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How can we improve the acceptability of vaccination against Human Papillomavirus (HPV) in France? An original qualitative study with focus groups comprising parents and school staff, interviewed separately.

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Highlights

- France has one of the lowest HPV vaccination coverage rates in Europe.
- There is no literature concerning school staff's point of view on HPV issues.
- No studies have been conducted since the vaccination was recommended for boys in France.
- Parents and school staff, including school nurses, experience a lack of knowledge about HPV.
- If information is a necessary element to get the capability to get vaccinated, motivation and opportunity are factors cited by parents and school staff.

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ABSTRACT

Background:

It has been proven that vaccination is effective against Human Papillomavirus (HPV) infections, genital warts, and pre-cancerous and cancerous cervical lesions. Nevertheless, the HPV vaccine coverage of 37.4% in 2021 in France is one of the lowest in Europe. To explore and understand the reason why French population is so late compared to its neighbours, we carried out focus groups with mothers and with National Education school staff. We aimed to identify knowledge and perceptions of HPV in both study populations, as well as factors influencing HPV vaccination.

Methods:

Between January 2020 and March 2021, we performed a qualitative study using an inductive approach with a thematic content analysis (TCA). We conducted semi-structured focus groups with 29 people including 15 mothers of adolescents in middle schools and 14 school staff from the national education system.

Results:

Different factors influenced the decision-making process of parents and school staff: knowledge and perceptions of HPV and its vaccine, sources of information about HPV and vaccination. Mothers' discourses differed from those of school staff. They mentioned the importance of gynaecological monitoring and the negative image of pharmaceutical companies, and questioned internet as a reliable source of information. For their part, school staff mentioned cultural and/or religious affiliation, municipalities' role to inform the population, and ethical dilemma or logistical challenges regarding HPV vaccination in schools.

Conclusion:

The results of these focus groups provided information on which elements may harm or help HPV vaccination. Identified perceptions, beliefs, knowledge, barriers, and facilitators will help us to build an intervention program focus on general practitioners (GP), school staff, parents, and adolescents.

Keywords: Human Papillomavirus (HPV); Vaccine Acceptance/Hesitancy; Vaccination; Decision-making

1. Introduction

In 2013, the World Health Organization (WHO) estimated that 270,000 women die each year from cervical cancer and consequently recommended the Human papillomavirus (HPV) vaccination [1]. Cited by the WHO [2], latest research estimated “604 000 new cases and 342 000 deaths in 2020” [3]. Because the vaccine against HPV is effective on 90% of HPV oncogene infections, cervical cancer – as well as oropharyngeal and other anogenital cancers [4–6] – could be prevented by vaccination [7,8].

France’s vaccination uptake is amongst the lowest in Europe [9], with 23.7% of 16 year old girls having a complete vaccination schedule [10] in 2018, and 37.4% in 2021 [11]. In addition, France’s HPV vaccination coverage decreased in 2010 and over the following years, which is unusual [12], but it has been on the rise again since 2015 [13]. The French Ministry for Solidarity and Health in its *2017-2030 Agenda* [14] is hoping for 60% vaccination coverage among adolescents by 2023 and 80% by 2030. HPV vaccine schedule in France consists of two shots for 11 to 14 year-old adolescents or three shots for 15 to 19 year-old adolescents and young adults, with a possibility to get vaccinated for men who have sex with men [15] until 26. Minors need parental consent of both parents or legal guardians to get vaccinated. Vaccination can be made by a physician, a nurse (on medical prescription) or a midwife and can be done at a liberal cabinet, a hospital or at a Free Information, Screening and Diagnostic Center – *Centre Gratuit d'Information, de Dépistage et de Diagnostic* (CeGIDD). Information about HPV and its vaccine is broadcast in school class and can be found at family planning and advisory centre – *centre de planification/planning familial*. In a more general way, vaccine hesitancy in France is a known public health problem, even during worldwide pandemic like COVID-19 [16] and including physicians [17]. Indeed, in almost 3 decades, France has experienced controversies about efficiency and side effects of vaccines like the hepatitis B vaccine and the HPV vaccine [18–20]. Nevertheless, the many and varied reasons for this low rate are not yet clear enough to create effective interventions.

Furthermore, the French National Authority for Health – *Haute Autorité de Santé (HAS)* previously used to only recommend vaccination for 11 to 14 year-old girls, but at the end of 2019 recommended that 11 to 14 year-old boys also be vaccinated [21]. As this decision is quite recent, we need to investigate whether the offer of vaccination for boys is well known by French parents and school staff.

Adolescents, and especially girls, are not always involved in decision-making to get vaccinated against HPV. When they are asked about this, maturity more than age seems to be an important factor in decision-making, however maturity could moderate the (mostly lack of) engagement and information due to physicians talking directly to parents, essentially mothers. [22]. As reported in a 2016 study [23], vaccine hesitancy concerning parents of girls in France is specific since safety and effectiveness of HPV vaccine is not enough to explain this hesitancy : concerns mentioning sexuality, recommendation by physician, information and need for HPV vaccine are complementary parameters to vaccine effectiveness and/or safety. Another study published the same year on a physicians panel showed that one-quarter of them do not frequently recommend the HPV vaccine, mostly due to a lack of information, and some of them even think that children have too many vaccines [20]. Those points illustrate that vaccine hesitancy about HPV in France is strong within the population, but also exists in physicians' minds.

To achieve the goal of 80% vaccination coverage, there is a need to change and improve knowledge, perceptions, beliefs, and behaviour about HPV vaccination. To that end, several theories and models have been developed. Among these, the Theory of Planned Behaviour (TPB) [24] is interested in attitude, subjective norms and perceived behavioural control that lead to intention then behaviour. It can be used in addition to motivational interviewing [25]. Another model is the Information-Motivation-Behavioural Skills (IMB) model [26], which explains AIDS-risk behaviour by “posits that

individuals must be informed, motivated, and behaviourally skilled to initiate and maintain HIV prevention behaviour” [27]. Both have applications on sexual health conducts and particularly HPV [27–31]. Cited by the WHO regional office for Europe pertaining to Tailoring Immunization Programmes [32], the COM-B model [33] tries to comprehend behaviour through capability, motivation (individual level) and opportunity (contextual level). Thanks to these models, we know that behaviour, and particularly health behaviour, can be predicted and modified. In the present study, we will mainly use the COM-B model as theoretical background and prism to interpret our results, since “it takes a comprehensive approach through focusing on a broad range of individual and contextual issues affecting health behaviours [32]” and “help to understand behaviour change or design interventions [34]”.

Studies have investigated knowledge, attitudes, facilitators and barriers surrounding cervical cancer screening and HPV vaccination in France in boys [35], girls [36], or both [37], as well as parents [38,39] and general practitioners (GP) [40]. Nevertheless, those studies are now five to ten years old and do not consider the HAS recommendation on vaccinating boys. In addition, studies on perceptions, beliefs, knowledge, facilitators, and barriers to HPV vaccination among French school staff are missing. Indeed, in high-rate vaccination coverage European countries, vaccination is mainly delivered through school health services [9]. Since France does not use this kind of public health policy with vaccination in schools (except for the COVID-19 vaccination), it is useful to investigate if HPV vaccination would be accepted or not by school staff. On the other hand, it has been shown that parents' attitude and their eventual vaccine hesitancy are important and dynamic factors to get adolescents vaccinated, and they are the ones who make the decision whether or not to vaccinate their minor children [39,41,42].

