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[Qualitative Review]

Factors that influence caregivers' and adolescents' views and practices regarding human papillomavirus (HPV) vaccination for adolescents: a qualitative evidence synthesis

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ABSTRACT

Background

Human papillomavirus (HPV) vaccination in adolescents provides a powerful tool for preventing cervical cancer in women and other HPV-associated diseases in people of all genders. HPV vaccines have been progressively introduced in many countries. However, worldwide, many adolescents do not receive HPV vaccination, for various reasons. The HPV vaccine might be costly or unavailable, healthcare systems might lack capacity for its delivery, or adolescent health might not be prioritised. Some caregivers and adolescents may not accept available HPV vaccines and vaccination services.

We currently lack a comprehensive understanding of the factors that influence HPV vaccination views and practices, and why some caregivers and adolescents may be less accepting of the vaccine. Qualitative research can contribute to this understanding and help inform policy and practice, including the development of more relevant, acceptable and effective interventions to promote public acceptance and uptake of HPV vaccination in adolescents.

This qualitative evidence synthesis supplements a Cochrane review of the effectiveness of interventions to improve uptake of adolescent vaccination, including HPV vaccination.

Objectives

The objectives of the review are to identify, appraise, and synthesise qualitative studies that explore caregivers' or adolescents' views, experiences, practices, intentions, decision-making, acceptance, hesitancy, or nonacceptance of HPV vaccination; to gain an understanding of the factors that influence caregiver and adolescent views and practices regarding HPV vaccination for adolescents; and to explore how the findings of this review can enhance our understanding of the related Cochrane intervention review.

Search methods

We searched MEDLINE, Embase, CINAHL, PsycInfo, and Scopus for eligible studies (February 2023). We updated this search in October 2024, but these results have not yet been fully incorporated.

Selection criteria

We included studies that utilised qualitative methods for data collection and analysis; focused on caregivers' or adolescents' views, practices, acceptance, hesitancy, or refusal of HPV vaccination for adolescents aged 9 to 19 years of age; and were from any setting globally where HPV vaccination is provided.

Data collection and analysis

We used a prespecified sampling frame to capture a sample of eligible studies that were from a range of geographical and income-level settings, were conceptually rich in relation to the review's phenomenon of interest, and included HPV vaccination for diverse genders. We extracted contextual and methodological data from each sampled study. We used a thematic synthesis approach to analyse the evidence. We assessed methodological limitations using a list of criteria used in previous Cochrane reviews and originally based on the Critical Appraisal Skills Programme quality assessment tool for qualitative studies. We used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to assess our confidence in each review finding. We integrated the findings of this review with those from the related Cochrane review of intervention effectiveness (by Abdullahi and colleagues), by mapping whether the trial interventions reflected or targeted the factors identified by this review as influencing caregivers' or adolescents' views and practices regarding HPV vaccination.

Main results

We included 206 studies in the review and sampled 71 of these for our synthesis. Of these, 35 studies were conducted in high-income countries, 26 studies in middle-income countries, 8 studies in low-income countries, and 2 studies in multiple-income settings. Studies came from all six World Health Organization (WHO) regions and included urban and rural settings. We downgraded our confidence in several findings, mainly due to concerns about how the studies were conducted (methodological limitations), concerns about perspectives lacking from some types of participants or in some settings (relevance), or because of variability in the data or insufficient evidence to support all aspects of a review finding (coherence).

Many complex factors were found to influence caregivers' and adolescents' HPV vaccination views and practices, which we categorised into eight overarching themes: 1) A lack of biomedical knowledge; 2) Perceptions of a range of interrelated risks and benefits (or lack thereof) associated with HPV vaccination; 3) Routine responses to vaccination generally or more specific views or experiences of other vaccines and vaccination programmes; 4) Complex nuclear familial decision-making dynamics; 5) Extended familial and social relations and networks, particularly extended family members, peers, traditional or religious leaders, and the media; 6) Interrelated socio-cultural beliefs and practices regarding adolescence, sexuality, gender, parenting and health; 7) Trust or distrust in the institutions, systems or experts associated with vaccination, most particularly teachers and the school, the pharmaceutical industry, government, science and biomedicine, and healthcare professionals; and 8) Access to, and experiences of, HPV vaccination programmes and delivery services, such as the convenience (or lack thereof) of HPV vaccination services, the cost of the vaccine, language barriers, the feminisation of HPV vaccination programmes and procedural aspects of school-based vaccination delivery.

We did not identify any major differences in the occurrence of these overarching themes between subgroups. However, for various subthemes certain differences emerged in relation to place, gender and socio-economic status, and between caregivers and adolescents.

The interventions tested in the related Cochrane review of intervention effectiveness most commonly targeted caregivers' and adolescents' lack of biomedical knowledge and their perceptions of the risks and benefits of HPV vaccination, with the other influencing factors identified by our review being underrepresented.

Authors' conclusions

Our review reveals that caregivers' and adolescents' HPV vaccination views and practices are not only influenced by issues related to individual knowledge and perceptions of the vaccine, but also an array of more complex, contextual factors and meanings: social, political, economic, structural, and moral. Successful development of interventions to promote the acceptance and uptake of HPV vaccination for adolescents requires an understanding of the context-specific factors that influence HPV vaccination views and practices in the target setting. Through this, more tailored and in turn more relevant, acceptable, and effective responses could be developed. The eight overarching themes that emerged from our review could serve as a basis for gaining this understanding.

PLAIN LANGUAGE SUMMARY

What factors influence caregivers' and adolescents' views and practices around human papillomavirus (HPV) vaccination for adolescents?

Key messages

• Many complex factors may influence caregivers' and adolescents' views and actions about human papillomavirus (HPV) vaccination for adolescents. We divided them into 8 themes relating to individual knowledge and perceptions, family and social relationships, and the wider contexts in which caregivers and adolescents live.

• Healthcare planners and policy-makers could use the themes to help them understand specific contexts in which people are making decisions about HPV vaccination. This may help them design more relevant and effective ways to promote vaccination acceptance and uptake.

What is human papillomavirus (HPV), and why vaccinate against it?

HPV is the leading cause of cervical cancer in women and also causes genital warts and several types of cancers in people of all genders. Vaccinating adolescents (young people aged from 9 to 19 years) is one of the most effective ways to prevent these illnesses.

Why is it important to understand what affects caregivers' and adolescents' decisions around HPV vaccination?

To be successful, HPV vaccination programmes depend on high levels of vaccination uptake. However, worldwide, many adolescents do not receive HPV vaccination. There are several reasons for this. Vaccines might be unavailable or adolescents may experience difficulties accessing vaccination services, for instance, because of poor-quality health services, distance from a health facility, or lack of money. Some caregivers and adolescents may not accept HPV vaccination.

What did we want to find out?
We wanted to know what factors influence caregivers' and adolescents' views and actions around HPV vaccination. We were interested in factors that may 'enhance' or 'reduce' acceptance of HPV vaccination.

What did we do?
We searched for studies that explored caregivers' or adolescents' views, experiences, and actions related to HPV vaccination for adolescents, in all countries where HPV vaccination is provided. Study participants had to be adolescents or caregivers who were responsible for deciding whether an adolescent should be vaccinated.

What did we find?
We found 206 relevant studies and analysed the results from 71 of them. Studies took place all over the world, and included urban and rural locations, as well as people living in high-, middle-, and low-income countries and communities.

Main results
We found that many complex factors may influence what caregivers and adolescents think about HPV vaccination and what actions they take. We divided these into 8 themes.

