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The role of maturity in adolescent decision-making around HPV vaccination in France

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ABSTRACT

Mothers are often responsible for vaccination decisions in the household. However, their confidence in certain vaccines such as Human Papillomavirus (HPV) vaccines is eroding in some countries. France is one of the countries with the lowest HPV vaccine uptake in Europe, with parents delaying or refusing the vaccine for their adolescent daughters due to safety- and effectiveness-related concerns. Although parental consent is required for vaccination, adolescents' involvement in HPV vaccination decision-making could improve vaccine uptake, with self-consent procedures already introduced in some countries. Adolescents' capacity to engage in decision-making is influenced by their maturity and autonomy in health. This study explored the role of maturity in decision-making around HPV vaccination in France through qualitative interviews with adolescent girls (n = 24) and their mothers (n = 21) and two focus groups with adolescent girls (n = 12). A codebook approach to thematic analysis revealed that adolescent girls' involvement in HPV decision-making is a process that evolved with maturity. As adolescents progressed towards maturity at different speeds, some expressed childlike traits such as impulsive decisions and others described more rational, reflective decision-making. Despite these differences, most adolescents in this study described a passive role in HPV vaccination decision-making, following their parents' lead. However, their expressed desire for information and involvement in discussions indicates that their lack of engagement may not only be due to a lack of maturity but also a result of mothers and doctors excluding them from getting involved. Furthermore, as health behaviours are shaped during adolescence, the influence of vaccine hesitant mothers on their daughters' own views and beliefs could be significant, together with exposure to regular controversies in the mainstream media. Individualised approaches to engage adolescents in decision-making around their own health are needed, for example through strengthening discussions and information around HPV vaccination with parents and doctors.

1. Introduction

Mothers across the world, play a caregiving and protective role for children and are primarily responsible for household health-related decisions [1,2]. As family health managers, they play a key role in teaching children healthy behaviours such as nutrition, hygiene and vaccination, with children commonly assuming the behaviours, beliefs and values of their mothers [2–4].

Some mothers delay or refuse vaccination for their children, questioning the necessity, effectiveness and safety of vaccines [5,6]. Increasing exposure to unverified and often negative information on the internet and social media, together with contextual and historical factors such as poor government management of previous health crises, including lack of transparency breeding distrust, have contributed to the decrease of public confidence in vaccination in some communities [7,8]. In some cases, this has led to important drops in vaccination coverage rates and the resurgence of vaccine-preventable diseases, as observed in recent measles outbreaks [9,10].

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1.1. Decision-making and public questioning of human papillomavirus vaccination

Vaccination against human papillomavirus (HPV) has elicited particularly strong concerns among parents, in part due to widespread controversies around the vaccine's safety that circulated in some countries [11,12]. France has one of the lowest HPV vaccination rates within Europe, with parents citing concerns about possible side effects and insufficient protection provided by the vaccine as reasons for refusal [13–16].

Compared to many countries in which HPV vaccination is administered in schools, the vaccine is administered by family doctors in France, targeting 11 to 14 year old girls as well as 15 to 19 year old girls as part of a catch-up campaign [17]. While there is no international agreement on the age at which adolescents are considered to be competent to make medical decisions, including vaccination, legal majority is often used as a threshold in European countries [18]. Minors under 18 years old in France are unable to be vaccinated against HPV without their parents' consent, which is often given implicitly [17]. Yet, studies have shown that adolescents as young as 11 years old could be competent to make informed decisions, including participation in clinical trials and acceptance of medical treatments [18–20]. While adolescents' competence is task and context specific, adolescents in some countries are increasingly being given a more active role in providing their consent to receive HPV vaccination. In the United Kingdom, the Gillick competency tool is used by health professionals to assess the competency of adolescents to provide consent for vaccination [21,22]. This allows adolescents to be vaccinated even if their parents have not provided written consent, whether for logistical or for ideological reasons [21,22].

