of men carrying HPV, including 21% with high-risk HPV- [2], and 32.1% for women in 2011- [3] it is estimated that 80% of women and men will be exposed to these viruses during their lifetime. HPV has a tropism for skin and mucous membrane epithelial cells.

The World Health Organization estimates that around 625,600 women and 69,400 men develop cancer linked to HPV infection worldwide. The most frequent cancer is cervical cancer (CC), with 660,000 new cases and nearly 350,000 deaths in 2022. In France, over 6,400 cancers are caused each year by HPV, with HPV 16 and 18 responsible for 70 to 80% of invasive CC. In Reunion Island CC is the third most frequent cancer in women.

Prevention of cervical cancer is mainly based on screening through pap smear tests and HPV vaccination, which has demonstrated effectiveness in decreasing the prevalence of HPV and the incidence of condylomas or intermediate-grade dysplasia. Currently, there is no specific treatment for HPV infection. Condylomas, benign external genital warts caused by certain types of HPV, primarily transmitted at the onset of sexual activity, affect men and women equally. Each year in France, these HPV cause genital warts in around 100,000 people [4]. The prevalence has been increasing over the last decades, with rates ranging from 0.1 to 5% in general population in France [5]. Even if treatments exist, recurrences are common (around 30%) [6].

Since 2006, two types of vaccines preventing HPV infection have been available, for young girls aged 11 to 14 years. Since 2019, the French Academy of Medicine has recommended extending HPV vaccination to adolescent boys, as it has been done in several countries. HPV infections are responsible for other types of cancers such as vulvar, vaginal, penile, anal canal and ENT sphere cancers.

An Australian study showed a significant reduction in pre-cancerous cervical lesions in women vaccinated five years earlier [7], supporting the possibility of cervical cancer eradication. By 2028, Australia may see fewer than four new cases of cervical cancer per 100,000 women, with the age-standardized death rate falling to 1 per 100,000 women by 2034- [8]. In the United States, the detection of high-grade CIN2+ lesions decreased by 14.4% on average per year between 2007 and 2014 among girls aged 15 to 19 [9].

In 2023, in France, 45% of girls were vaccinated by age 16 while only 16% of boys of the same age were vaccinated. These rates remain insufficient in France. In Reunion Island, only 12,7% of children aged under 16 received one dose in 2022 [10]. Following the launch of HPV vaccination campaign by the French government in 2023, a slight increase in vaccination rates was observed: 16% of boys and 27% of girls had received at least one dose of the vaccine (Unpublished data, cited by ARS Réunion, June 2024). In 2022, a team in Reunion Island showed that lack of information (from parents and health practitioners) about HPV was one of the contributing factors to this low vaccination rate as well as fear of adverse events [11]. The marketing of these vaccines was accompanied by increased pharmacovigilance, with over 175 million doses administered worldwide [12], including more than 5.5 million doses in France. Serious adverse events initially reported as

potential concerns were thoroughly investigated and ultimately not confirmed [13].

Literature shows that high vaccination levels are achieved in countries that vaccinate in schools. A review of the literature conducted in November 2017 identified sixteen studies on school-based HPV vaccination interventions for girls aged 11 to 19. These studies showed vaccination coverage exceeding 80% in countries like Australia, the United Kingdom, Belgium and Portugal [14]. In Australia, school-based vaccination programs have been in place for years and are considered essential. According to numerous publications, school-based vaccination provides access to many adolescents, helps reduce health inequalities, facilitates communication with parents, and is practical, accessible and benefits from support and supported by peer-led information sharing.

An intervention study carried out in Niger in 2018 involving over 1000 students, showed that peer-led HPV education significantly improved knowledge, with knowledge scores increasing 12.94 ± 9.23 to 53.74 ± 10.69 ($p < 0.0001$) [15]. Peer learning is an interesting teaching method. Already in 1993, in Australia, a review of the literature reported the potential benefits of the peer learning process in clinical training in adults, reporting social and academic gains already reported in children and positive studies in nursing literature [16]. Another review of more recent literature demonstrates the benefits of this learning during practical internships in the health field [17]. It includes 47 articles from 8 different countries and evaluates different methods for this learning. It appears to reduce stress, increase self-confidence and improve skills. A review of English articles published between 2001 and 2010 in nursing training also demonstrates that not only ambassador group but also group receiving information from ambassador group, learned and benefited from the interaction [18].