1. A lack of medical knowledge

2. Beliefs and ideas about the risks and benefits of HPV vaccination

3. Views or experiences of other vaccines and vaccination programmes

4. The roles adolescents and their primary caregivers play in decision-making

5. The views and actions about HPV vaccination of other family members or other members of their social community, such as peers, traditional or religious leaders, and the media

6. Wider social or cultural beliefs about adolescence, sexuality, gender, parenting and health

7. Trust or mistrust in the institutions or people associated with vaccination, such as teachers and schools, the pharmaceutical industry, the government, and healthcare professionals

8. Access to, and experiences of, HPV vaccination programmes and services, such as how convenient they are, the cost of the vaccine, or barriers related to language.

What are the limitations of the evidence?
Our confidence in the evidence is mainly moderate to high. However, the methods or findings of some studies were not very clear, and some focused on one type of setting or country, so were potentially not relevant for other settings or countries. All the included studies were published in English or French, so we may have missed findings published in other languages.

How up to date is this evidence?
The evidence is up-to-date to February 2023.

SUMMARY OF FINDINGS

Summary of findings 1. Summary of qualitative findings. Theme 1: Biomedical knowledge

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 1 Biomedical knowledge about HPV and HPV vaccination was often limited amongst caregivers and adolescents.	Albert 2019; Alexander 2012; Ali 2022; Ambali 2022; Balogun 2018; Bowen 2014; Bunton 2013; Burke 2015; Chau 2021; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Craciun 2012; Creed 2021; Dalmau 2020; De Fouw 2023; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Harries 2009; Holroyd 2022; Jackson 2016; Joseph 2015; Katahoire 2008; Katz 2013; Kisaakye 2018; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Marlow 2009; Muresianu 2022; Patrick 2022; Paul 2014; Perez 2015; Perkins 2013; Rail 2018; Reiter 2014; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015; Warner 2015	High confidence	
Finding 2 A lack of biomedical knowledge about HPV and HPV vaccination contributed to reducing many caregivers' and adolescents' acceptance of the vaccine, including influencing their decision to delay or decline it, or generating concerns that they had accepted the vaccine or were expected to accept it without being properly informed. Providing caregivers and adolescents with biomedical information about HPV and HPV vaccination could enhance acceptance of it.	Ambali 2022; Bartolini 2012; Beyen 2022; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Craciun 2012; Creed 2021; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Holroyd 2022; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Patrick 2022; Perez 2015; Perkins 2013; Rail 2018; Remes 2012; Roncancio 2019; Turiho 2017; Venderbos 2022; Vermandere 2015; Warner 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Finding 3 A lack of biomedical knowledge about HPV and HPV vaccination did not impact on many caregivers' and adolescents' acceptance of the vaccine - they accepted it despite having limited biomedical knowledge about it.	Ambali 2022; Balogun 2018; Chiang 2015; Dalmau 2020; Friedman 2013; Getrich 2014; Harries 2009; Joseph 2015; Katahoire 2008; Madhivanan 2009; Paul 2014; Rail 2018; Reiter 2014; Remes 2012; Stephens 2013; Turiho 2017	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Finding 4 A lack of biomedical knowledge about HPV and HPV vaccination contributed to enhancing some caregivers' and adolescents' ac-	Alexander 2012; De Fouw 2023; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Harries 2009; Katz 2013; Turiho 2017; Vermandere 2015; Wakimizu 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and

ceptance of the vaccine. These individuals held beliefs that did not align with biomedical understandings yet served as strong motivators to receive the vaccine.			coherence (contradictory data)

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus

Summary of findings 2. Summary of qualitative findings. Theme 2: Perceptions of the risks and benefits (or lack thereof) of HPV vaccination

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 5 Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its many short-term side effects, including discomfort, pain, swelling or cracked skin at the injection site, dizziness, headache, fever and fainting. The number of vaccine doses required for different vaccination schedules contributed to increasing concerns about side effects for some whilst decreasing concerns for others.	Ali 2022; Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Gutierrez 2013; Harries 2009; Islam 2018; Jackson 2016; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Perkins 2013; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Turiho 2017; Wakimizu 2015; Warner 2015	High confidence	
Finding 6 Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its various serious and long-term adverse effects. Negative reproductive health effects for women, including infertility, were a particularly prominent concern.	Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Gutierrez 2013; Harries 2009; Islam 2018; Jackson 2016; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Perkins 2013; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Turiho 2017; Wakimizu 2015; Warner 2015	High confidence	
Finding 7 Many caregivers and adolescents were less accepting of HPV vaccination due to their uncertainty about the effectiveness of the vaccine.	Adeyanju 2022; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Islam 2018; Jackson 2016; Joseph 2015; Kucheba 2021; Mitchell 2021; Njuguna 2021; Perkins 2013; Rendle 2017; Siu 2014; Turiho 2017; Wakimizu 2015; Ward 2017	High confidence	
Finding 8	Bartolini 2012; Bowen 2014; Burke 2015; Cooper 2010; Cover 2012; Craci-	High confidence	

Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about the relative 'newness' of the vaccine, which contributed to uncertainty regarding its safety and effectiveness. Some caregivers wished to delay HPV vaccination for their adolescent until they felt sufficient evidence had accumulated about its risks and benefits.	un 2012; Dalmau 2020; Elit 2022; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Gordon 2011; Joseph 2015; Katahoire 2008; Kucheba 2021; Liebermann 2020a; Njuguna 2021; Perkins 2013; Rail 2018; Rendle 2017; Siu 2014; Turiho 2017; Venderbos 2022; Vermandere 2015; Wakimizu 2015; Ward 2017		
Finding 9 Many adolescents were less accepting of HPV vaccination due to their fear or dislike of needles.	Alexander 2012; Balogun 2018; Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Jackson 2016; Katahoire 2008; Njuguna 2021; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Wakimizu 2015	High confidence	
Finding 10 Many caregivers were less accepting of HPV vaccination due to their concern that it would promote what they perceived as 'inappropriate' sexual practices, including the initiation of sex, promiscuity or unsafe sexual practices.	Albert 2019; Alexander 2012; Ambali 2022; Balogun 2018; Bartolini 2012; Cooper 2010; de Oliveira 2019; Evans 2021; Fielding 2018; Fisher 2020; Francis 2011; Kucheba 2021; Perkins 2013; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Warner 2015	High confidence	
Finding 11 Many caregivers and adolescents perceived cervical cancer to be a frequent and serious illness that causes immense pain, suffering and financial cost. This contributed to increasing their HPV vaccination acceptance, particularly amongst those with personal experiences of cervical cancer and those from resource-limited settings.	Albert 2019; Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Creed 2021; Dalmau 2020; De Fouw 2023; de Oliveira 2019; Elit 2022; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Harries 2009; Jackson 2016; Joseph 2015; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Patrick 2022; Remes 2012; Turiho 2017; Vermandere 2015; Wakimizu 2015; Ward 2017	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Finding 12 Some caregivers perceived cervical cancer and other HPV-related cancers to be illnesses that are not easily transmitted and increasingly preventable, detectable and treatable. This contributed to reducing their acceptance of HPV vaccination as the prevention of cancer, including cervical cancer, was not seen as a significant benefit of vaccination.	Albert 2019; Bowen 2014; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Ward 2017	Low confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about both coherence (contradictory data) and adequacy
Finding 13 Some caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other cancers besides cervical cancer, which in turn contributed to increasing their accep-	Alexander 2012; Cover 2012; Creed 2021; Galbraith-Gyan 2019; Grandahl 2019; Joseph 2015; Patrick 2022; Perkins 2013; Venderbos 2022; Wakimizu 2015	High confidence	