The purpose of this study was to evaluate knowledge, perceptions, beliefs, facilitators, and barriers to HPV vaccination among school staff from middle schools and parents of adolescents attending these schools as these two populations are highly involved in the decision of HPV vaccination in France. In order to obtain a large amount of information which could lead to a powerful public health plan, we were interested in collecting elements which support or discourage vaccination.

2. Methods

2.1 Study design

This study is part of a larger project named “PrevHPV”, which started in 2019 and involves eight research teams across France (<https://iresp.net/presentation-du-projet-prevhvp>). The project comprises three successive phases: the diagnostic phase, the co-construction phase, and the experimental phase [43]. This study was conducted during the first phase. The focus group method was used to explore the knowledge of the target populations on the issue of HPV and HPV vaccination. We choose a qualitative method because focus groups provide evidence of a range of differences and similarities in the participants' views about perceptions on HPV vaccination [44]. As focus groups allow participants to “generate a wider range of ideas and views than that of interviews [34,45]”, we hope that experiences shared on the basis of the same group belonging lead to have large common ideas. We then aim to classify these elements in each of the COM-B model factors (i.e. capability, motivation, opportunity) to propose recommendations of interventions. Additionally, focus group is useful to stimulate spontaneous ideas among participants and allows for a safe and reassuring space since the groups are based on commonalities (e.g., similar profession, be a parent).

2.2 Recruiting the participants

The administrative regions targeted for the diagnostic phase were the Ile de France, Auvergne-Rhône-Alpes, Grand Est and Pays de Loire, hereafter called the “study area”, where PrevHPV teams were settled. This study area represented a diversity of demographic, geographical and socioeconomic contexts. Furthermore, the study area represents a diversity of HPV vaccine coverage rates [46] : Pays de la Loire (HPV VC among 16-year girls in 2018: 30%), Grand Est (29%), Auvergne-Rhône-Alpes (23%) and Ile-de-France (19%). The rectorates of the study area (public middle-school) and the diocesan management (private middle-school) have been informed of the project. Using data from the Ministry of National Education, more than 60 middle schools were selected in the study area to ensure a balanced distribution of urban/rural areas, public/private schools, and public schools belonging to a high-priority educational network (high level of social deprivation)/others.

We contacted each head of middle school by mail/phone to ask him/her to participate in the study, expecting to recruit 30 to 40 middle schools. Middle schools’s recruitment was on a voluntary basis. Among the middle schools contacted, 27 agreed to participate but due to the evolution of the health context between agreement and the focus groups being carrying out, only 13 actually participated. In each middle school, a PrevHPV representative was appointed with the task of forwarding an email to all parents and school staff. This email contained an information sheet about the PrevHPV project, as well as the procedures to be followed (filling out questionnaires, and the possibility of participating in a focus group). The objective of the parent's questionnaire was to determine the preferences of this population regarding vaccination (based on the discrete choice method). For school staff's questionnaire, the objective was to collect knowledge, perceptions, attitudes, and perceived obstacles related to HPV infections and anti-HPV vaccination. Actually, 301 school staff [47] and 538 parents of middle-schoolers completed the online questionnaire. At the questionnaire’s end, they could register to participate also in a focus group by contacting the study group directly by email to set the dates and times of the focus groups from January 2020 to March 2021. We received emails from thirty-six people who expressed an interest in participating in a focus group, but only 29 people actually participated. Respondents came from the following regions: Pays de la Loire, Auvergne-Rhône-Alpes, and Grand Est.

2.3 Data collection

We planned to create three to six focus groups for each population (with five to eight participants in each). In general, the number of focus group needed to achieve data saturation varied based on factors such as the research question, population, and data analysis techniques used [48]. However, Guest et al. (2017) concluded that a range of three to six focus groups was a commonly used and effective approach for qualitative research. Concerning this study, parents of middle-schoolers and school staff were interviewed separately. We stopped when data saturation was reached for each population, after seven focus groups had been created.

The focus groups followed interview guide, some questions where only for parents and others for school staff (Table 2 in Appendix). The interview guides were developed through an informal consensus among the study group, based on its expertise in qualitative research regarding attitudes toward HPV vaccination and results from the literature. They were composed of open-ended questions exploring participants’ (i) knowledge about HPV and HPV vaccination; (ii) attitudes, preferences, beliefs, perceptions, facilitators and barriers regarding HPV vaccination; (iii) decision-making for vaccination behaviour; and (iv) views regarding the role of school in promoting HPV vaccination. The interview guides has been pre-tested to check that the questions has been properly understood. The

interview guide was pilot-tested only with parents since both populations were being asked questions that were fairly similar. Additionally, both populations were within the same age ranges.

Each focus group was conducted by two members of the study group, a pairing of a psychologist and a sociologist trained in qualitative research interviews (MB, JB and/or CJ). Two researchers were PhD and the third had a HSS master's degree. All researchers were women, they were full-time on the study. They were trained and had experience to interview and to realise focus groups. Furthermore, during two focus groups, two doctoral students were present as observers. The focus groups stopped when the participants had no more comments and therefore depended on the number of participants (between 50 minutes and 2 hours). After obtaining oral consent, all focus groups were audio recorded (no note taking during the interview) and transcribed. All focus group were conducted in French, there were translated to english when we writing up the manuscript. Each focus group participants were offered a €20 gift voucher after the focus group. All participants have a participant code: the two first letters corresponding to the population of mothers (FG) or school staff (GD), the number is the focus group number and the last letter is the participant letter (Table 3 in Appendix).

2.4 Data analysis and interpretation

Data analysis was run using the method of thematic content analysis (TCA). The issue of interaction between participants in a focus group and its impact on thematic analysis was relevant to talk about. The interaction between participants could either facilitated or hindered the identification of themes. The focus group moderator managed the interaction between participants to ensure that all voices were heard and that the discussion stayed on track. By carefully managing the interaction between participants, researchers gained deeper insights into the research topic and identified meaningful themes that emerged from the discussions [45]. Coding the seven transcripts was undertaken by one researcher (MB) without software. The corpora were analyzed first separately and then put into perspective to highlight the similarities and differences in the discourses of these two populations. Three other members of the study group (SB, CJ and AG) double-coded to verify meaning, relevance and reliability. A series of meetings (MB, SB, CJ, and AG) were held to deconstruct the themes of the interview grid based on the data collected. These exchanges made it possible to review, refine and confirm the main themes and subtopics, enabling us to create a final thematic analysis grid.

The participants have not yet had the results of the study. After each focus group, participants had the opportunity to provide us with their comments on the PrevHPV study orally. These comments will not be analyzed as they were mostly expressions of gratitude for conducting the study or requests for information on the topic discussed, which we provided after the focus groups.