New educational methods have emerged in recent years, such as escape games. Introduced to the health sector in 2017, it is still early to fully assess their impact. For example, in the French Antilles, escape games have been used to fight against smoking and alcohol consumption (unpublished data provided by the company Tricky®). The Paris Committee, in collaboration with The French League Against Cancer developed a card-based escape game focused on smoking cessation. A literature review in 2019 identified methods of designing and implementing escape games in professional medical or academic settings [19]. Few articles were included, with most studies assessing participants' perception rather than providing significant data on knowledge improvement. New studies are expected to address these gaps.

Our study aims to evaluate the effectiveness of two awareness-raising interventions: peer learning and an escape game, in improving HPV vaccination rate among middle school students in Reunion Island.

2. Methods

2.1 Trial design

This is a randomized, controlled, open-label intervention study based on two awareness strategies for HPV vaccination in Reunion Island. Six months prior to randomization, the research team will develop an escape game based on cards. Regular meetings, approximately every three weeks, will help to define the main objectives of the game.

Three months will be dedicated for manufacturing the supports by the service company. Afterward, colleges (selected from lists provided by the local education authority in March- April) will be randomly divided into three groups:

(1) The reference arm, without any intervention; they will only follow the campaign vaccination set up by the government;

(2) The second group, which will receive specific education related to HPV vaccine to form an ambassador class;

(3) The third group in which the escape game in cards will be distributed.

Interventions will only be performed in 7th grade classes for children around 12 years old. One or two referent teachers for each college will be selected to assist the interventions. All participants will complete an HPV baseline knowledge questionnaire before and few months after intervention. After the trial, the team will collect rate of vaccination uptake, with **initiation of the vaccination schedule (at least one dose)** considered sufficient for assessment (since World Health Organization concludes that single-dose HPV vaccine might deliver solid protection) [20].

2.2 Study objectives

The primary objective is to evaluate the impact of two awareness-raising measures against human papillomavirus by involving middle school students to increase vaccination rate. Through this study, we aim to compare the proportion of students who initiated vaccination before and after the interventions. In addition, we will evaluate motivations and challenges encountered in both escape games and ambassador classes, as well as overall student satisfaction and knowledge (*Appendix 1: knowledge quiz and Appendix 2-3: satisfaction quiz*).

2.3 Settings

This study is scheduled to start in August – September (beginning of school year) and is expected to last for approximatively one school year, concluding in July. (*Figure 1: participant timeline*). The research team will plan a randomization to allocate seven colleges per arm.

2.4 Ethic approval and consent to participate statement

Subjects of this study are minors. This intervention study does not involve vaccinating children but focuses on raising awareness about HPV. The research team will inform the parents through an information leaflet distributed in June and August. Any parental objections will be fully respected.

2.5 Patient and public involvement

Following the distribution of information leaflets to parents and students, and obtaining the consent of school directors, randomization of the schools will take place. The research team, along with teachers, will check for any potential objections and ensure that students whose parents object do not participate in the interventions. Parents may withdraw their child from the study at any time by simple request. Participants will have the right to receive information relating to the study, and particularly the results.

2.6 Sample size

This is a cluster randomized controlled trial with 3 parallel arms, designed to evaluate the effectiveness of two awareness programs addressing the risks associated with HPV and its prevention, in 7th grade classes in Reunion colleges. The reference arm is a no-intervention group. The allocation ratio is 1:1:1. The primary outcome is the proportion of children who initiated the HPV vaccination schedule. The WHO Strategic Advisory Group of Experts recently assessed evidence suggesting that a one-dose vaccination schedule provides comparable effectiveness to the traditional two-dose schedule.

The research team may include up to one additional ambassador class in arm 2 if a college has more than five 7th grade classes, to facilitate the dissemination of information.

To calculate the number of subjects required, the following assumptions are considered:

- The hypothesis that at the end of the school year, 30% of children in the control group will have initiated their vaccination – based on vaccination coverage data published by Santé Publique France in 2023 (21.5% of children (girls and boys combined) aged 12 in Reunion had received at least one dose of HPV vaccine by December 31, 2023 - [21].
- A constant intra-cluster correlation coefficient (CCI) with a value of 0.1 (rather conservative value - [22].
- An alpha risk of 5%
- 90% power
- The average number of 7th grade students (n) is 190 per college
- A design effect (allowing intra-class correlation to be taken into account) of 19.9 (calculated as $1 + \text{CCI} \times (n - 1)$).