tance of it. This was a particularly common motivator of HPV vaccination for adolescent men.			
Finding 14 Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against HPV infection, which in turn contributed to increasing their acceptance of it. This was a particularly common motivator of HPV vaccination for adolescent men.	Alexander 2012; Ambali 2022; Cordoba-Sanchez 2019; Galbraith-Gyan 2019; Getrich 2014; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Njuguna 2021; Paul 2014; Perkins 2013; Roncancio 2019; Venderbos 2022; Vermandere 2015	High confidence	
Finding 15 Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other STIs besides HPV, including genital herpes, gonorrhoea and HIV/AIDS. This in turn contributed to increasing their HPV vaccination acceptance. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings in which endemic sexual and gender-based violence was perceived to make women particularly vulnerable to STIs.	Alexander 2012; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Grandahl 2019; Harries 2009; Joseph 2015; Katz 2013; Perkins 2013; Turiho 2017	High confidence	
Finding 16 Many caregivers and adolescents perceived HPV vaccination as beneficial for health promotion and disease prevention generally, which contributed to increasing their acceptance of it. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings, where preventing illness and associated financial burden were frequently viewed as very important.	Albert 2019; Alexander 2012; Ambali 2022; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cordoba-Sanchez 2022; Cover 2012; Creed 2021; de Oliveira 2019; Elit 2022; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Joseph 2015; Katz 2013; Madhivanan 2009; Patrick 2022; Paul 2014; Roncancio 2019; Turiho 2017	Moderate confidence	Finding downgraded because of moderate concerns about methodological limitations
Finding 17 Some caregivers perceived HPV vaccination as beneficial only for the individual who receives it and therefore thought herd immunity was not an advantage. This contributed to reducing these caregivers' HPV vaccination acceptance due to their sense of collective responsibility as a driver for vaccination.	Gordon 2011; Reich 2010	Very low confidence	Finding downgraded because of serious concerns about both adequacy and relevance (partial relevance)
Finding 18 Many adolescents and caregivers perceived HPV vaccination to be beneficial and necessary only for people who are, or are about to become, sexually active. Numerous adolescents indicated that they were not yet sexually active, and many caregivers thought their adolescent was not yet having sex nor would be in the foreseeable future. This in turn con-	Alexander 2012; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Lismidiati 2019; Madhivanan 2009; Perkins 2013; Reich 2010; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Wakimizu 2015	High confidence	

tributed to reducing HPV vaccination acceptance for these adolescents and caregivers.			
Finding 19 Some caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who have not yet engaged in sexual activities. This contributed to reducing acceptance of HPV vaccination amongst adolescents who were already sexually active or caregivers who suspected their adolescent was already sexually active.	Cooper 2010; Turiho 2017	Very low confidence	Finding downgraded because of serious concerns about adequacy, moderate concerns about relevance (partial relevance) and minor concerns about coherence (contradictory data)
Finding 20 Many caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who engage in what was seen as 'inappropriate' sexual practices, including promiscuity, having multiple sexual partners or premarital sex. Numerous adolescents and caregivers characterised themselves or their adolescent as practising monogamy, sexual restraint or abstinence until marriage, which contributed to reducing their acceptance of HPV vaccination.	Albert 2019; Balogun 2018; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Harries 2009; Jackson 2016; Joseph 2015; Katahoire 2008; Liebermann 2020a; Madhivanan 2009; Paul 2014; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus; **STI:** sexually transmitted infection

Summary of findings 3. Summary of qualitative findings. Theme 3: Views and experiences of other vaccines and vaccination programmes

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 21 Some adolescents' and caregivers' views and practices around HPV vaccination formed part of a routine response to vaccines and vaccination more generally. This contributed to both increasing and decreasing HPV vaccination acceptance, depending on their routine response.	Bowen 2014; Bunton 2013; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Jackson 2016; Marlow 2009; Perkins 2013; Rail 2018; Roncancio 2019; Venderbos 2022; Ward 2017	High confidence	
Finding 22 Some caregivers' and adolescents' views and practices around HPV vaccination were influenced by their views and experiences of other vaccines or vaccination programmes. A belief that vaccination is generally beneficial, witnessing the benefits of other vaccines, or having positive personal experiences receiving other vaccines contributed to in-	Bartolini 2012; Burke 2015; Chau 2021; Chiang 2015; Cover 2012; Creed 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Katahoire 2008; Kucheba 2021; Madhivanan 2009; Mitchell 2021; Patrick 2022; Paul 2014; Reich	High confidence	

creasing HPV vaccination acceptance amongst various caregivers and adolescents. In contrast, witnessing adverse effects of other vaccines or having negative personal experiences receiving other vaccines contributed to decreasing HPV vaccination acceptance amongst various caregivers and adolescents.	2010; Remes 2012; Turiho 2017; Vermandere 2015; Ward 2017

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus

Summary of findings 4. Summary of qualitative findings. Theme 4: Nuclear familial decision-making dynamics

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 23 Sometimes the decision around HPV vaccination was perceived to be made by the caregiver(s), with limited or no involvement of the adolescent. Some adolescents were supportive of this parental decision-making authority, whereas others resented not being consulted, particularly when they held contrasting HPV vaccination views to their caregiver(s). In both cases, HPV vaccination could be received, delayed or declined, depending on the caregivers' views.	Alexander 2012; Bowen 2014; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Elit 2022; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Warner 2015	High confidence	
Finding 24 Sometimes the decision around HPV vaccination was perceived to be made by the adolescent. This was potentially more common amongst older adolescent men and men who have sex with men (MSM); in households where primary caregiver(s) were absent; or when adolescents held contrasting HPV vaccination views to their caregiver(s). In all cases, HPV vaccination could be received, delayed or declined, depending on the adolescent's views.	Alexander 2012; Bowen 2014; Cooper 2010; Craciun 2012; Fisher 2020; Grandahl 2019; Gutierrez 2013; Joseph 2015; Katz 2013; Pop 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Finding 25 Various caregivers held a view that the decision around HPV vaccination should be made by adolescents because it is the adolescent's body and sexuality. Some of these caregivers therefore delayed HPV vaccination until their adolescent was older and thought to be more equipped to make the decision themselves.	Alexander 2012; Bowen 2014; Craciun 2012; Joseph 2015; Pop 2015	Low confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data) and moderate concerns about both relevance (partial relevance) and adequacy
Finding 26 Sometimes the decision around HPV vaccination was perceived to be a consultative process and made jointly between the caregiver(s) and adolescent. When views differed, the ultimate decision was perceived to reside with	Alexander 2012; Bartolini 2012; Bowen 2014; Cooper 2010; Cordoba-Sanchez 2019; de Oliveira 2019; Getrich	High confidence	

the caregiver(s) in some instances and the adolescent in others. In both cases, HPV vaccination could be received, delayed or declined, depending on the views of the final decision-maker.	2014; Gordon 2011; Grandahl 2019; Wakimizu 2015		
Finding 27 Often HPV vaccination decision-making comprised either paternal or maternal caregiver involvement, rather than both. Which caregiver was involved was frequently influenced by who was primarily responsible for making decisions about the household or child-rearing. In all cases, HPV vaccination could be received, delayed or declined, depending on the views of the caregiver involved.	Adeyanju 2022; Ali 2022; Ambali 2022; Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Fielding 2018; Francis 2011; Gordon 2011; Jackson 2016; Madhivanan 2009; Muresianu 2022; Njuguna 2021; Roncancio 2019	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus

Summary of findings 5. Summary of qualitative findings. Theme 5: Social networks, communities and the media