3. Results

Four focus groups were created with mothers (n=15) and three were conducted with school staff (n=14) (Table 4 in Appendix). Four of them were held face-to-face in middle schools and three others were conducted as virtual meetings. All parents were mothers; aged 39-50; two were tradespeople, shopkeepers, or company managers, four were managers or had highly intellectual professions, four had intermediate professions and five were employees according to the INSEE nomenclature of professions and socio-professional categories. Regarding the school staff, most participants (11/14) were women; aged 38-62; five were school nurses, four were teachers and five were support staff.

The main themes selected were: (i) Knowledge about human papillomavirus and its vaccine, (ii) Barriers and facilitators of HPV vaccination, (iii) Sources of information about HPV and help with the decision-making process, and (iv) The idea of vaccination in middle schools. A selection of the verbatim was made in order to keep those that were the most meaningful for each code (Table 3 in Appendix).

3.1.1 The perception of human papillomavirus and its vaccine

Mothers and school staff interviewed felt that HPV and the HPV vaccine are a misunderstood topic for them: "*We have the impression that there is a lack of information*" (GD1D). They showed a significant lack of knowledge on the subject which might result in incorrect information. For example, participants saw HPV as a women's issue, only to be discussed between women because they thought that the HPV vaccine was the "cervical cancer vaccine": "*I have the impression that this vaccine is a girl's thing*" (GD3K). This led to a lack of awareness of vaccination for boys. Most respondents were unaware that vaccination was intended for young boys in the same way as for young girls: "*I've never heard of it [HPV vaccination] for boys.*" (FG2I).

However, some of the participants had correct knowledge about HPV and the vaccine. Some participants knew that there was an association between HPV and one or more types of cervical cancer: "*A virus that can cause cancer [...] in both boys and girls*" (GD2E). Only a few participants knew that infections by HPV could lead to condylomas, which are also called genital warts: "*The virus can cause pre-cancerous cells [...] cancers [...] condylomas*" (FG1A). Furthermore, most of the participants surveyed mentioned the existence of the HPV vaccine and the conditions for getting vaccinated at least once: "*The vaccination is recommended between the ages of 11 and 14*" (FG4L).

Some mothers noted the relevance and importance of the Pap smear test to detect possible pre-cancerous cells or genital warts in time: "*HPV infection can stay hidden for years and then we think we are safe, but we aren't, that's why it's important to keep having smears*" (FG1A). They did not accept that women are not informed enough about the reasons for this examination.

3.1.2 Barriers and facilitators of HPV vaccination

Both populations consider that children are too young to receive a sexuality-related vaccine: "*At 11 they are not concerned'. Why now?*" (FG1B). This data suggests that this vaccine should be desexualized because the problem is the sexual nature of virus transmission: "*This vaccine [...] has a lot of meaning for families, i.e. it carries a sexual connotation*" (GD3K).

Another obstacle mentioned is the divergence of discourses between health professionals (physicians, gynaecologists, midwife) in relation to HPV vaccination. Participants report a lack of homogeneity: "*Are all doctors well informed?*" (GD1B); doctors rarely have a unanimous opinion about HPV vaccination:

"If the medical profession is divided, it is difficult to ask the population to adhere." (FG1B), which leads mothers having difficulty in making up their minds about HPV vaccination.

In addition, there are barriers directly related to the vaccine and its components. They were afraid of the potential side effects: *"We are still trying to find out today, as with any vaccine, what the side effects are."* (FG2C), and have real doubts about the effectiveness of the vaccine: *"Do we have enough distance from this vaccine as well?"* (GD1A). These two barriers result from the negative image of vaccination in France: *"[There is a] general reluctance to vaccinate in France."* (GD3N).

A mother also felt that there was a mistrust of pharmaceutical companies, which is a barrier to HPV vaccination: *"It would be more a distrust of other actors such as the pharmaceutical companies that manufacture them [vaccines]"* (FG2G).

School staff mentioned two additional obstacles. The first is religious and/or cultural affiliation, which can hinder discussion of this topic. One example was adolescents with a religious and/or cultural background that forbids premarital sex, who still have sex but hide it to avoid shame: *"We have 17 nationalities in the school, they still have relationships despite everything, but given the significantly large North African community in the school, it is not even worth talking about it because the girl has to be a virgin at the time of marriage"* (GD3M). Sexuality is a real taboo for them; therefore, it is difficult to talk to them about sexually transmitted infections and about vaccination to prevent these infections with school staff.

The second barrier noted by school staff is health professionals' lack of time. Physicians are constantly in a hurry to meet patient demand: *"Doctors 'don't have the time'"*(GD3K), which leads to the perception for patient of not being listened to. In addition, not all professionals take the time to talk about HPV and vaccination because this is rarely the purpose of a consultation.

Both populations mentioned several facilitators for HPV vaccination. The most frequently mentioned was the need for accurate and up-to-date information: *"Please 'don't leave us in the dark'"* (FG4O); *"If we had more knowledge about sexuality prevention in Year 5 and Year 4, we could tackle it."* (GD3N). Herd immunity is an argument for participants to show the importance of HPV vaccination: *"In terms of public health, it only makes sense if we vaccinate the entire population."* (FG3N). Some mentioned vaccination as an act of good citizenship.

They also felt that talking about vaccination policies in other countries could give concrete examples and understanding of different mentalities: *"There is much less fear about vaccinating children, adolescents and adults [in Italy] than in France, where there is a whole other culture around vaccination."* (GD3J). By looking at what happens in countries with a high HPV vaccination coverage, it is easier to accept this vaccination: *"My brother lives in Quebec and in their country it's only logical to get vaccines"* (FG4L).

A minority of participants believed that the HPV vaccine should be made mandatory to achieve better vaccination coverage: *"If it's really something of public interest, you have to send a strong message saying that it's compulsory"* (FG2G).

Other lever to facilitate vaccination was raised by school staff. They believe that there is a need to train GPs and school nurses on HPV and HPV vaccination: *"Should there be compulsory training or seminars to refresh the doctors' skills?"* (GD2I).

3.1.3 Sources of information about HPV and help with the decision-making process

Participants seek information about HPV and vaccination from medical staff, family, close friends, press and media, public authorities, and school staff. Mothers also seek informations on this topic on the internet: *"I have been on sites recommended by my doctor once or twice"* (FG1B). For both populations interviewed the means of obtaining information are diverse: face-to-face, through the press: *"Health magazines talk about it regularly"* (FG2E), and/or through the internet. However, they expressed a need to have more people to talk to about HPV because, for example, mothers are not sure that online information is reliable. All of these factors and the means of obtaining information are in some way involved in making the decision as to whether or not to vaccinate children against HPV.