In total therefore, the number of colleges to be included is 8 colleges per arm, making a total of 24 colleges and approximately 3,144 students.

2.7 Recruitment

Our sample will include *7th grade* middle school students from randomly selected schools Reunion Island, following the agreement of the school directors. These colleges will be randomly assigned to one of the three groups in a 1:1:1 ratio using a randomization algorithm. All students attending the selected colleges will be invited to participate in the study. (*Figure 2*)

2.8 Eligibility criteria

In this study inclusion criteria will be:

- students in 7th grade class from middle schools in Reunion Island that will be randomly assigned for the study.

Exclusion criteria will be:

- students with parental opposition to participate.

2.9 Intervention

2.9.1 Control group

The control group will consist of eight randomly assigned middle schools. These schools will follow the existing vaccination campaign (without any modifications) already implemented by the French government. Parents are distributed information tools with consents through their children. Both parents are invited to sign the written consent form, and the child is to submit it to the school counselor or the school nurse, who then forward it to the vaccination teams assigned to their area. The vaccination teams are thus able to organize, in coordination with the education team, their visit to the school on a specific day, bringing the number of vaccine doses corresponding to the number of consent forms received. Vaccination teams usually come to a school twice a year (two vaccine doses six months apart).

A pre-intervention questionnaire will be administered to assess the students' baseline knowledge about HPV (T0). This questionnaire will be standardized, anonymous, and identical for all participants. Questionnaire will be available on tablets, computers or on paper according to availability. A post-intervention knowledge assessment will be conducted three months later using a questionnaire identical to the pre-intervention one, to evaluate changes in the rate of correct responses before and after the intervention (T1).

The standardized knowledge questionnaire was developed by the research team and will assess knowledge about HPV epidemiology, complications, and prevention (including vaccination) (Appendix). Each question will require children to respond with “Yes,” “No,” or “I don’t know.” The questionnaire will consist of **11 questions**. (Appendix 1).

Recovery of vaccination status will be done with the help of the French security social system after anonymization of social security numbers (T3).

2.9.2 Intervention group: Ambassador class (peer learning)

A 7th grade class will be drawn at random to be designated ambassador class for each college randomized in this arm. If, however, there are more than five 7th grade classes per college, two ambassador classes will be planned (*Figure 2*). The children of the ambassador class will receive an intervention during one class hour.

This group will receive a 30-minute presentation on human papillomavirus (HPV) delivered by a trained facilitator during class. The presentation will be standardized and consistent across all participating classes to minimize potential bias. It will be developed in advance by a team of experts and will remain identical for all classes within this intervention arm. The presentation will cover key topics, including the human papillomavirus, its epidemiology in France and Reunion Island, its benign and malignant sequelae, as well as preventive measures such as screening and vaccination. To ensure the students' comprehension of the material, they will complete a satisfaction questionnaire following the presentation.

The same pre (T0) and post-intervention (T1) questionnaire than in control group assessing knowledge about HPV will be administered.

This protocol, which integrates peer learning, will train "ambassador classes" on HPV prevention. In a second step, these students will subsequently disseminate the information to their peers in other 7th grade classes in their middle school (T2). They will have the autonomy to select the format for delivering the information during class (e.g., games, presentations, films, posters, slideshows, comics, etc.). The students who receive the information from their peers will also complete a satisfaction questionnaire. A field coordinator will be present during the training sessions to ensure that essential information is effectively conveyed and, if necessary, to supplement any important details that may have been overlooked in the student-led presentations.

Recovery of vaccination status will be done with the help of the French security social system after anonymization of social security numbers (T3).

2.9.3 Intervention group: Escape game cards

The intervention for this group will involve a card game modeled after an "unlock" escape game, specifically designed for this study to raise awareness about human papillomavirus (HPV). This game on the theme of HPV and its vaccine will be developed over several weeks by a team of experts. All 7th grade classes of the randomized middle school will participate in this game for one hour of class, thus we will need to ensure that enough card games are available so that each student from randomized classes can play during each session. Middle school students will be supervised by a dedicated facilitator trained in this type of intervention.

Each game session will last no longer than 45 minutes.