However, involving adolescents in vaccination decision-making could include various challenges. Adolescents' competency to make health decisions depends on a variety of factors, including their maturity level and ability and readiness to assume responsibility for health and life decisions over time.

1.2. The role of maturity in adolescent decision-making

Maturity is defined differently across legal, social, psychological, sexual or public health contexts. In this paper, we use Cauffman and Steinberg's definition of maturity, in relation to judgement in decision-making [23]. While their definition was proposed in the context of legal decisions, it has previously been applied to health [24,25] and refers to essential factors influencing vaccine decision-making. They define maturity of judgment in decision-making in relation to three key psychosocial factors: responsibility, temperance and perspective [23]. Responsibility refers to the development of a sense of personal identity, leading to health autonomy and the ability to make decisions independently, resisting external pressure to act in a way that may go against one's own values [23]. Rather than simply disregarding the advice of others, it is about understanding how others can influence one's own beliefs and behaviour and knowing where and when to turn for advice [23,26]. Temperance is the ability to control one's emotions and impulses, avoiding rash decisions and evaluating situations before making a rational and informed decision [18,23,26,27]. Perspective is the acknowledgement of the bigger context in which decisions are made, for example by understanding short- and long-term consequences of decisions or by being able to see how one's decision may affect others [18,23,28]. It also refers to the understanding of why others make certain decisions and the influence of larger forces that cannot always be controlled such as the role of social institutions [23].

These factors can define how adolescents make decisions, including around HPV vaccination, although they will also depend on the nature of the situation and the context in which a decision is being made [18,23]. Maturity should be understood as a continuum rather than a binary concept, which means that children of the same age may have different levels of maturity as they progress differently through physical, neurodevelopmental, psychological and social changes [23,29]. Furthermore, while adolescents may be mature enough to make decisions in certain areas, they could be less competent in others [18]. Intellectual maturity may not automatically imply emotional or social maturity; for instance, while adolescents may understand medical information, they have been shown to be more likely than adults to be influenced by their emotions when making decisions [18,26]. The age at which HPV vaccination is given in France corresponds to major life and social changes and school transitions, as adolescents move from primary school (ages 6–11) to middle school (ages 11–15). The impact of this transitional period between childhood and adulthood is not negligible, as adolescents reach an age when they seek greater independence from parents while experiencing closer relations with peers, which could have important implications for health decision-making [30].

1.3. Aim and rationale

In this paper, we explore the role of maturity in adolescents' involvement in the decision-making process about being vaccinated against HPV in France. This understanding can provide insights into adolescents' interactions with their mothers during the decision-making process as well as insights on how mothers' concerns about vaccination could shape their daughters' current and future beliefs and perceptions of vaccination. These findings could provide valuable information for the development of policies on adolescent consent for vaccination.

2. Methods

Qualitative semi-structured interviews and focus group discussions with adolescent girls and their mothers were conducted in France to explore the role of maturity in decision-making around HPV vaccination.

2.1. Data collection

Between October 2018 and March 2019, 24 in-depth interviews and two focus groups (with 5 and 7 participants in each group) were conducted with adolescent girls (aged 15–16) and 21 in-depth interviews were conducted with their mothers. Participants were purposively selected to include both vaccinated and unvaccinated girls from different districts in Paris. However, only eight vaccinated girls were identified for this study, three of whom took part in focus group discussions.

Participants were identified using two recruitment methods. Adolescents were first approached through public, private and professional *Lycées* (high schools), with prior approval from the school directors. However, as only four interviews and two focus groups were conducted using this recruitment method, a local research agency specialised in behavioural research (BVA Group) was contracted to identify additional participants. All participants received a study information letter that described the study objectives and stated how interviewees' confidentiality would be protected. Adolescent girls and their mothers were required to provide written informed consent to take part in the study. Adolescents were also asked to obtain written consent from their parents.