GPs, gynaecologists and/or paediatricians are the main source of information about the virus and vaccination for all participants: *"It was the doctor who mentioned it"* (GD2F). Some participants expressed a feeling of confidence in their medical professional: *"I trust my doctor"* (FG2F); *"I prefer to follow my doctor's advice than to look on the internet"* (FG4L). They explained that this medical appointment very often led to discussions with their spouse, family, colleagues, and friends: *"I asked some friends if they had done it for their daughters."* (FG3M). However, as mentioned before, participants sensed a divergence in the discourse of health professionals, which did not facilitate decision-making regarding the implementation of HPV vaccination.

They mentioned that adolescents also talk about HPV and vaccination among themselves when they already have discussed this topic with an adult, so adolescents need to have interlocutors: *"Even with her group of friends, they were talking about it [...] she has a lot of questions"* (GD2H).

The act of vaccination is a family decision: parents have a predominant role in the decision-making process: *"It's us [parents] who make the decision"* (FG2E). Some participants announced that the decision to vaccinate was up to the parents; the adolescent has no say: *"Children follow the family decision, well, the parents' decision."* (GD3N). Nevertheless, more than half of the participants mentioned the importance of including their adolescent's opinion in the decision-making process: *"They make their own decisions, they are the ones who take responsibility."* (FG1B) Adolescents are involved in the vaccination decision or follow their parents' decision. The decision-making process concerning school staff is more about the decisions on whether HPV vaccination school programs should be implemented.

In order to improve people's knowledge about HPV and HPV vaccination, both populations talked about the role that national health institutions could play in public health: *"We must really insist on public health, on the fact that France has a social health system and that everyone must participate in it"* (FG1A). Some school staff suggested another way to obtain information, the participation of municipalities which could be mobilised to better inform the population: *"Parents could go and find out about this information provided by the municipalities"* (GD2I). The population needs clear and scientific information to be aware of the collective protection against HPV.

School staff and mothers mentioned middle schools as a place to educate adolescents about HPV. They encourage the use of external speakers (health professionals, health students, and/or actors in public health) to inform young people about public health issues, particularly HPV: *"When it comes from a third party, it can resonate with them a bit more and maybe they will take the information more seriously."* (FG2G).

The role of teachers is ambivalent; on the one hand teachers are a legitimate means to conduct awareness sessions on HPV: *"The only people who should be able to talk about it are the life science teachers."* (GD1B). On the other hand, it is difficult to ask teachers to get involved in this kind of project because they already have a lot of work: *"I 'don't think that's the role of teachers"* (FG1A).

Moreover, school nurses are key contacts for informing adolescents about HPV and the vaccine: *"If I could talk about HPV in a more convincing way, then I could add it as an essential subject during sexuality education activities."* (GD3N). Information could also be provided through posters hung on school grounds: *"It should be written down in black and white because all of the information we have had is oral."* (FG2E).

School staff mentioned that the role of schools could be more important in transmitting information on HPV to pupils by creating, for example, an HPV Prevention Day: *"Having days, HPV Day, that's strong [...] we know that it works, 'Sidaction', days like that"* (GD3K). To them, it is necessary to include parents in this information process, in particular by involving parents' associations in the organisation of health information sessions.

However, school staff and mothers mentioned that public health issues are only brought up at school if management allows it: *"It is the role of the headmaster to bring public health into the school."* (FG1A). Furthermore, management decides who intervenes and how the interventions are carried out.

3.1.4. The idea of vaccination in middle schools

Mothers' and school staff's perceptions of vaccination in middle schools were divided. Facilitators and barriers have been mentioned.

Some mothers and school staff accept that vaccination can be carried out in middle school because they or their relatives have already had this experience when they were young or as professional and do not see any disadvantages: *"When we vaccinated for H1N1 the logistics were created and at that time we had the equipment and the skills, we knew how to inject, we knew how to make vaccines."* (GD3M). For a vaccination to be carried out in middle schools, they think that adolescents must receive prior information: *"That could be interesting, information provided on a small and simple piece of paper"* (FG40) and a parental consent must be signed: *"We had to ask the parents for permission"* (GD1C).

Nevertheless, some participants were reluctant to vaccinate in schools. According to them, one barrier to vaccination in schools is the reaction of parents. Parents of middle schooler might be against this proposal: *"We are going to have to actually talk about sexuality, so will the families appreciate us talking about it?"* (GD1A). Also, they find vaccination in schools complicated because they believe less time would be devoted to prevention: *"Prevention [...] in my time it was much more present"* (FG1A). They denounce the lack of human resources in schools, which makes it difficult to implement vaccination in schools: *"There are fewer and fewer school nurses"*(FG1A); *"Be careful, the school is not a place of care, so we vaccinate, we [the nurses] are alone, there is no doctor"* (GD3K).

School staff added other obstacles. According to them, parents could see vaccination in schools as a "mass immunisation", which can be perceived as negative: *"I don't really see the place of mass vaccination [...] in secondary schools"*. (GD2G). Furthermore, school staff denounced an overload of interventions in schools, which hinders the possibility of adding new events such as a vaccination day: *"We must not mix everything up, we already do a lot [school road safety certificates 1 and 2, education on emotional and sexual life, learning to swim]"* (GD1B). Vaccination in the school environment could

cause tensions between adolescents, particularly judgement of one another: "*Those who do not want to be vaccinated, do they still go to school? Could this not create tensions?*" (GD3J). Finally, school staff raised the issue of the lack of freedom of schools. It is the school's management who decides on the public health topics to be addressed and the actions implemented. According to school staff, it would be more relevant to set up a national awareness policy on HPV and vaccination to have a fair way of providing information: "*We cannot set up an individual policy for a school, it must be part of a more global public health policy*". (GD3L).

Finally, both populations acceptance of vaccination in schools is mixed: some agree under certain conditions, while others are against it given the difficulties encountered within the establishments.

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4. Discussion

4.1 Main Results

Mothers and school staff informed us of feeling a lack of knowledge [49], mainly about HPV and to a lesser extent about its vaccine, which is similar to what focus groups found in East Africa [50]. This feeling makes it difficult for mothers to decide whether to vaccinate their child and for school staff to communicate with pupils. They rarely have incorrect information, except on the subject of vaccination in boys, which is not yet known by all. This element is possibly explained by the fact that the *Haute Autorité de Santé* recommended the HPV vaccination for boys in December 2019 but reimbursement by statutory health insurance was only put in place in January 2021 (when the information campaigns started).

Mothers and school staff learn about HPV and the vaccine at different levels. At local level, the main actors are family, peer groups and GP (or a medical specialist). The place of physicians is primordial as their opinions are considered legitimate because the relationship of trust is established with the patient [51]. Involving government institutions would be a fair way of informing the French population about HPV and HPV vaccination. This demand by school staff and mothers could be achieved by offering information and HPV vaccination campaigns in schools, as is done in Sweden, Canada and Australia [52]. Some school staff and mothers think that vaccination could be introduced in middle schools only if there is parental consent and information is provided to families in advance.

Finally, the management of the Covid-19 pandemic by school staff has shown the effectiveness of vaccination in schools.