The same pre (T0) and post-intervention (T1) questionnaire than in control group assessing knowledge about HPV will be administered.

Moreover, students will be asked to complete a satisfaction questionnaire following the game.

Recovery of vaccination status will be done with the help of the French security social system after anonymization of social security numbers (T3).

2.10 Measures

2.10.1 Primary outcome: Evaluate new tools to improve vaccination

The primary outcome of this study is the proportion of children in each group who will initiate HPV vaccination by the end of the school year.

2.10.2 Secondary outcomes

1-Evaluate the proportion of girls and boys in each group who will initiate HPV vaccination by the

end of the school year

2-Explore and evaluate the motivations and difficulties will be perceived by: the students of the ambassador class and the children participating in the escape games.

3-Evaluate the overall satisfaction of students within each arm for descriptive purposes.

4-Compare the level of knowledge of the students included before and after intervention for each arm.

2.11 Blinding

Due to the nature of the interventions, blinding will not be implemented in this study. None of the participants will be blinded during the trial.

2.12 Data collection, management, and monitoring

Questionnaires of knowledge pre and post-intervention will be identical for all students. (Appendix 1). Satisfaction questionnaires will be adapted to the arm of the trial: ambassador class or escape game to evaluate the specificities of each intervention. (Appendix 2-3).

Recovery of vaccination status will be done with the help of the French security social system after anonymization of social security numbers.

2.13 Statistical analysis

The analyzes will be carried out by biostatistician staff from La Réunion University Hospital, in interaction with the methodologist and the coordinating investigator of the study, according to the statistical analysis plan established before the database freeze, using the SAS (version 9.4, SAS Institute Inc., Cary, NC, USA), Stata (version 16, Stat corp., Tex, USA) or R software.

Qualitative variables will be described in terms of number and percentage. The quantitative variables will be described by mean and standard deviation, or median and range.

The results of the comparative analyzes of the endpoints will be presented according to the intention-to-treat principle, that is to say according to the group allocated by the randomization of the classes, regardless of deviations from the research protocol, and from all students included and followed until the end of the school year.

At the college level, the main deviation from the expected research protocol is non-participation in the intervention allocated by randomization.

At the student level, expected deviations from the protocol include occasional absenteeism during data collection at different periods, permanent departure from college during the academic year, individual refusal to participate, at any point during the study. These factors may result in a loss of statistical power and could impact the generalizability of the findings. Statistical significance will be set at $P < 0.05$ (two-sided).

The results of this study will be published following the CONSORT recommendations extended to cluster randomized trials.

3. Discussion

Expected outcomes

Reunion Island displays one of the lowest vaccination coverage rates among regions in France and Europe. With this study protocol, we aim to achieve a vaccination coverage rate between 30% and 45% among young people in Reunion after one school year. If this study demonstrates the effectiveness of the proposed interventions (ambassador classes and escape games), the expected benefits would be substantial, both locally and nationally. Indeed, other overseas french territories also exhibit relatively low HPV vaccination rates, according to Santé Publique France. This study protocol could be implemented in these other departments. By validating innovative strategies to improve HPV vaccination coverage in middle schools, this research could not only influence national vaccination campaigns but also provide insights for similar initiatives in other medical fields. It could thus play a central role in combating vaccine hesitancy, particularly among younger generations, by informing the population. The study results could also have a positive impact on the involvement of children and families in vaccination campaigns. By reinforcing messages delivered by healthcare professionals and improving communication with the families of participating children, this study could contribute to better acceptance of the HPV vaccine, thereby reducing the incidence of benign, precancerous, and cancerous conditions associated with this virus.

The objective of this study is to achieve 30% vaccination coverage in the control group, as indicated in the rationale for calculating the sample size. Furthermore, we would like to demonstrate that the interventions proposed, such as ambassador classes and the escape game, make it possible to increase this coverage to 45% in the other participating groups.

Comparison with previous work

A recent literature review reveals that high levels of vaccination coverage are achieved in countries that vaccinate in schools. Studies have shown that vaccination coverage exceeds 80% in countries using educational programs like Australia, the UK, Belgium, and Portugal. In Australia, vaccination is essential for accessing many adolescents, reducing inequalities, and promoting information to parents - [23]. In 2020, a team at La Réunion increased vaccination rates after interventions, with 26 girls receiving a complete vaccination schedule compared to three boys [24].