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 28 Various caregivers' and adolescents' views and practices around HPV vaccination were influenced by the HPV vaccination views and practices of their extended family members. This contributed to both increasing or decreasing HPV vaccination acceptance, depending on family members' views and practices.	Ali 2022; Bartolini 2012; Cooper 2010; Cover 2012; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Gutierrez 2013; Holroyd 2022; Jackson 2016	High confidence	
Finding 29 Adolescents' peers played an important role in shaping their HPV vaccination views and practices. When peers provided misinformation, discouraged vaccination, ridiculed those receiving the vaccine, or had negative reactions when they received the vaccine, this contributed to reducing HPV vaccination acceptance for many adolescents. In contrast, when vaccination rates amongst peer groups were high or when peers were witnessed receiving the vaccine without experiencing side effects, this contributed to enhancing HPV vaccination acceptance for many adolescents.	Beyen 2022; Cooper 2010; Fielding 2018; Friedman 2013; Getrich 2014; Katz 2013; Kucheba 2021; Patrick 2022; Roncancio 2019; Rujumba 2021; Wakimizu 2015	High confidence	
Finding 30 Caregivers' peers played an important role in shaping their HPV vaccination views and practices. When their peers expressed concerns about the vaccine or declined it for their own adolescent, this contributed to reducing HPV vaccination acceptance amongst many caregivers. In contrast, when their peers accepted the vaccine for their own adolescent or when their peers' adolescent	Chiang 2015; Craciun 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Mitchell 2021; Njuguna 2021; Roncancio 2019; Turiho 2017; Venderbos 2022	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)

received the vaccine without experiencing negative effects, this contributed to enhancing HPV vaccination acceptance amongst many caregivers.			
Finding 31 Some caregivers' HPV vaccination views and practices were influenced by the HPV vaccination views and practices of traditional or religious leaders. This contributed to both increasing or decreasing acceptance of HPV vaccination, depending on the views and practices of traditional or religious leaders.	Balogun 2018; Galbraith-Gyan 2019; Liebermann 2020a; Turiho 2017	High confidence	
Finding 32 Many caregivers' and adolescents' views and practices around HPV vaccination were influenced by the information they received about the vaccine from the media. Negative media messages about HPV vaccination contributed to increasing fears and doubts, or a decision to delay or decline it. In contrast, positive media messages about HPV vaccination contributed to enhancing confidence in it or a decision to receive it.	Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Grandahl 2019; Jackson 2016; Kucheba 2021; Liebermann 2020a; Nordtug 2021; Siu 2014; Wakimizu 2015; Ward 2017	Moderate confidence	Finding downgraded because of moderate concerns about coherence (contradictory data) and minor concerns about methodological limitations

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus

Summary of findings 6. Summary of qualitative findings. Theme 6: Socio-cultural beliefs and practices

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 33 Several caregivers viewed adolescence, particularly amongst women, as a time of 'sexual innocence' and 'purity'. HPV vaccination appeared to threaten this view, by obliging caregivers to think of their adolescent as a sexual being or to initiate conversations about sex with them. This in turn contributed to decreasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for women.	Alexander 2012; Balogun 2018; Bowen 2014; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Joseph 2015; Katz 2013; Kucheba 2021; Lismidiati 2019; Madhivanan 2009; Muresianu 2022; Paul 2014; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Reiter 2014; Remes 2012; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Warner 2015	Moderate confidence	Finding downgraded because of moderate concerns about coherence (contradictory and ambiguous data) and minor concerns about methodological limitations
Finding 34	Albert 2019; Alexander 2012; Balogun 2018; Chiang 2015; Gordon 2011; Gutierrez 2013;	Moderate confidence	Finding downgraded because of moderate concerns

Several caregivers viewed adolescence, and particularly in men, as a time of 'sexual curiosity' and 'experimentation' that is largely outside of parental control. This in turn contributed to increasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for men.	Harries 2009; Katz 2013; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Rendle 2017		about coherence (contradictory data)
Finding 35 Several caregivers and adolescents associated HPV infection and its sequelae with what they perceived as 'bad' and 'inappropriate' sexual practices that 'others' engage in, including promiscuity, multiple sexual partners or sex before marriage. This in turn contributed to decreasing acceptance of HPV vaccination, particularly for women, amongst many of these caregivers and adolescents as they considered it personally unnecessary or potentially stigmatising to receive.	Balogun 2018; Chiang 2015; Cooper 2010; De Fouw 2023; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Harries 2009; Jackson 2016; Joseph 2015; Katahoire 2008; Liebermann 2020a; Njuguna 2021; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Finding 36 Many caregivers associated 'good' parenting with taking personal responsibility for the promotion and protection of adolescent sexual health, and perceived HPV vaccination as a means to facilitate this responsibility. Some of them perceived HPV vaccination as providing an opportunity to educate their adolescent, whilst others perceived it as enabling them to avoid blame if negative health outcomes ensued despite receipt of the vaccine. In both cases these perceptions contributed to enhancing acceptance of HPV vaccination for many caregivers.	Burke 2015; Chiang 2015; Craciun 2012; de Oliveira 2019; Jackson 2016; Joseph 2015; Katz 2013; Madhivanan 2009; Nordtug 2021; Perkins 2013; Roncancio 2019	Low confidence	Finding downgraded because of moderate concerns about both methodological limitations and coherence (contradictory and ambiguous data)
Finding 37 Many caregivers associated 'good' parenting with taking personal responsibility for the promotion and protection of adolescent sexual health and perceived HPV vaccination as sabotaging this responsibility. Some of these caregivers saw HPV vaccination as a 'passive' method of sexual health promotion and therefore less effective than, or undermining of, more 'active' methods. Others saw HPV vaccination as a form of state intrusion on their parental rights. In both cases these perceptions contributed to reducing acceptance of HPV vaccination for many of these caregivers.	Albert 2019; Bowen 2014; Galbraith-Gyan 2019; Pop 2015; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Ward 2017	Low confidence	Finding downgraded because of moderate concerns about both coherence (contradictory and ambiguous data) and relevance (partial relevance) and minor concerns about methodological limitations
Finding 38 Some caregivers and adolescents were less accepting of HPV vaccination due to the religious beliefs they held, and the view that health and illness are governed by God and divine providence. They in turn perceived HPV vaccination as unnecessary or interfering with God's will.	Cordoba-Sanchez 2019; Evans 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Madhivanan 2009; Perkins 2013; Pop 2015; Vermandere 2015; Warner 2015	Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus

Summary of findings 7. Summary of qualitative findings. Theme 7: Trust or distrust in the institutions, systems or experts associated with vaccination