In regard to the COM-B model used by the WHO regional office for Europe, we can observe that each component of it is mentioned by one or both groups of participants. We can easily imagine that information is one of the first necessary element to feel capability. It concerns mothers and school staff, but also adolescents and physicians which lack of knowledge as seen before [20,23,51,53]. Each group asks for up-to-date and targeted information, but “HPV day” for school staff and gynaecological follow-up, in particular the Pap smear test, for women for mothers work in the same direction of increase understanding and knowledge about HPV and its vaccine. Knowing that HPV causes almost all cervical cancers highlights the relevance of cervical cancer screening and thus the HPV vaccination. Mothers also talked about the importance of taking a step back from information on the Internet because it is not always reliable [38], which is why they most often go to websites advised by their health professionals.

Motivation can be seen through the evocation of collective protection and sexuality by both studied populations. If the first one is a facilitator, since altruism is good for well-being [54–56], the second could be a barrier to mothers, school staff and potentially physicians. In fact, as adolescents and young adults don't seem to have sufficient knowledge, sexual education and health intervention is important to give information and get them vaccinated [57,58]. For some mothers, difficulties in trusting pharmaceutical companies can be a barrier to learn more about HPV and trust HPV vaccine, which we have already seen for HPV vaccination in the U.S. [59]. On the other hand, religious and/or cultural affiliation can also be seen as a barrier by school staff. While we may surpass more easily pharmaceutical scepticism – and vaccine hesitancy resulting – by pointing numerous positive studies about HPV vaccine since its launch in the 2000s', changing people's mind about their spiritual beliefs and cultural habits is harder. This point shows us the importance of social identity, social norms and self-esteem on risk perception, attitude and practices, especially among adolescents, which can be linked to religion [60,61]. Nevertheless, it is possible, and planned in French institutions, to have a class or workshop on sexual education, and it could be precisely on HPV and its vaccine.

At last, opportunity is evoked by both groups through the access of people possessing knowledge about HPV and its vaccine, whether it be school staff, like school nurses, or external speakers, as it is expressed by mothers. School staff also talk about lack of time, which is a necessary resource to give opportunities to adolescents to get informed and even vaccinated. Furthermore, it can be considered that mobilized municipalities and “HPV day” evoked by school staff could open opportunities as well. Meanwhile, the management of the Covid-19 pandemic by school staff has shown the effectiveness of vaccination in schools. All of these points help us to better understand vaccine hesitancy and give ways to overtake it and give recommendations.

4.2. Strengths and limitations of the study

The particular context of France recommending HPV vaccination for boys, and the origin of the target population, combined with a qualitative approach, make this study an important step for a better public health policy. It allowed us to identify similarities and differences between mothers and school staff, which will be useful in developing targeted messages.

Some studies have used interviews, mainly semi-directive interviews, to investigate knowledge about HPV and HPV vaccination in women [62], parents [63] or school nurses [64]. Nevertheless, our choice was to perform focus groups [65,66], a method used for our subject of interest in multiple countries and continents, *e.g.* East Africa [50], Vietnam [67], Malaysia [68], Australia [69] and England [70]. By building groups based on parenting or profession, we hoped that this common trait among participants would lead to formulate, and share lived experience, knowledge, or beliefs more easily.

Despite these positive elements, this work has some limits. One of them is a potential selection bias, as participants were recruited on a voluntary basis, which could mean that participants were more aware of HPV than non-participants. Another limitation that deserves to be mentioned is that we had two focus groups with only two participants, mainly due to last-minute cancellations. Having only two participants may limit the diversity of perspectives, however, in both cases encountered during this research, the exchanges were interactive. Furthermore, some information about the participants' children, such as age, gender, and whether or not they are vaccinated, as well as information about the participants themselves, such as whether they have refused to vaccinate their child, were not requested and could have influenced their responses. Also, questions posed to school staff were not asked on a personal basis, so we do not have the same information across all the populations surveyed. Another limit is that the parental focus group was comprised solely of women, and school staff were also predominantly women. Even if women represent a larger group than men among school staff [71], the difference was larger in our focus groups. This point could be important, as it is known that health behaviour is influenced by gender [72], such as a simple and common cold is treated differently by men and women [73], and that vaccine hesitancy seems stronger among women than men [74].

There is also a need to contextualize this study. If it began before the COVID-19 pandemic, and almost half of it was carried out during the pandemic. As vaccination is part of the French strategy to halt the pandemic, an interaction in school staff and especially parents' minds could have happened between the COVID-19 vaccine and HPV vaccine. This point is particularly relevant due to French citizens' scepticism toward the COVID-19 vaccine (even if fluctuating) compared to similar countries, especially at the time of this study [75], which could have altered participants' responses.

4.3 Implications for the PreVHPV program and for public health

These targets mean that this study approach has some sense of originality. Although parents are regularly questioned about HPV and its vaccine in school-based interventions [76], this is not the case for school staff. Since public health campaigns are mostly aimed at middle schools, school nurses are the first people involved in the vaccination of minors, as they transmit information about HPV and HPV vaccination. As regards the rest of the school staff, they have a role in education and mobilisation where HPV prevention is concerned. If they lack information, they will not be able to pass on the recommendations of the French Ministry for Solidarity and Health. School nurses' skills could be very relevant in achieving an 80% vaccination coverage rate if they have the latest information about this topic. And since children aged 11 to 14 do not regularly consult physicians, school is the best place to mobilise this captive population against HPV.

This study is a useful basis for building an intervention to improve HPV vaccine information and acceptability, which would be evaluated in real-world settings. The role of school staff must be investigated, and public health professionals should work closely with those who spend a lot of time with adolescents. Building on this, an intervention has been developed within the PreVHPV program.

A key player in middle schools to improve health education is the school nurse [64]. Our results show that interrogated French school nurses are asking for information about HPV. Even though school nurses are often employed part-time, working in several middle schools at once, they can have an impact on pupils' health, particularly by providing them with information. They have the health records of the entire Year 7 when they arrive at middle school, which is the age the vaccine starts to be recommended. Thus, they need to be well informed and up to date about HPV and its vaccine. Furthermore, professionals other than school nurses, such as life science teachers, play a part in sexual education in schools, and thus also need to have all the latest information. If there are difficulties in training school staff about HPV and its vaccination, schools could reach out to associations and/or health professionals for help.

As school staff complain about lack of human, material and financial resources, public institutions, such as departmental council which is in charge of health action in France, could help middle schools to organize HPV information courses and/or vaccination days. Indeed, to have a chance at enhancing vaccine coverage, the information about HPV given to pupils needs to be doubled up by vaccination on school days and on school premises. This public health action could increase HPV vaccination [77].

An increase in parents' knowledge could also be a key factor to vaccinating more adolescents. Parents, especially mothers, have a major role to play in HPV vaccination decision-making [22]. With this in mind, meetings where parents are provided with information and have discussions with health professionals about HPV and its vaccine could allay their fears and correct false beliefs. This would mean that parents are more aware of the dangers of HPV and would get them to talk about vaccination to their children.