A recent study in two South African educational institutions showed the effectiveness of peer learning, which involves students acquiring knowledge or skills through experience, observation, or education [25]. This method allows students to think collectively on a subject, increasing their sense of critique and understanding. Studies have shown potential benefits of this learning process in clinical training for adults, with positive social and academic gains reported among children. Another recent review found that it reduces stress, increases self-confidence, and improves skills [26] [27]. An intervention study in Niger in 2018 found that both groups understood and benefitted from the interaction between the two groups [28].

In conclusion, vaccination in schools is essential for reducing inequalities and improving health outcomes. Peer learning, or learning by pairs, can be an effective teaching method that can help students understand and apply concepts more effectively.

Escape games, also known as escape games, have been developed as educational tools in recent years. They are immersive games built around a scenario and typically aim to solve puzzles within a predetermined time frame. In the health field, escape games were introduced in 2017 to improve knowledge, increase interest, and motivation, and enhance team cohesion and communication. In the Antilles, escape games were used to fight against tobacco and alcohol use, with the Paris Committee and the Cancer League creating a game using a card game format. The game is currently available in the gaming world, with some games being "unlock" games. A 2019 literature review reviewed the design and execution of escape games in medical and academic settings, finding that few articles were selected, participant perception was evaluated, and data on knowledge improvement was not provided [29].

Limitations of the study

Vaccination coverage is expected to continue increasing between 2023 and 2025, which may influence the number of schools included in each study arm and affect the calculation of the required sample size. This trend could potentially reduce the statistical power of the study.

Due to the nature of the intervention, participants will not be blinded during the trial. However, data collection through questionnaires will be anonymized and conducted at the class level. Vaccination status will be retrieved with the assistance of the social security system, following the anonymization of social security numbers.

Finally, the study's limitations are also related to the school calendar, which could impact the ongoing vaccination campaign and introduce a contamination bias between the study arms.

Strengths of the study

To our best knowledge, this study is the first of its kind in France enhancing the program recently launched by the French government for the 2023 school year by incorporating innovative educational tools, such as the escape game, in comparison to peer learning through ambassador classes. The results of this study, along with the development of these educational programs, could be adapted and applied to other regions in France or even to other countries, for other medical subjects.

In addition, the size of the sample allows us to obtain a better level of confidence.

This study focuses on a major public health issue considering the current epidemiological context. It is important to address this now, given the effectiveness of the vaccine in preventing complications of the papillomavirus. This study will allow us to identify the most beneficial life period in terms for vaccination effectiveness and focus on primary prevention action.

If this study demonstrates effectiveness, the expected benefits will be significant and will provide numerous benefits for public health in the short, medium and long term:

- Validate the best strategies for improving HPV vaccination campaigns in French schools and even internationally.
- Increase HPV vaccination coverage in Reunion Island.
- Optimize vaccination campaigns in schools.
- Promote the involvement of children themselves in the HPV vaccination campaign across all Reunion colleges.
- Enhance and reinforce the messages delivered by healthcare professionals and public communications.
- Raise awareness among families of participating children
- Reduce the incidence of HPV-related benign pathologies such as condyloma, as well as precancerous and cancerous lesions.

Conclusion

In conclusion, this represents the first study protocol designed to enhance HPV vaccination rates among children in Reunion Island using innovative tools, specifically escape games and ambassador-led classes. This multicenter study may offer promising intervention strategies to address HPV vaccine hesitancy, potentially complementing the ongoing HPV vaccination campaign in France.

Acknowledgements

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Conflicts of Interest

No conflicts of interests declared.

Abbreviations

CC Cervical cancer

CIN Cervical intraepithelial neoplasia
ENT Otolaryngological
HPV Human papillomavirus
WHO World Health Organization