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 39 Trust in teachers and the school contributed to both enhancing and reducing various caregivers' acceptance of HPV vaccination. When HPV vaccination was provided at their adolescent's school, some caregivers were more inclined to consider it or to have confidence in it. When teachers communicated hesitancy or negative attitudes about HPV vaccination, this contributed to reducing HPV vaccination acceptance for some caregivers.	Bartolini 2012; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Elit 2022; Grandahl 2019; Rail 2018	High confidence	
Finding 40 Some caregivers and adolescents were less accepting of HPV vaccination due to their distrust of the pharmaceutical industry and its perceived profit motive, which they perceived to be corrupting vaccine development, testing and marketing.	Bowen 2014; Bunton 2013; Craciun 2012; Nordtug 2021; Perez 2015; Pop 2015; Reich 2010; Ward 2017	Moderate confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about methodological limitations
Finding 41 Trust in government and government-run programmes was associated with both enhancing and reducing caregivers' acceptance of HPV vaccination. Many caregivers expressed strong sentiments of trust in government, which in turn meant that their acceptance of HPV vaccination depended on it being formally approved or endorsed by government. When this occurred, it contributed to enhancing confidence in, and acceptance of, HPV vaccination for many caregivers. When this was absent, it contributed to reducing confidence in, and acceptance of, HPV vaccination for many caregivers.	Ambali 2022; Bunton 2013; Chau 2021; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; Fielding 2018; Friedman 2013; Katahoire 2008; Madhivanan 2009; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Rail 2018; Remes 2012; Siu 2014; Ward 2017	High confidence	
Finding 42 Distrust of government and government-run programmes contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. These individuals questioned the motives of government and what it promotes, and by extension, were therefore sceptical of the benefits and safety of HPV vaccination.	Bartolini 2012; Cooper 2010; Craciun 2012; Creed 2021; Elit 2022; Evans 2021; Friedman 2013; Kucheba 2021; Nordtug 2021; Patrick 2022; Pop 2015; Ward 2017	High confidence	
Finding 43 Some caregivers and adolescents' views and practices around HPV vaccination were shaped by their trust or distrust of science and biomedicine. Faith in the benefits	Bowen 2014; Chiang 2015; Cover 2012; Evans 2021; Friedman 2013; Islam 2018; Mitchell 2021;	High confidence	

and safety of scientific progress contributed to enhancing some caregivers' and adolescents' confidence in the benefits and safety of HPV vaccination and in turn enhanced their acceptance of it. Other caregivers' and adolescents' distrust of science and biomedicine contributed to reducing their confidence in the benefits and safety of HPV vaccination, and in turn reduced their acceptance of it.	Rendle 2017; Stephens 2013; Ward 2017		
Finding 44 Trust in HCPs was associated with both enhancing and reducing acceptance of HPV vaccination for numerous caregivers and adolescents. Many caregivers and adolescents held strong sentiments of trust in HCPs for various reasons, including as a routine response, the perceived training and expertise of HCPs, experiences of good-quality relationships with them, or because HCPs came from the same ethnic group as them. Consequently, many caregivers and adolescents followed the HPV vaccination recommendations of their HCPs, or turned to them for advice, answers to their questions, help with making sense of information or reassurance. This contributed to both enhancing or reducing acceptance of HPV vaccination, depending on the views and practices of HCPs.	Alexander 2012; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; Dalmau 2020; de Oliveira 2019; Elit 2022; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Islam 2018; Jackson 2016; Joseph 2015; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Lismidiati 2019; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Perkins 2013; Rendle 2017; Roncancio 2019; Siu 2014; Stephens 2013; Ward 2017; Warner 2015	High confidence	
Finding 45 Distrust of HCPs contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. This distrust emerged from a generalised distrust of medicine; the perceived simplistic, unbalanced and contradictory vaccine information provided by HCPs; or the perceived commercial interests or racism of HCPs. Some caregivers and adolescents in turn questioned the motives of HCPs and what they promoted, including HPV vaccination.	Bowen 2014; Craciun 2012; Evans 2021; Gordon 2011; Nordtug 2021; Pop 2015; Rail 2018; Stephens 2013; Ward 2017	Moderate confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about methodological limitations
Finding 46 Some caregivers' and adolescents' distrust in the institutions, systems or experts associated with vaccination was grounded in their experiences of structural discrimination or exploitation. For many, such experiences contributed to reducing their confidence in the motives and actions of those in power, and in turn their acceptance of what they promote, including HPV vaccination.	Bowen 2014; Craciun 2012; Evans 2021; Pop 2015; Stephens 2013	Moderate confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about both methodological limitations and adequacy

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HCP:** healthcare professional; **HPV:** human papillomavirus

Summary of findings 8. Summary of qualitative findings. Theme 8: Access, supply and delivery logistics

Summary of review findings	Studies that contributed to the review finding	GRADE-CERQual assessment of confidence in the evidence	Explanation of GRADE-CERQual assessment
Finding 47 Many caregivers' and adolescents' views and practices regarding HPV vaccination were influenced by the convenience, or inconvenience, they experienced in accessing it. Access barriers such as having to miss work and associated lost wages; lack of time and competing priorities; transportation challenges and costs; difficulties fitting in with vaccination schedules; vaccine stock-outs or limited availability; or a general lack of access to quality healthcare services contributed to reducing acceptance of HPV vaccination for many caregivers and adolescents.	Adeyanju 2022; Ali 2022; Bunton 2013; Chiang 2015; Cooper 2010; Elit 2022; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Islam 2018; Jackson 2016; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Mitchell 2021; Patrick 2022; Paul 2014; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Vermandere 2015; Wakimizu 2015	High confidence	
Finding 48 Many caregivers' and adolescents' views and practices regarding HPV vaccination were influenced by the cost of the HPV vaccine. Having to pay for the vaccine contributed to reducing acceptance of it for many, whereas providing it for free or at a low cost contributed to increasing acceptance for many because it was perceived to be affordable or important. However, providing the HPV vaccine for free or at a low cost contributed to reducing some caregivers' and adolescents' acceptance of it because they equated low cost with low or inferior quality.	Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chau 2021; Cover 2012; Craciun 2012; de Oliveira 2019; Elit 2022; Fielding 2018; Francis 2011; Grandahl 2019; Harries 2009; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Paul 2014; Reiter 2014; Roncancio 2019; Siu 2014; Vermandere 2015; Wakimizu 2015; Warner 2015	High confidence	
Finding 49 Various caregivers and adolescents from ethnic minority groups faced language barriers in accessing healthcare services and health information, including in relation to HPV vaccination. This contributed to reducing acceptance of HPV vaccination due to misunderstanding information about it, or decreasing willingness to seek vaccination services or confidence to engage in conversations with HCPs.	Burke 2015; Jackson 2016; Stephens 2013; Warner 2015	Low confidence	Finding downgraded because of moderate concerns about both relevance (partial relevance) and adequacy
Finding 50 Women-targeted HPV vaccination programmes in various settings contributed to reducing acceptance of HPV vaccination for many adolescents and caregivers. For some it perpetuated the view that the HPV vaccine is a 'female' vaccine and therefore unnecessary or emasculating and embarrassing for men to receive. Others were suspicious of the motives behind targeting women, which in turn reduced	Adeyanju 2022; Bartolini 2012; Beyen 2022; Chau 2021; Chiang 2015; Cooper 2010; Craciun 2012; Friedman 2013; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Perkins 2013; Rail 2018;	High confidence	

their acceptance of HPV vaccination for women. Some resented what they saw as the patriarchal norms of sexual and reproductive health being a woman's responsibility reinforced by women-targeted vaccination programmes. Others resented what they perceived as discrimination against men. Many of these caregivers and adolescents reported being more accepting of HPV vaccination for men and women when it was (or would be) gender-neutral, due to what they perceived as the promotion of equal responsibility and opportunity for sexual health.	Reiter 2014; Remes 2012; Siu 2014; Venderbos 2022; Warner 2015		
Finding 51 Some adolescents' acceptance of HPV vaccination was enhanced when certain school-based delivery strategies were implemented, including using privacy screens and distraction techniques, reducing the numbers of adolescents waiting together for vaccination, and providing vaccination early in the day. These strategies helped to reduce fears and the impact of peers' negative reactions to vaccine administration amongst some adolescents, and in turn contributed to increasing their HPV vaccination acceptance.	Cooper 2010	Very low confidence	Finding downgraded because of serious concerns about both relevance (partial relevance) and adequacy, and minor concerns about methodological limitations

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HCP:** healthcare professional; **HPV:** human papillomavirus

BACKGROUND

Human papillomavirus (HPV) infection is the most common sexually transmitted infection (STI) worldwide (WHO 2019a). It is estimated that between 50% and 80% of sexually active individuals will be infected with HPV at some point in their lives (Baseman 2005; Liu 2015). While most HPV infections are transient and asymptomatic, persistent infection with high-risk HPV types (most frequently HPV-16 and HPV-18) is associated with several cancers (CDC 2015). Cervical cancer is the fourth most common cancer amongst women worldwide, with an estimated 604,127 new cases and 341,831 deaths in 2020 (Bruni 2023). The global burden of cervical cancer is projected to continue to increase, rising to 700,000 cases and 400,000 deaths in 2030, a 21% and 27% increase respectively in the number of cases and deaths from 2018 (WHO 2020). HPV is also known to cause several other conditions in people of all genders, including precancerous lesions, anogenital warts, and cancers of the vulva, vagina, penis, anus, oropharynx, head, and neck (Bruni 2023).