An additional way to increase vaccination coverage in the adolescent population could be to involve physicians. Mothers listen to their doctor's advice and healthcare messages carefully when making a decision, which could lead them to vaccinate their children against HPV [52]. Since GPs are an effective mediation figure with medical knowledge, and in regard to the scientific literature that shows an important part of vaccine hesitancy among physicians, training to support physicians when communicating about the vaccination and updating their knowledge of HPV and HPV vaccination with the latest information could help increase vaccination coverage. Thus, an e-learning training for GP has been done within the PreVHPV program, which goes from information about HPV to motivational interviewing in order to work on the shared decision making.

Following the results of the focus groups, we have identified intervention strategies to improve the information provided to the population about HPV, reduce vaccine hesitancy [78] and, consequently, increase HPV vaccination coverage. Three components were chosen for the interventional phase of the PrevHPV Project, namely: (i) online training and decision-making tools available to general practitioners, (ii) education, motivation, and mobilization sessions for middle-schoolers and their parents, and (iii) HPV vaccination days in middle-school (with the intervention of mobile vaccination teams). Results of this part of the PrevHPV program will be published at a later stage.

Some mothers also talk about HPV vaccination as the good choice to make to protect others. As this point of view is set on a moral level of good and bad decisions for society, it highlights the importance of subjective norms supported by the TPB [24]. Group influences and dynamics mean people want to avoid the “black sheep effect” [79], those individuals identified as an HPV vector of transmission. Since a link between subjective norms and intention to vaccinate against HPV has been found [36], future research could investigate how to use the influence of parents, colleagues or peer pressure as social entities to increase HPV vaccination.

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5. Conclusion

Despite being Louis Pasteur's country, France has had a complicated relationship with vaccination for several years. By using the qualitative approach of focus groups with mothers and school staff, we tried to clarify what the influencing factors, facilitators, and barriers to HPV vaccination were. These data showed some key points, such as the importance of up-to-date information, who could be best positioned to deliver the information, and the need for preventive care concerning HPV and HPV vaccination in public healthcare. Results of this study enable some recommendations for a more effective anti-HPV healthcare program: (i) online training and decision-making tools available to general practitioners, (ii) education, motivation, and mobilization sessions for middle-schoolers and their parents, and (iii) HPV vaccination days in middle-school.

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The study follows the COREQ reporting guidelines (Table 1 in Appendix).

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Table 1/ COREQ (Consolidated criteria for REporting Qualitative research) Checklist

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal Characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	4
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	4
Occupation	3	What was their occupation at the time of the study?	4
Gender	4	Was the researcher male or female?	4
Experience and training	5	What experience or training did the researcher have?	4
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	3
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	3
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	4
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	4
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	3
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	5
Sample size	12	How many participants were in the study?	5
Non-participation	13	How many people refused to participate or dropped out? Reasons?	3
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	5
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	4
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	5
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	3-4
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	5; Appendix Table 4
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	5
Field notes	20	Were field notes made during and/or after the interview or focus group?	4
Duration	21	What was the duration of the interviews or focus group?	4
Data saturation	22	Was data saturation discussed?	3

Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	4
Domain 3: Analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	4
Description of the coding tree	25	Did authors provide a description of the coding tree?	4
Derivation of themes	26	Were themes identified in advance or derived from the data?	3;5
Software	27	What software, if applicable, was used to manage the data?	4
Participant checking	28	Did participants provide feedback on the findings?	4
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. participant number	5-9
Data and findings consistent	30	Was there consistency between the data presented and the findings?	10-11
Clarity of major themes	31	Were major themes clearly presented in the findings?	10-13; Appendix Table 3
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	Appendix Table 3

Table 2/ Focus groups' interview guide – Mothers / School Staff

Themes	Questions	Concern
<p>Knowledge/ Beliefs</p>	<p>Starting question: What do you know about HPV and its vaccine?</p> <ul style="list-style-type: none"> ○ <i>Knowledge of the new recommendations: Who should be offered the vaccination?</i> ○ <i>Sources of information: How and when have you heard about the HPV vaccine?</i> ○ <i>Understanding the vaccine: What questions do you still have about this vaccine?</i> 	<p>mothers & School staff</p>
<p>Attitudes, preferences, and barriers to HPV vaccination</p>	<p>Starting question: What do you think of this vaccine in terms of public health?</p> <ul style="list-style-type: none"> ○ <i>Universal vaccination: Do you think that HPV vaccination for boys is warranted?</i> ○ <i>Acceptability of the vaccine: Why do you think adolescents should be vaccinated?</i> ○ <i>Barriers: What are the barriers to HPV vaccination?</i> 	<p>mothers & School staff</p>
<p>Decision- making process</p>	<p>Starting question: What is the decision-making process for vaccination in general and HPV vaccination in particular?</p> <ul style="list-style-type: none"> ○ <i>Decision-making: Who decides about HPV vaccination?</i> <ul style="list-style-type: none"> ○ Are there any disagreements about vaccination between parents? ○ <i>Child's place: To what extent is your child involved in this decision?</i> <ul style="list-style-type: none"> ○ <i>Have you discussed this with him or her?</i> ○ How difficult can it be to talk about this with your child? ○ What has your child told you about this vaccine? ○ Has he/she heard about it before? ○ <i>Role of the doctor: What was the role of your doctor in this decision?</i> <ul style="list-style-type: none"> ○ Did you discuss this with him/her? ○ Did he/she give you any information? ○ <i>Did he/she offer you this vaccine?</i> ○ What kind of relationship do you have with your doctor? ○ <i>Satisfaction: Are you satisfied with your decision?</i> <ul style="list-style-type: none"> ○ Do you think you have had enough information to make a decision? <p>What are your sources of information about your health?</p>	<p>mothers</p>

<p>Decision-making process</p>	<p>Starting question: In your experience, are pupils involved in the decision to get vaccinated?</p> <ul style="list-style-type: none"> ○ To what extent are pupils seeking information about HPV vaccination? ○ In your opinion, do parents consider their child's point of view? 	<p>School staff</p>
<p>Increase in immunisation coverage / School participation</p>	<p>Starting question: What would you suggest to improve HPV vaccination coverage?</p> <ul style="list-style-type: none"> ○ <i>The role of school:</i> Do you think schools have a role to play in promoting the HPV vaccine? <ul style="list-style-type: none"> ○ In your opinion, how could the school and its stakeholders be mobilised to promote this vaccine? ○ Do you think that the school can have an information role? ○ Do you think the school can play a role in facilitating the administration of the vaccine? <p>Do you have anything to add?</p>	<p>mothers</p>
<p>School's mobilisation and participation</p>	<p>Starting question: What would you suggest to improve HPV vaccination coverage?</p> <ul style="list-style-type: none"> ○ <i>The role of school: How can schools help promote HPV vaccination?</i> <ul style="list-style-type: none"> ○ What are your experiences in that field? ○ Do you think the school can have an informational/educational role? ○ What do you think about vaccination at school? ○ <i>Anti-Vax: How do you deal with the Anti-vax position?</i> <p>Do you have anything to add?</p>	<p>School staff</p>

Table 3/ Thematic analysis of focus groups with mothers and school staff

Explanation of participant codes: FG/GD 1 A

- FG corresponds to the population of mothers; GD corresponds to the population of School Staff
- Focus group number
- Participant letter