Interviews (30–60 min) and focus groups (60 min) were conducted in French by an experienced qualitative researcher who is fluent in English and French. The interviews were conducted in

participants' homes or at a private place of their choosing and the focus groups took place in schools with girls from the same school class. Interviews and focus group discussions were audio-recorded with prior approval from all participants. All interviews were conducted privately; no caregiver requested to be present during the interviews with adolescents. Adolescents recruited through schools entered a lottery to receive an Amazon voucher to thank them for their time, while all participants recruited through the research agency were compensated for their time.

Topic guides for the interviews and focus group discussions (see supplementary materials) were designed to cover predetermined questions around HPV vaccination knowledge, decision-making processes and influences, and beliefs and perceptions, while remaining sufficiently flexible to allow discussions to be shaped by the participants' responses. The topic guides were piloted with three adolescent girls (excluded from the analysis).

2.2. Data analysis

This study used a codebook approach to thematic analysis, as described by Braun and Clarke as a cluster of methods distinct to reflective thematic analysis in its use of a structured coding framework [31]. Transcripts from the interviews and focus group discussions, field notes and analytical memos were imported into Nvivo® for analysis. All data files were anonymised to ensure confidentiality, removing personal identifiers such as names and locations and using numerical codes to refer to participants (using the letter 'V' to indicate vaccinated individuals). All files were stored on a secure server and password-protected computers. Analysis was conducted in French to avoid losing the meaning of data, with quotes for this paper directly translated into English for write-up by the researcher fluent in both languages.

Data was analysed using a coding framework, developed by deductively drawing parent codes from the topic guides, existing literature and contextual background information and the analytical memos. The coding framework was tested on four transcripts and finalised using an inductive process to derive additional codes. The final framework used to code remaining transcripts was reviewed by a second researcher, allowing some codes to be modified, merged or removed during the analysis.

Transcripts from interviews with mothers and adolescent girls and focus groups with adolescent girls were coded separately to detect differences and similarities in the coding phase. Coded excerpts as well as the language used by participants was then compared between mothers and adolescent girls, with particular attention paid to exchanges between adolescent girls during the focus group to understand how HPV vaccination is discussed among peers.

Codes were analysed by inductively drawing a list of issues and themes from a comparison and analysis of coded excerpts. These themes were then analysed in the context of literature on adolescent decision-making, following a framework analysis approach to theme development [32]. This type of analytical approach also recognises the researchers' subjectivity in analysis and the contextual aspect of knowledge [31].

Ethical approval

This study obtained ethical approval from the London School of Hygiene & Tropical Medicine [Ref. 15320 3] and from Aix-Marseille Université [Ref. 2018–12-07–005].

3. Results

HPV vaccination was generally discussed by participants as a decision that should involve girls and mothers. However, perceptions about the extent to which adolescent girls should be included in the decision varied widely between and within families. Both mums and girls spontaneously referred to '*maturity', independence and responsibility* as key factors influencing the role adolescents should have in decision-making: "*It depends on everyone's maturity, because some people can be convinced of their decision at a certain age but (. . .) without necessarily having enough hindsight*" (A19).. While none described what they meant by the term 'maturity', differences in maturity levels were used to explain why some adolescent girls might be involved in HPV vaccination decision-making and others may not. The word 'immature' was never used and involvement in decision-making was instead described as a process that evolves together with maturity. Some adolescents described their own process of change and perception of becoming more mature: "*My mentality also changed a lot in comparison to before. Now, I ask myself a lot more questions, while before, it was 'I have to do it, so I do it'*" (A3).

Five key themes were identified through the thematic analysis, organised and described in further details below according to Cauffman and Steinberg's definition of factors influencing maturity. The themes 'adolescents' role in decision making, 'recognising the influence of others' and 'adolescent girls' understand of HPV vaccination relate to 'responsibility'. The theme 'impulsive and emotional decisions' related to temperance, and the theme 'understanding the broader context in which decisions are made' relates to 'perspective'.