HPV vaccines provide a powerful tool for the primary prevention of cervical cancer in women and other HPV-associated diseases in people of all genders (Bergman 2019; Bloem 2017; WHO 2022a). Three prophylactic HPV vaccines directed against high-risk HPV types are currently available: the quadrivalent vaccine, the bivalent vaccine, and the nonavalent vaccine, which were first licenced in 2006, 2007, and 2014 respectively (WHO 2022a). All three vaccines are intended to be administered prior to HPV exposure, which is ideally before the onset of sexual activity. There is strong and consistent evidence that all three HPV vaccines are safe, highly immunogenic, and induce strong direct and indirect protection against high-risk HPV infection and its sequelae (Arbyn 2018; Drolet 2015; Schiller 2012; WHO 2022a).

Since licensure in 2006, HPV vaccines have been progressively introduced in many countries. By 2023, 126 (66%) of the 194 World Health Organization's (WHO) Member States had introduced HPV vaccination programmes (Lehtinen 2024). The pace of HPV vaccination programme introduction in low- and middle-income countries (LMICs) has been slower than in high-income countries (HICs), due to the high cost of the vaccines (Ebrahimi 2023). However, through financing mechanisms such as Gavi, the Vaccine Alliance and the Pan American Health Organization (PAHO) Revolving Fund for Latin American and Caribbean countries, the number of LMICs with national HPV vaccination programmes and small-scale pilot or demonstration projects has increased in recent years (Black 2018; Botwright 2017; Ebrahimi 2023; Gallagher 2018). For example, of the new introductions of HPV vaccination programmes in 2019, 87% were in LMICs (Bruni 2021).

HPV vaccination programmes in both LMICs and HICs have employed various strategies (or combinations of strategies) to deliver the vaccine. Commonly used strategies include: providing HPV vaccination at fixed healthcare facilities; school-based outreach strategies whereby the vaccine is provided at schools, usually targeting learners of a specific age or in a specific grade/class; other outreach strategies whereby the vaccine is delivered at mobile sites (e.g. community centres, libraries, marketplaces) close to large numbers of target-aged adolescents; and vaccination delivery via large-scale vaccination campaign strategies making use of, for example, existing campaign days (e.g. Child Health Days) or supplementary immunisation activities (WHO 2016b; WHO 2017).

Despite the expansion of HPV immunisation programmes, vaccination coverage remains suboptimal worldwide (Brotherton 2015; Bruni 2021; Lehtinen 2024; Loke 2017; Newman 2018), and has declined in several countries in recent years (Lehtinen 2024; Marshall 2019a). WHO/United Nations Children's Fund (UNICEF) HPV vaccination coverage estimates from 2010 to 2019 reported an average coverage of around 67% for the first dose and 53% for the final dose, while global coverage of the final HPV dose for 2019 and 2021 was only 15% and 12% respectively (Lehtinen 2024). Coverage also varies greatly by region. The WHO/UNICEF coverage estimates for the final dose of the vaccine for women in 2019 ranged from 77% in Australia and New Zealand, 35% in Europe and North America, 20% in sub-Saharan Africa, to only 1% in northern Africa and western, central and southern Asia (Bruni 2021). HPV vaccination coverage has also been negatively impacted by the COVID-19 pandemic, especially in LMICs. School closures and interruption of routine vaccination programmes saw the halting of HPV delivery in many countries, and several planned HPV introductions during the pandemic were delayed (Bruni 2021; Lehtinen 2024; Toh 2021).

Barriers to achieving high HPV vaccination coverage are known to be multifactorial (Fernández 2010). Supply-side factors, such as the cost and unavailability of vaccines, poor health system capabilities for vaccination delivery, vaccine storage and cold chain constraints, and the low prioritisation of adolescent health, are all important contributors to suboptimal HPV vaccination coverage (Bloem 2017; Brotherton 2015; Ebrahimi 2023; Gallagher 2018; Lehtinen 2024). However, low demand for and non-acceptance of HPV vaccination are additional challenges. A range of studies and several reviews have revealed that many caregivers and adolescents lack knowledge about the reasons for, and health benefits of, HPV vaccination and may have multiple concerns about the safety and consequences of HPV vaccination, both in high- and low-income settings (Ebrahimi 2023; Lacombe-Duncan 2018; Loke 2017; Marshall 2019a). However, we currently lack a comprehensive understanding of what influences views and practices regarding HPV vaccination, and why some caregivers and adolescents may be less accepting of HPV vaccination for adolescents. Qualitative research can contribute to this understanding and help inform policy and practice, including the development of more relevant, acceptable, and effective interventions to promote public acceptance and uptake of HPV vaccination in adolescents.

Description of the topic

There is debate in the literature regarding how we should name the fact that some people decide not to vaccinate. Various concepts and definitions have been used, sometimes interchangeably, including nonacceptance, refusal, hesitancy, lack of confidence, lack of trust, low demand and low uptake. However, there is agreement in the literature that traditional understandings of individuals and groups as either ‘anti-’ or ‘pro-’ vaccines are inadequate. Rather, there is growing recognition that vaccination views and practices exist along a continuum, from total acceptance of all vaccines to complete refusal of all vaccines (Feemster 2013; Larson 2014; Larson 2022; NVCA 2015). Vaccine hesitancy is seen to fall in the middle of this continuum. In 2014, the WHO defined vaccine-hesitant individuals as “a heterogeneous group who hold varying degrees of indecision about specific vaccines or vaccination in

general... Vaccine hesitant individuals may refuse some vaccines, but agree to others; delay vaccines or accept vaccines but are unsure in doing so" (WHO 2014a). More recently, the WHO revised its definition of vaccine hesitancy to a "motivational state of being conflicted about, or opposed to, getting vaccinated" (WHO 2022b).