Main themes	Subtopics	Codes	Verbatims	Occurrences
Knowledge about Human Papillomavirus (HPV) and its vaccine	Misunderstood topic	Lack of knowledge	<i>"I don't feel informed enough to answer"</i> (FG4O); <i>"We have the impression that there is a lack of information"</i> (GD1D); <i>"I have no information"</i> (GD2E).	155
	Correct Knowledge	Link between HPV and cancer	<i>"The second most common cause of cancers of the throat, ears and nose (ENT) is HPV"</i> (FG1A); <i>"I also thought it could be oral or throat cancers."</i> (FG3K); <i>"The virus can cause pre-cancerous cells [...] cancers [...] condylomas"</i> (FG1A); <i>"A virus that can cause cancer [...] in both boys and girls"</i> (GD2E).	66
		Existence of the vaccine	<i>"The vaccination is recommended between the ages of 11 and 14 "</i> (FG4L) <i>"I had heard that it was a vaccination that was done when you were young"</i> (GD2E); <i>"It is not only young girls who are concerned, I also talk to young men."</i> (GD3J).	85
		Importance of gynaecological monitoring	<i>"HPV infection can stay hidden for years and then we think we are safe, but we aren't, that's why it's important to keep having smears"</i> (FG1A); <i>"We go to the gynaecologist every year without asking ourselves why we do it"</i> (FG1A).	8
	Incorrect Knowledge	Women's issues	<i>"I thought at first that this vaccine was only for girls."</i> (FG2G); <i>"I think it is an infection mainly in girls, not in boys"</i> (GD1C); <i>"I have the impression that this vaccine is a girl's thing"</i> (GD3K).	53

		Lack of awareness of vaccination for boys	"I've never heard of it [HPV vaccination] for boys." (FG2I); "What's the point of vaccinating boys?" (GD3K); "I thought that vaccination was exclusively for women" (GD1B).	34
Vaccination against HPV	Barriers	Young age of adolescents	"At 11 they are not concerned'. Why now?" (FG1B); "No, because at that age I don't think they're mature enough." (FG2F); "I think that the barrier is the age, asking to vaccinate at 11 years old is complicated!" (GD3K).	50
		Problem related to sexuality	"It was easier to get her vaccinated when she was 11 years old, before she was in a sexual relationship with boys or girls." (FG1A); "This vaccine [...] has a lot of meaning for families, i.e. it carries a sexual connotation" (GD3K).	38
		Religious and/or cultural affiliation	"We have 17 nationalities in the school, they still have relationships despite everything, but given the significantly large North African community in the school, it is not even worth talking about it because the girl has to be a virgin at the time of marriage" (GD3M).	7
		Divergence of the medical discourse	"If the medical profession is divided, it is difficult to ask the population to adhere." (FG1B); "Are all doctors well informed?" (GD1B).	29
		Lack of medical professionals' time	"HPV doesn't trigger a consultation with a doctor [...] it comes at the end, you know when he writes the prescription, it would be perhaps good, if she's the right age" (GD3K); "Doctors 'don't have the time"(GD3K).	3
		Doubts about the effectiveness of the vaccine	"We don't have any information about what this vaccine does, have there been any studies, are there really any positive results?" (FG2I); "Do we have enough distance from this vaccine as well?" (GD1A).	30
		Potential side effects	"We are still trying to find out today, as with any vaccine, what the side effects are." (FG2C);	34

			<i>"Are there no secondary risks" (GD1B); "I'm afraid it will lead to something else." (GD2I).</i>	
		Negative image of vaccination in France	<i>"We are in a country that is somewhat anti-vaccine." (FG1B); "[There is a] general reluctance to vaccinate in France." (GD3N).</i>	36
		Negative image of pharmaceutical companies	<i>"It would be more a distrust of other actors such as the pharmaceutical companies that manufacture them [vaccines]" (FG2G);</i>	7
	Facilitators	Need for accurate and up-to-date information	<i>"Need to have something quite concrete, that speaks to people who are not from the medical field" (FG1B); "Please 'don't leave us in the dark" (FG4O); "It's not just a campaign for parents [...] we really need to integrate young people." (GD1D); "If we had more knowledge about sexuality prevention in Year 5 and Year 4, we could tackle it." (GD3N).</i>	74
		Collective protection	<i>"In terms of public health, it only makes sense if we vaccinate the entire population." (FG3N); "The purpose of vaccinating adolescents is to make this virus circulate less so that there are fewer infected people who develop this type of cancer" (GD2I).</i>	41
		Making the HPV vaccine mandatory	<i>"If it's really something of public interest, you have to send a strong message saying that it's compulsory" (FG2G); "When I came out of my consultation, I said to myself that frankly, if it was compulsory, it would almost have suited me." (GD1D).</i>	15
		Training for General	<i>"Should there be compulsory training or seminars to refresh the doctors' skills?" (GD2I); "We should already be trained and informed [school nurses]" (GD3N).</i>	11

		Practitioners and school nurses		
		Talking about foreign countries' vaccination policies	"My brother lives in Quebec and in their country it's only logical to get vaccines" (FG4L); "There is much less fear about vaccinating children, adolescents and adults [in Italy] than in France, where there is a whole other culture around vaccination." (GD3J).	20
Actors	General practitioner / specialist	Main source of information	"It was my gynaecologist who gave me the prescription and I went to my general practitioner for the vaccination." (FG4L); "It was the doctor who mentioned it" (GD2F); "I always refer to the family or the specialist, gynaecologist sometimes also the midwife." (GD3J).	109
		Legitimate source of information	"I trust my doctor" (FG2F); "I prefer to follow my doctor's advice than to look on the internet" (FG4L); "I would tend to trust my doctor" (GD1A).	38
	Authorities	Role in public health	"We must really insist on public health, on the fact that France has a social health system and that everyone must participate in it" (FG1A); "We [nurses] need support, we 'can't just say 'we're going to do the HPV campaign', there has to be support behind it, there has to be there has to be a political will" (GD3K)	20
		Management according to the immunisation schedule	"If it is not reimbursed by social security, doctors do not talk about it." (FG2E); "A story about the reimbursement of the vaccine that was reimbursed for girls but not for boys [...] I have the impression that there was also a story about money behind it, about the cost of the vaccine" (GD1D).	12
	The municipality	Organising role to inform the population	"Parents could go and find out about this information provided by the municipalities" (GD2I).	3