3.1. Adolescents' role in decision making

Adolescent girls' involvement in HPV vaccination decision-making was mostly described by mothers in terms of 'passive obedience', with one mother explaining that her daughter would hand over all responsibility to her without understanding what decisions such as vaccination mean (M14). Similar to childhood vaccination, girls followed their parents' decisions without taking into consideration their own values or preferences, sometimes without being aware of which vaccine they received: "*My parents take me [to get vaccinated] but I don't know what I'm vaccinated against (. . .) So, I really don't know whether I received [the HPV vaccine] or not*" (A2). Some girls not only followed their parents' decisions, but repeated the concerns expressed by their mothers, without always understanding them. Although this was in part explained as part of a strong relation of trust, girls also thought that their parent's life experience made them more capable of reflecting on the decision: "*I think parents' advice is to be taken into account because they are adults, they have life experience*" (A10). While some girls explained feeling mature, health was seen as an area remaining under parental responsibility. A couple of girls preferred to distance themselves from decisions that could carry possible risks: "*I prefer to let my mum decide for me, because if something happens to me, I don't want to be responsible*" (A15).

Mothers also discussed HPV vaccination as their responsibility, sometimes preventing their daughters from taking part in the decision: "*I did it early to take the decision instead of her, and I assume that completely; for me it's the mother's role.*" (M1V). Doctors seemed to share that perspective, as girls explained they rarely discussed HPV vaccination directly with them: "*He said 'on this day, I would like you to come back to get a vaccine', but then he explained everything to my mum*" (FG2). One mother believed that involving her daughter in this decision would represent '*cowardice*' and not '*assuming your role as a parent in decision making'*, stressing that "*the responsibility could place a weight on her shoulders*" (M16).

Despite most girls and mothers agreeing that the decision should remain the responsibility of parents, some participants believed that girls should also be involved in the decision to some extent. Having an informed discussion about the vaccine and HPV infection and cervical cancer was described as important by both

mothers and adolescent girls. A few girls also believed that as the vaccine concerns their own bodies, they should make the final decision, showing a sense of personal identity and separate self: "*It concerns girls, not parents. They won't be the ones who have to live with the vaccine, or who have to get vaccinated. Girls, not parents should decide*" (A20). The age for legal maturity and parental consent was also questioned by mothers, who acknowledged that today's adolescents are becoming mature earlier and suggested that new legislation around access to health could reflect these changes: "*Maybe if there was a legislation to allow girls who would like to get vaccinated to do it without their parents' consent. I mean, for abortions, young people can do it without their parents' consent. So, there is a whole procedure that is already in place.*" (M24). A couple of mums also described trying to empower their daughters in relation to their own health, explaining that HPV vaccination could be a good opportunity to help them become more mature: "*I try to make her more independent. Well, it even goes beyond health; it's more… yes, in terms of autonomy.*" (M11).

3.2. Recognizing the influence of others

When reflecting about HPV vaccination, the role and influence of others in decision-making was discussed differently by adolescent girls, which could indicate different maturity levels. Although some girls understood the influence others such as friends, experts or figures publicly discussing vaccination may have on their own decisions, others referred to themselves as stubborn or not easily influenced: "*I like to make decisions myself. (…) If the advice fits me, I follow it, if it doesn't, I don't follow it. I follow my own mind*" (A3). One girl also reported doing the opposite of what people tell her, almost describing an act of teenage rebellion: "*Most of the time, when people tell me something, I do the opposite (…) when I want something, I really want it so even if I listen to what they tell me… (…) I'm quite stubborn actually*" (A11). Girls who understood the influence of others often grounded their responses in more reflection and explained their decisions would depend on whom they talk to.

3.3. Adolescent girls' understanding of HPV vaccination

Maturity in decision-making was described by both mothers and adolescents in relation to the understanding of what HPV vaccination represents, with many describing adolescent girls as too young to be responsible for the decision: "*I don't think she has perspective, well she cannot understand and could refuse because of opposition [to her parents] or because she doesn't like injections, or because she doesn't understand the importance of this decision*" (M13V). While some participants were aware of the benefits of protection against cancer or the understanding of the possible risks associated with vaccination, some mothers also described maturity in relation to a girl's awareness of sexual health: "*she isn't in this type of thing, and she doesn't have the consciousness of all these [issues], what is an STI… She's millions miles away from all of this*" (M11). This was only described by one adolescent girl: "*We're not going ask a 10 year-old to choose whether she wants to get vaccinated, because she doesn't have the maturity to understand what it consists of. But I think we should talk more to girls, especially as they engage in sexual intercourse earlier now, so they should be warned before it happens*" (A24).