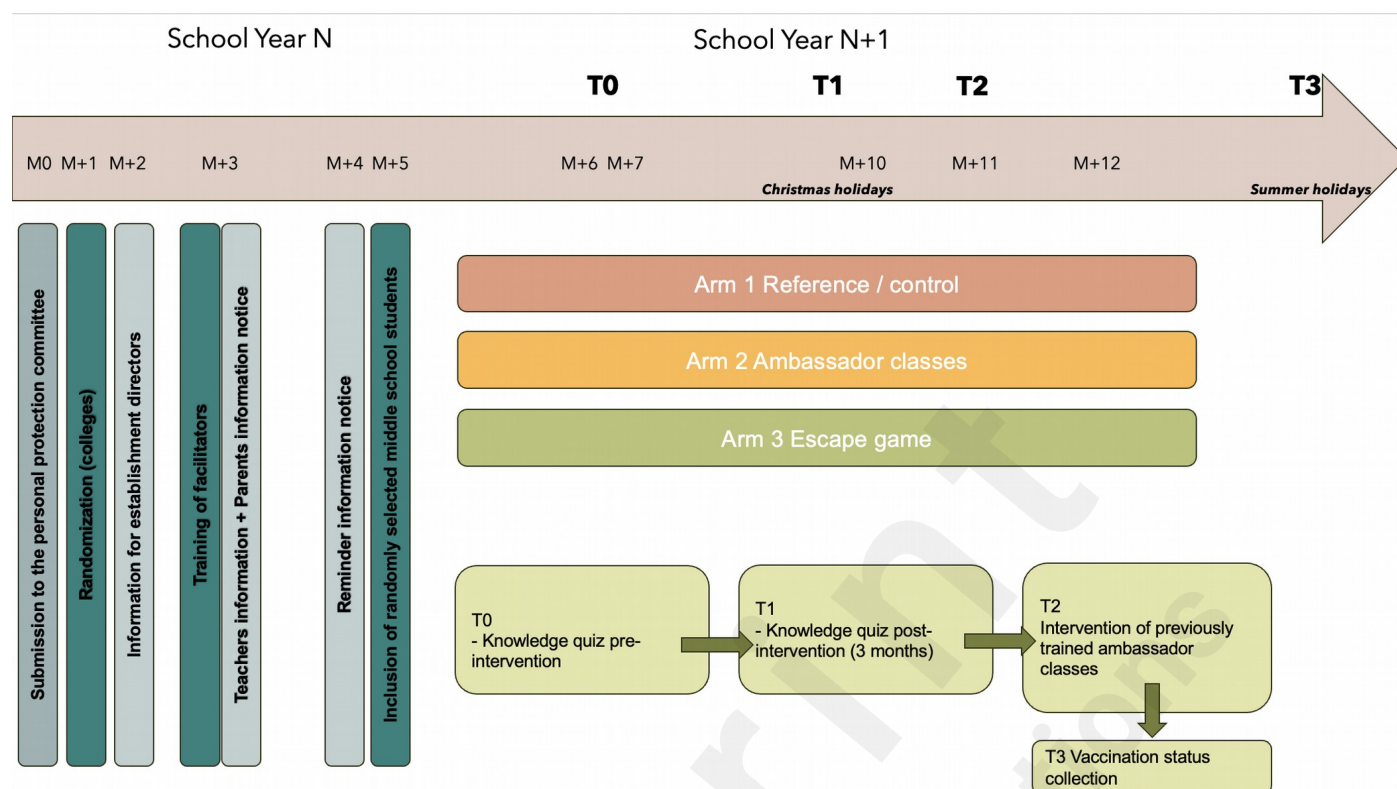


Figure 1 : Participants timeline

T0 : pre-intervention questionnaire

T1 : post intervention questionnaire at 3 months

T2 : only for ambassador classes : information by ambassador classes to their peers in 7th grade class

T3 : collection of vaccination status

Arm 1 Control

Arm 2 Ambassador classes

Arm 3 Escape game

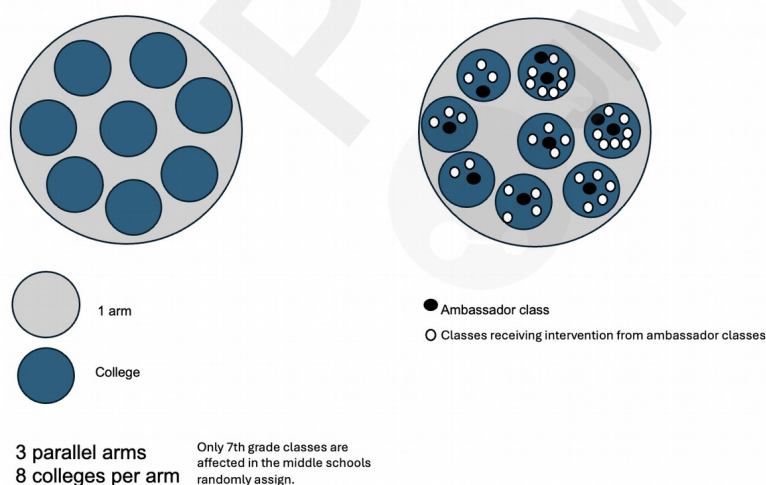


Figure 2: Diagram showing the composition of colleges randomly assigned.