A growing body of evidence also suggests that vaccine acceptance, hesitancy and nonacceptance are complex and context-specific, and that their nature and drivers may vary for different vaccines (Corben 2016; Dubé 2015; Larson 2014; Larson 2022; WHO 2022b). The HPV vaccine and HPV vaccination programmes comprise various features that distinguish them from other childhood, adolescent, and adult vaccines and vaccination services, and which may give rise to certain unique factors influencing their acceptance (or not). The HPV vaccine is one of the newest vaccines recommended for adolescents, and unlike most other adolescent vaccines, requires multiple doses that differ for different ages (WHO 2022a). The vaccine also targets an STI in young adolescents, and thus vaccination views and practices may be influenced by the complex array of socio-cultural norms and taboos frequently associated with both STIs and adolescent sexual activity (Bloem 2017; Pollack 2007). In addition, the vaccine was approved initially for girls only, and later extended to men. Currently, most HPV vaccination programmes continue to prioritise women (Bruni 2021; Bruni 2023). This is in accordance with WHO's initial recommendations that, for the prevention of cervical cancer, the primary target population for HPV vaccination should be girls aged 9 to 14 years (WHO 2017). This 'feminisation' of the vaccine may in turn produce certain distinctive gender disparities in vaccination views and practices (Lacombe-Duncan 2018; Radisic 2017). At the same time, multiple actors are frequently involved in HPV vaccination decision-making, including adolescents, caregivers, healthcare providers, and often teachers (Gowda 2012; McRee 2010). For example, for an adolescent to make a decision about whether to be vaccinated or not, their own assent is required together with legal parental or guardian consent in most cases (WHO 2014b). Teachers also play a pivotal role in the uptake of HPV vaccination, given the extensive use of schools as a delivery platform for HPV vaccination programmes (Abdullahi 2016). The decision-making dynamic amongst these different stakeholders will potentially impact on the HPV vaccination views and practices of both caregivers and adolescents. In sum, caregiver and adolescent views and practices regarding HPV vaccination are potentially influenced by a complex array of factors. Yet our understanding of these factors, and their possible interaction, is still limited.

A number of contrasting conceptual frameworks have been developed in an attempt to understand and categorise the factors that influence vaccination acceptance, hesitancy and nonacceptance generally (Cooper 2019a; Cooper 2021). Various psycho-social models have been developed that seek to identify the socio-psychological factors that shape vaccination. For example, the WHO developed a '3C' framework, including confidence, complacency and convenience constructs (MacDonald 2015; WHO 2013a), which has been extended by others to incorporate two additional 'Cs': calculation and collective responsibility (Betsch 2015; Betsch 2018). The WHO has also recently developed the Behavioural and Social Drivers of Vaccination Framework, which includes four domains: what people think and feel about vaccines; social processes that drive or inhibit vaccination; individual motivations (or hesitancy) to seek vaccination; and practical factors that shape the experience of seeking and receiving vaccination (WHO 2022b).

Other approaches have sought to incorporate the more structural drivers of vaccination. For example, Peretti-Watel and colleagues' model conceptualises vaccine hesitancy and acceptance as a two-dimensional decision-making process that depends on people's level of commitment to modern society's risk culture and their trust in the authority of healthcare providers and mainstream medicine (Peretti-Watel 2015). Also, from a more structuralist perspective, Cooper and colleagues have proposed two concepts for understanding possible pathways to reduced acceptance of childhood vaccination (Cooper 2021). The first concept, 'neoliberal logic', suggests that caregivers who experience a conflict between vaccination programmes and their neoliberal views of health and healthcare decisions, may be less accepting of vaccination for their children. The second concept, 'social exclusion', suggests that experiences of social exclusion may lead caregivers to refuse vaccination because they distrust it, as a form of resistance or a way to bring about change, or to avoid vaccination due to the time, costs, and distress it creates.

Alternative approaches, such as the WHO's 'Vaccine Hesitancy Determinants Matrix', draw on adaptations of socio-ecological models of health behaviour to identify the multiple and interrelated levels of influence impacting on vaccine acceptance, hesitancy, and nonacceptance (Callréus 2010; Larson 2014; Sturm 2005; WHO 2013a).

Thus, there is currently no agreed framework for understanding the factors that influence vaccine acceptance generally, and it is unclear whether any of these models can be appropriately applied to HPV vaccination acceptance more specifically.

This Cochrane review focuses on understanding the (interacting) factors that have been identified through qualitative research, to influence caregiver and adolescent views and practices regarding HPV vaccination, and how these factors may promote or inhibit acceptance. We focus on factors that may 'enhance' or 'reduce' acceptance of vaccination as a way of capturing the continuous, as opposed to categorical, nature of vaccination views and practices. The factors associated with a specific vaccination stance (e.g. delayed vaccination, nonacceptance, hesitancy, acceptance etc.) that were reported by the studies included in this review, are reported in the review findings. Also, we focus specifically on studies that report on the views of caregivers or adolescents, and not those of other relevant stakeholders. This is because our intention is to understand the factors considered important by, and meaningful to, the target users of HPV vaccination. If caregivers or adolescents reported that others have had an influence on their vaccination views and practices, we report this in the review findings.

Why is it important to do this synthesis?

There is currently a large global focus on HPV vaccination as a key strategy to reduce the global burden of cervical cancer and other HPV-related diseases. In 2016, the World Health Assembly adopted the Global Health Sector Strategies for HIV, viral hepatitis and STIs (2016-2021), which endorse the effectiveness of HPV vaccination as a cost-effective STI prevention strategy, and encourage countries to introduce the vaccine and achieve high coverage (WHO 2016a). In 2017, the WHO identified cervical

cancer as a public health priority and recommended that all countries include HPV vaccines within their national immunisation programmes (WHO 2017). Three years later, in its 2020–2030 Cervical Cancer Elimination strategy, the WHO set a target of vaccinating at least 90% of girls before they reach 15 years of age by 2030 (WHO 2020). Over the last decade, numerous countries worldwide have introduced national HPV immunisation programmes, and these numbers are predicted to increase in the future. The beneficial effects of these programmes are already evident, with evidence of decreased prevalence of vaccine-targeted HPV types, and decreased incidence of cervical adenocarcinoma in situ, high-grade cervical intraepithelial neoplasia and genital warts (Arbyn 2018; Bergman 2019; Bonanni 2015; Drolet 2015; Garland 2016; Hall 2019; WHO 2022a).

However, HPV vaccination uptake remains suboptimal worldwide, which threatens to undermine its individual and public health impact (Lehtinen 2024). While there is a need to address the structural and health system barriers to HPV vaccination uptake, strategies that promote public acceptance and uptake of HPV vaccination are also required. To support the development of such strategies, it is important to understand the factors that influence caregivers' and adolescents' views and practices regarding HPV vaccination, and how these factors may promote or inhibit acceptance. A better understanding of these issues could help inform intervention strategies, ensuring better alignment with the norms, experiences, and expectations of recipients, thus potentially improving their effectiveness.

Currently, there is also increased global focus on the demand side of vaccination more generally (Cooper 2021). This is a consequence of several challenges, including low or stagnated vaccination coverage in some settings (de Figueiredo 2016; Hull 2017); recent global outbreaks of largely eliminated vaccine-preventable diseases, such as measles, which have been linked to under-vaccination (Dabbagh 2018; Larson 2018); concerns about the rise of vaccine hesitancy (Larson 2022; WHO 2019b); and more vaccines becoming available and more diseases becoming the focus of eradication campaigns (Larson 2022; WHO 2013b). The COVID-19 pandemic and subsequent global rollout of COVID-19 vaccination programmes have further heightened international concerns about, and focus on, vaccine hesitancy and refusal (NASEM 2021; WHO 2021). A better understanding of the drivers of HPV vaccine hesitancy, and how they may be similar or different to the drivers of hesitancy for other vaccines, could help inform efforts to reduce vaccine hesitancy and promote acceptance more broadly.

How this review might inform or supplement what is already known in this area

Various non-Cochrane reviews have focused on issues related to the demand side of HPV vaccination (see Table 1 for a summary of these reviews). Many of these reviews have a narrow population focus (e.g. only caregivers, only men, only women) and geographical scope (e.g. only from a specific region). Knowledge is therefore limited about whether, and if so how, the factors influencing acceptance of HPV vaccination may differ across settings and population groups (Loke 2017). In addition, whilst several reviews have included qualitative studies, in most cases the results were synthesised quantitatively or in a narrative summary. Carrying out a comprehensive qualitative evidence synthesis that systematically explores the factors that influence vaccination acceptance across global settings, and from the perspective of caregivers and adolescents of any gender, will provide a single point of access for synthesised qualitative evidence on vaccine acceptance to inform interventions and strategies.