Many adolescent girls were not aware of HPV vaccination, and showed limited understanding around HPV infection, cervical cancer and HPV vaccination. They often explained this by a lack of access to information rather than unwillingness to become more informed. In fact, many girls explained that they would need more information before being able to decide whether to accept the vaccine, showing an understanding of the need to evaluate situations before making decisions. Girls not only explained they would do their own research before making a decision, but also described an assessment of where to find trustworthy information. The importance of obtaining advice from others was raised, especially those with more expertise such as doctors or those with previous experience with vaccination, such as older sisters.

3.4. Impulsive and emotional decisions

Adolescence was also seen as a period of change, when decisions are sometimes highly volatile. A few girls changed their mind repeatedly as the interview progressed. One explained that her responses cannot be seen as certain because adolescent girls change their minds based on the situations they are in, from one day to the next: "*Opinions change all the time. (…) the fact that you ask me all these questions, I answer them, but I know, myself, personally, I really know that it's probably going to change. Maybe one day, I will finally have a response*" (A3). While for some girls, this could be a sign of impulsive decision-making, it could also be a sign of maturity, showing that adolescents take into account different influences before making decisions: *"If I still don't want to get vaccinated then I won't do it and if I received information that convinced me to get vaccinated, then I would do it*" (A21V). This can be particularly difficult in a controversial context, as adolescents explained they received conflicting advice from doctors and mothers described the vaccine as highly controversial.

In comparison to mothers, girls seemed calmer when discussing HPV vaccination, less influenced by emotions and impulses. While mothers showed strong fears about the safety of HPV vaccination and discussed the vaccine as highly controversial, girls were convinced of the protection offered by the vaccine, expressing positive feelings of security, reassurance and tranquillity associated with a vaccine that prevents cancer. Girls also explained that as they become more mature, they have less emotional reactions to decisions. For example, not being afraid of needles was associated with '*growing up*', with most girls describing their experience of vaccination as a stress-free one.

3.5. Understanding the broader context in which decisions are made

HPV vaccination was discussed in the context of the general public's decisions around vaccination with girls describing public controversies around vaccination: "*It's controversial. Of course! If it wasn't, we would have done, or we wouldn't have… but we would be asking ourselves the questions, we wouldn't be here to talk about it. I think that's what differentiate it from other vaccines, yes*" (A10). However, attitudes towards parents who might be hesitant to vaccinate their children were varied. Some girls expressed incomprehension and strong criticism of parents who might not want to vaccinate their daughters and protect them against diseases: "*If parents don't want her to get vaccinated, it's not normal*" (A23V). Others, despite disagreeing with anti-vaccine views, expressed an understanding of the reasons for their hesitancy: "*I know there are controversies around vaccines, saying that they don't necessarily work or they cause other diseases or complications, or that we would catch the diseases when receiving the vaccine, but I do not believe all of this*" (A24). Finally, some girls, especially those with mothers with anti-vaccination views, expressed worries about the controversies around HPV vaccination.

Adolescent girls discussed HPV vaccination with both a short- and long-term outlook, particularly in relation to the prevention of HPV infection and cervical cancer. In fact, while most girls described the importance of the prevention of cancer in the long-term, some girls also believed that it was too early for them to get vaccinated as they were not sexually active yet: "*If you don't have sex when you're 15 years old, well, I don't see why you would*

do a vaccine that protects against sexually transmitted diseases" (A2). One girl also discussed the permanence of the decision to accept a vaccine: "*I think that there is more of a preventive nature in saying no than if I say yes when, well, once we have said yes, in fact, it's a little irreversible. We can't, we can't go back, so I would say no*" (A10).