	A family decision	The predominant role of parents	<i>"It's us [parents] who make the decision" (FG2E); "It is the parents who make the decisions about vaccinations" (GD1A).</i>	63
		A private matter	<i>"There are discussions that happen at home that may not happen in other families." (FG1A); "These are really decisions that cannot be taken by the school and in the school, it is a family decision that must be taken as the family." (GD3K).</i>	44
		Active adolescent in decision making	<i>"They make their own decisions, they are the ones who take responsibility." (FG1B); "I found it interesting that she [her daughter] was completely involved in this decision because it's true that it concerns her more than us". (GD1D).</i>	30
		Adolescent follows parental decision	<i>"They are not old enough to have that role." (FG2F); "When I talked to her about it at home, she said, 'Yes, Mom, I want to do it' [the vaccine]." (FG2H); "Children follow the family decision, well, the parents' decision." (GD3N)</i>	10
	Middle School	Important role of external speakers	<i>"When it comes from a third party, it can resonate with them a bit more and maybe they will take the information more seriously." (FG2G); "An external intervention proposed to voluntary families, why not, because we realise that we are not informed." (GD1A).</i>	43
		A legitimate role for teachers to play	<i>"Could all vaccinations be reviewed in Year 7?" (FG1A); "The only people who should be able to talk about it are the life science teachers." (GD1B)</i>	25
		A delicate role for teachers to play	<i>"I 'don't think that's the role of teachers" (FG1A); "I 'don't think it's up to us [teachers] to inform them [adolescents] about it [HPV]." (GD1A).</i>	13
		Management decides which	<i>"It is the role of the headmaster to bring public health into the school." (FG1A); "School is not necessarily the place for information on vaccinations". (GD1A).</i>	10

		public health issues to address		
		The school nurse: a key contact	<i>"We have to start talking about it [vaccination] again, as the school nurses used to do." (FG1A); "If I could talk about HPV in a more convincing way, then I could add it as an essential subject during sexuality education activities." (GD3N).</i>	38
		Posters in the School	<i>"Make little flyers" (FG2I); "It should be written down in black and white because all of the information we have had is oral." (FG2E); "Also through displays, adolescents like it" (GD1C).</i>	18
		Do an HPV Day	<i>"Having days, HPV Day, that's strong [...] we know that it works, 'Sidaction', days like that" (GD3K).</i>	4
		The parent's association	<i>"Perhaps through the parents' association". (GD1A).</i>	2
	Place of peer groups	Among adults	<i>"I have I talked to colleagues too, who had their children vaccinated". (FG2D); "I asked some friends if they had done it for their daughters." (FG3M); "Did you vaccinate your daughter? What do you think?' These are discussions that we have between parents, but in the end we don't have any answers."(GD1D).</i>	31
		Among adolescents	<i>"She talked about it with her girlfriends [...] I don't get the impression that it was a taboo for her". (FG1A); "Even with her group of friends, they were talking about it [...] she has a lot of questions" (GD2H).</i>	7
	Other sources of information	Internet	<i>"I have read testimonies [on the internet]." (FG1B); "I have been on sites recommended by my doctor once or twice" (FG1B).</i>	10
		Press / Media	<i>"Health magazines talk about it regularly" (FG2E); "There were advertising campaigns." (FG2J);</i>	42

			"I found out about it in the press a few years ago" (GD1A); "We heard a lot about HPV when it [the vaccine] came out, it was quite publicised on TV". (GD3K).	
Vaccination in schools	Accepted	Subject to parental consent	"Why not in middle school, if we have the parents' agreement?" (FG1A); "We had to ask the parents for permission" (GD1C); " I always say that it is the parents who are legally responsible."(GD2E).	16
		Already experienced without problems	"A bit like everything that happens in Quebec, I had full confidence [...] I find that we feel almost supported as parents that it's done at school [the vaccination]" (FG4O); "When we vaccinated for H1N1 the logistics were created and at that time we had the equipment and the skills, we knew how to inject, we knew how to make vaccines." (GD3M).	27
		In the event of an epidemic	"In the event of a serious epidemic, such as we are experiencing today, [...] it seems perfectly logical to me that we should be able to use the resources of the national education system to protect as many people as possible." (GD3N).	1
		in case of prior information	"That could be interesting, information provided on a small and simple piece of paper" (FG4O); "[HPV vaccination in middle school] not before prevention and information campaigns". (GD3M).	9
	Halted	Lack of human, material and financial resources	"There are fewer and fewer school nurses" (FG1A); "Be careful, the school is not a place of care, so we vaccinate, we [the nurses] are alone, there is no doctor" (GD3K); "Would the rooms be sufficiently sanitised?" (GD1B).	18
		Less prevention in schools	"Prevention [...] in my time it was much more present" (FG1A); "Frankly, it's not our role to vaccinate, to run a campaign [...] to be part of a vaccination policy [...] I don't know if it's really our role in fact." (GD3K).	17

		Fear of the parents' reaction	"French parents [are] so upset about schools, [...], they see the school as an enemy". (FG4O); "We are going to have to actually talk about sexuality, so will the families appreciate us talking about it?" (GD1A).	31
		Mass vaccination	"I don't really see the place of mass vaccination [...] in secondary schools". (GD2G).	10
		Intervention overload	"We must not mix everything up, we already do a lot [school road safety certificates 1 and 2, education on emotional and sexual life, learning to swim]" (GD1B).	12
		Adolescents' judgement of their peers	"Those who do not want to be vaccinated, do they still go to school? Could this not create tensions?" (GD3J).	5
		Lack of freedom	"We cannot set up an individual policy for a school, it must be part of a more global public health policy". (GD3L).	2

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Table 4/ Characteristics of the participants in the focus groups (n=29)

Explanation of participant codes: FG/GD 1 A

- FG corresponds to the population of mothers; GD corresponds to the population of School Staff
- Focus group number
- Participant letter

Focus group date	Participants	Number of participants	Age - years	Gender	Profession	participant's code
Focus group 1 <i>(March 2020, face-to-face)</i>	Mothers	2	39	Female	Hospital midwife	FG1A
			50	Female	Human Resources officer	FG1B
	School staff	4	55	Female	Teacher	GD1A
			60	Male	Support staff (educational)	GD1B
			53	Female	Support staff (administrative)	GD1C
			38	Female	Support staff (administrative)	GD1D
Focus group 2 <i>(September 2020, face-to-face)</i>	Mothers	8	50	Female	Self-employed trader	FG2C
			40	Female	Hospital care assistant	FG2D
			46	Female	Graphic designer	FG2E
			40	Female	Police officer	FG2F
			46	Female	Administrative manager	FG2G
			39	Female	Administrative assistant	FG2H
			47	Female	Human Resources officer	FG2I
			43	Female	IT Project Manager	FG2J
			School Staff	5	43	Male
	54	Male			Support staff (administrative)	GD2F
	45	Female			Teacher	GD2G
	44	Female			Teacher	GD2H
	41	Female			Support staff (administrative)	GD2I
	Mothers	3	41	Female	Teacher	FG3K

Focus group 3 (February 2021, virtual)			46	Female	Care unit manager	FG3M
			43	Female	Nurse	FG3N
	School Staff	5	40	Female	School nurse	GD3J
			44	Female	School nurse	GD3K
			38	Female	School nurse	GD3L
			62	Female	School nurse	GD3M
		48	Female	School nurse	GD3N	
Focus group 4 (March 2021, virtual)	Mothers	2	44	Female	Secretary for the Administration and Control of Sustainable Development	FG4L
			47	Female	Responsible for the institutional pathway for people with disabilities	FG4O

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