Appendix

Appendix 1: Knowledge quiz (for all arms, to be distributed at the beginning of school year and 3 months after)

HPVax-Game



Class:

Date:

Knowledge quiz	Yes	No	I don't know
Have you ever heard of the papillomavirus?			
If Yes:			
- On the internet-----			
- Magazines -----			
- Social networks -----			
- Vaccination campaign in college -----			
- On the radio -----			
- At the doctor -----			
- Other -----			
Are you vaccinated against papillomavirus?			
- One dose?			
- Two doses?			
Is HPV infection a sexually transmitted infection?			
What diseases are linked to HPV?			
- Cervical cancer?			
- Anal cancer?			
- Throat cancer?			
- Penile cancer?			
- Genital warts?			
- Bladder cancer?			
Who can get an HPV lesion?			
- Only women			
- Only men			
- All sexually active people			
Is a condom enough to protect against HPV?			
Do you usually have no signs or symptoms when you are infected with HPV?			
A vaccine against HPV exists. Who can be vaccinated first?			
- Girls?			
- Boys and girls?			
- Boys?			
At what age is it recommended to get vaccinated?			
- 14 - 17 years old?			
- 22 – 26 years old?			
- 11 – 14 years old?			
Socio-demographic information			
Are you:			
- A boy?			
- A girl?			
Your mother's profession?			
Your father's profession?			
Where do you live?			
Do you plan to get vaccinated in the next 6 months?			

Appendix 2. Satisfaction questionnaire for ambassador classes

Satisfaction questionnaire
Study HPVax-Game

Date of intervention:

College:

Class:

We need your opinion.

Can you position yourself by circling a number going from 0 (very negative) to 10 (the maximum):

1- Did you like the intervention on HPV?

 1 2 3 4 5 6 7 8 9 10

2- Would you recommend this procedure to a friend?

 1 2 3 4 5 6 7 8 9 10

3- Did you like the formatting of the presentation?

 1 2 3 4 5 6 7 8 9 10

4- Did you like the theme covered (Awareness of HPV and its vaccination)?

 1 2 3 4 5 6 7 8 9 10

5- Have you encountered any difficulties in understanding?

 1 2 3 4 5 6 7 8 9 10

6- Do you think you have learned and retained things?

 1 2 3 4 5 6 7 8 9 10

7- Would you like to do another type of game on the theme of HPV?

 1 2 3 4 5 6 7 8 9 10

8- What do you think of the duration of intervention?

 1 2 3 4 5 6 7 8 9 10

9- Had you already heard of HPV before the presentation?

 1 2 3 4 5 6 7 8 9 10

Appendix 3. Satisfaction questionnaire for escape game group

Satisfaction questionnaire Escape Game
Study HPVax-Game

Date of intervention:

College:

Class:

We need your opinion. Can you position yourself by circling a number going from 0 (very negative) to 10 (the maximum):

1-Did you like playing this escape game?

 1 2 3 4 5 6 7 8 9 10

2- Would you like to play it again?

 1 2 3 4 5 6 7 8 9 10

3- Would you recommend playing it to a friend?

 1 2 3 4 5 6 7 8 9 10

4- Did you like the formatting of the game?

 1 2 3 4 5 6 7 8 9 10

5- Did you like the theme covered (Awareness of HPV and its vaccination)?

 1 2 3 4 5 6 7 8 9 10

6- Did you find the game difficult?

 1 2 3 4 5 6 7 8 9 10

7- Do you think you learned things from the game?

 1 2 3 4 5 6 7 8 9 10

8- Would you like to do another type of game on the theme of HPV?

 1 2 3 4 5 6 7 8 9 10

9- Was the time to complete the game sufficient?

 1 2 3 4 5 6 7 8 9 10

10- Had you already heard of HPV before this game?

 1 2 3 4 5 6 7 8 9 10

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Supplementary Files