A few unvaccinated and vaccinated girls also discussed the act of vaccinating themselves as a social one and a way of protecting others, such as their sexual partners or the greater community. Finally, some adolescent girls also understood the role of social institutions in their decision, mentioning that vaccines can be trusted because they are produced by experts and health authorities whose role is to protect populations.

4. Discussion

This study explored the role of maturity in adolescent decision-making around HPV vaccination in France. Adolescent girls' involvement in decision-making was found to be a process that evolves together with maturity, with important differences identified in maturity levels and participation in decision-making from one family to the next. While some girls described childlike traits such as doing the opposite of what they are being told or making impulsive decisions without understanding the role and influence of others on their own decisions, others reported going through more rational decision-making processes. These differences could be a consequence of adolescents progressing towards maturity at different speeds and could be influenced as well as influence relationships between adolescents and their mothers [33,34]. In fact, some adolescents described their life as a period of change, explaining that as they become more mature, they start asking more questions and become less emotional when making decisions. For example, while many studies have previously reported strong fears of needles among adolescents [35–37], participants in this study reported being less anxious about needles than they used to be when they were younger, associating overcoming their fears with progressing towards adulthood.

In contrast to more mature adolescents, some girls described their decision-making process as highly volatile, explaining that their decisions would be influenced by the information they receive and the people they speak to, with some girls even repeatedly changing their mind about HPV vaccination during the interview. This could suggest these adolescent girls were less emotionally mature, making decisions emotionally or impulsively rather than rationally [23]. However, some mothers expressed even more emotional reactions to HPV vaccination than their daughters, confirming the theories that adults often make decisions, including in relation to vaccination, using an intuitive, rapid and sometimes emotional system rather than a more analytical one [38,39]. Adolescence is not only a period of change for adolescents themselves but also for their mothers, and the impact of these changes on the role of emotions in mothers' decision-making should be explored further. Adolescents' volatile decisions and uncertainty may also reflect the controversial environment in France where the adolescent girls grew up, surrounded by information questioning the safety and value of HPV vaccination, including from medical sources and the mainstream media [15]. More research is needed to understand the long-term effect of low public confidence in vaccination on adolescents' future views on vaccination, especially in the current context of misinformation spreading on social and digital media [40].

In fact, adolescent girls expressed strong, albeit varied, opinions about vaccine hesitant individuals in France. Some girls in this research were highly critical of those they labelled as "anti-vaccine", questioning why parents, even their own, would refuse protecting their children against diseases. Others expressed concerns and worries about the controversies and uncertainties around HPV vaccination. More importantly, some adolescent girls also discussed their own mothers' hesitancy towards vaccination, repeating their concerns without necessarily understanding them. Adolescence is an important stage during which health behaviours and beliefs develop, often being passed down from parents [2,41]. As future parents and vaccinators, adolescence is the first time girls are asked to face a decision about vaccination and the influence of vaccine hesitant mothers could have longer term impacts on the girls' future vaccine confidence [4].

Furthermore, most girls in this study described their role in HPV vaccination decision-making as one of passive obedience. Health, and more specifically vaccination, was described as being the responsibility of parents, confirming findings from previous research [35,42,43]. While some girls wished for more involvement in decision-making, most of them followed their parents' decisions. Our findings suggest that adolescents' lack of involvement in decision-making may be related to societal restrictions and social norms rather than solely a lack of maturity. In fact, girls in the study explained receiving little information about HPV vaccination, and being ignored by their doctors who discussed the vaccine directly with their mothers. Only one mother in this study described HPV vaccination as an opportunity to start empowering girls to become more autonomous in health decisions. Similarly, some mothers preferred to avoid talking about the vaccine with their daughters because of personal concerns about vaccination or because of the conviction that girls are too young to be involved in such decisions. The decision of vaccine hesitant mothers to exclude girls from discussions about the vaccine were previously observed in another study in the United States [44]. Girls' exclusions from decision-making means that any positive views towards vaccination or desire to protect themselves from cervical cancer may not influence their mothers' decisions.

As parental consent constitutes a potential barrier to optimal vaccination uptake and mothers' hesitancy towards HPV vaccination is particularly high in France, engaging adolescent girls in decision-making could be beneficial to improving HPV vaccine uptake [15,34,43]. Allowing adolescents to participate in healthcare decisions has not only been shown to make them more autonomous and responsible, but also to help adolescents make better and more informed decisions about sexual health [44–46]. Additionally, adolescent girls in this study as well as in others have reported a desire to become more informed and more involved in decision-making, while showing a strong interest in HPV and cervical cancer [42,43,47]. Yet, most of them reported not having received any information from their teachers at school or from school nurses about the vaccine. Improving communication and education strategies targeted at adolescents is therefore essential to improve their understanding of what vaccination represents and increase their autonomy in vaccination decision-making, especially as awareness was found to be particularly low in this study.

Furthermore, as adolescents were found to progress at different speeds towards maturity, a one-size-fits-all approach to adolescent involvement in shared decision-making may not be appropriate and more individualised approaches may be required. In the UK for instance, adolescent self-consent for HPV vaccination is possible but healthcare professionals are required to use the Gillick competency tool to evaluate their ability to understand what vaccination involves and their competency to make decisions autonomously [48]. Adolescent self-consent comes with important challenges however, such as the risk of straining family relationships by allowing adolescents to override their vaccine-hesitant parents and the difficulty healthcare professionals may face in assessing adolescents' autonomy [21,34]. This is particularly true as some parents' hesitancy in France comes from controversies that surrounded the Hepatitis B vaccination campaign, previously

provided in schools [49]. Focusing on gradually engaging adolescents in their own care and encouraging the development of their responsibility and autonomy instead may be more appropriate in countries without self-consent legislation already in place [34].

4.1. Study limitations

This study provides a valuable analysis of the role of maturity in adolescent decision-making around HPV vaccination. However, some results have to be interpreted with caution. As this was an exploratory study, maturity was not measured against any tools and findings focused on thematic analysis instead. Further research could explore associations between maturity levels, assessed through such scales, and willingness to accept HPV vaccines. All adolescent girls included in this study were from Paris, and most of them were not vaccinated against HPV, which could have skewed some of the findings. Data was collected with 15 to 16 years old girls, to obtain a sample of girls who had passed the age of being offered the vaccine. While our findings around maturity may not apply to younger girls, they provide important information around the possible involvement of older girls in decision-making. The use of two different recruitment methodologies may also have influenced the final sample of participants included in the study. Girls who accepted to take part in the study may have been more mature than those who refused, influencing some of the findings. Findings from this study are only applicable to adolescent girls: no interviews were conducted with adolescent boys as they were included in the HPV vaccination programme in France in 2020, after data for this study was collected. Future research could explore the differences in the role of maturity among boys and girls in HPV vaccination decision-making.

4.2. Conclusion

This study found that adolescent girls in France were rarely included in HPV vaccination decision-making, despite their interest in HPV and cervical cancer and their desire to be involved in discussions with their mothers and doctors. While adolescent girls and mothers described involvement in decision-making as a process that evolves together with maturity, adolescents were often prevented from taking part in decisions by their mothers, doctors, and a lack of information. As some adolescents showed signs of maturity of decision-making, strategies should be developed to increase their gradual engagement in their own care, including in vaccination. This is especially important in a context where mothers are refusing or delaying HPV vaccination due to low confidence in vaccination.

CRediT authorship contribution statement

E. Karafillakis: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft. **P. Peretti-Watel:** Conceptualization, Methodology, Supervision, Writing – review & editing. **P. Verger:** Conceptualization, Methodology, Writing – review & editing. **T. Chantler:** Conceptualization, Methodology, Writing – review & editing. **H.J. Larson:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of Competing Interest

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Appendix A. Supplementary data

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