This qualitative evidence synthesis also supplements a Cochrane review on interventions to improve vaccination uptake amongst adolescents (Abdullahi 2020). The review found that, compared to standard care, health education and a multi-faceted intervention targeting providers and caregivers probably improve HPV vaccination uptake (moderate-certainty evidence), and that financial incentives may improve HPV vaccination uptake compared to no incentives (low-certainty evidence). The review also found that provider prompts probably have little or no effect, compared to standard care, on HPV vaccination schedules (moderate-certainty evidence), and that a class-based school vaccination strategy probably increases HPV vaccination uptake more than an age-based school vaccination strategy (moderate-certainty evidence). The review concluded that the effectiveness of interventions to enhance HPV vaccination acceptance and uptake is still uncertain. Other reviews have reached similar conclusions (Dempsey 2015; Walling 2016).

The findings of this qualitative evidence synthesis may help to explain why and how some of the interventions to improve HPV vaccination uptake are more effective than others. The findings from this review can also be used to inform the design of future effectiveness reviews by suggesting outcomes that are important to caregivers and adolescents, and generating hypotheses that can be tested, for example, in future subgroup analyses. In addition, the results from this synthesis may help improve our understanding of the reasons for acceptance of HPV vaccination from the perspective of caregivers and adolescents, contributing to the future development of more relevant, acceptable, and, in turn, potentially effective interventions to promote public acceptance and uptake of HPV vaccination.

The findings of this qualitative evidence synthesis also complement a related Cochrane qualitative evidence synthesis on the factors that influence caregivers' views and practices regarding routine childhood vaccination (Cooper 2021), and provide insights into whether the drivers of HPV vaccination acceptance may differ from those pertaining to childhood vaccination.

OBJECTIVES

The objectives of the review are to:

- identify, appraise, and synthesise qualitative studies that explore caregivers', or adolescents' views, experiences, practices, intentions, decision-making, acceptance, hesitancy, or nonacceptance regarding HPV vaccination;
- gain an understanding of the factors that influence caregiver and adolescent views and practices regarding HPV vaccination for adolescents; and
- explore how the findings of this review can enhance our understanding of the related Cochrane intervention review (Abdullahi 2020).

METHODS

When preparing this review, we used EPOC's Protocol and Review Template for Qualitative Evidence Synthesis (Glenton 2020a).

Criteria for considering studies for this synthesis

Types of studies

We included:

- primary studies that used qualitative study designs such as ethnography, phenomenology, case studies, grounded theory studies, or qualitative process evaluations;
- studies that used both qualitative methods for data collection (e.g. focus group discussions, individual interviews, observation, diaries, document analysis, and open-ended survey questions) and qualitative methods for data analysis (e.g. thematic analysis, framework analysis, grounded theory);
- mixed methods studies where it was possible to extract the data that were collected and analysed using qualitative methods;
- studies regardless of whether they were linked to an intervention.

We excluded:

- studies that collected data using qualitative methods but did not analyse these data using qualitative analysis methods (e.g. open-ended survey questions where the response data are analysed using descriptive statistics only).

We did not exclude any studies based on our assessment of methodological limitations, but utilised this information to assess our confidence in the synthesis findings.

Topic of interest

The topic of interest of this synthesis is the factors that influence caregiver and adolescent views and practices regarding HPV vaccination of adolescents from the perspective of caregivers and adolescents.

Types of participants

We included studies that reported on views, experiences, practices, intentions, decision-making, acceptance, hesitancy, or nonacceptance regarding HPV vaccination, as given by caregivers and adolescents. 'Caregiver' means anyone who is directly involved in caring for the adolescent, the decision to vaccinate the adolescent, or the responsibility to take the adolescent for vaccination or provide consent for their vaccination (Ames 2017). 'Adolescent' means people aged 9 through 19 years of age. The WHO defines adolescents as people aged between 10 and 19 years (WHO 2018). However, HPV vaccination is recommended for people aged nine years and older, and thus our definition of adolescence sought to capture this recommendation. We included studies that did not specify the age of participants, but referred to them as 'children' or 'adolescents'.

We excluded studies if they only reported what healthcare providers, teachers, policy-makers, programme administrators, managers, or other immunisation stakeholders said about the vaccination views, practices, acceptance, hesitancy, or nonacceptance of caregivers or adolescents, or the factors influencing them. We also excluded studies if it was not possible to extract the data on caregivers' or adolescents' perspectives from other stakeholders' perspectives.

Types of interventions

We included studies about HPV vaccines and HPV vaccination. HPV vaccines include the three prophylactic HPV vaccines currently available and recommended by the WHO: the quadrivalent vaccine, the bivalent vaccine, and the nonavalent vaccine (WHO 2017). We included studies that did not specify the type of HPV vaccine, but referred to 'HPV vaccine(s)' or 'HPV vaccination'. We included all studies irrespective of the vaccine doses, vaccination schedule, and vaccination setting. HPV vaccination can be provided in a number of settings and through various delivery strategies (WHO 2016b). Examples may include, but not be limited to:

- vaccine delivery at healthcare facilities (e.g. a fixed public or private healthcare facility);
- vaccine delivery through outreach (e.g. at schools, community centres, marketplaces, and other fixed or mobile sites where people gather);
- vaccine delivery through public campaigns.

Settings

We included studies from any setting globally where HPV vaccination is provided. These settings could include healthcare facilities and fixed or mobile outreach sites in communities.

Search methods for identification of studies

Electronic searches

We searched Epistemonikos for related reviews to identify eligible studies for inclusion, as well as the following electronic databases:

- MEDLINE (Ovid) 1946 to April 23, 2021;
- PubMed April 22, 2021 to February 7, 2023;
- Embase (Ovid) 1974 to April 23, 2021;
- Embase (Elsevier) April 22, 2021 to February 10, 2023;
- CINAHL (EBSCO) 1981 to February 10, 2023;
- APA PsycInfo (Ovid) 1806 to April 23, 2021;
- APA PsycInfo (EBSCOhost) April 23, 2021 to February 9, 2023;
- Scopus (Elsevier) 1970 to February 8, 2023.

We chose these databases as we anticipated that they would yield the highest number of results based on preliminary, exploratory searches. We developed search strategies for each database, using guidelines developed by the Cochrane Qualitative & Implementation Methods Group for searching for qualitative evidence (Harris 2018). We did not apply any limits on language or geographical location. Search strategies for all databases are given in Appendix 1.

We performed an updated search of the above databases in October 2024. Those results have been added to Characteristics of studies awaiting classification and will be incorporated into the review at the next update.

Searching other resources

In addition to database searching, we handsearched references of all included studies and key references (i.e. relevant systematic reviews). We also conducted a cited reference search for all included studies in ISI Web of Science and Google Scholar to identify whether they were cited by other relevant papers. Additionally, we contacted researchers with expertise relevant to

the synthesis topic to request studies that might be eligible. Where necessary, we also contacted authors of included studies to clarify reported published information and to seek unpublished results/data.

Data collection, management, and synthesis

Selection of studies

We collated records identified from different sources into one database and removed duplicates. Two independent review authors (SC, BS, NJ, JR, NL, EM) then used Covidence to assess each record for eligibility. At this stage, we decided to exclude dissertations, because of the very high numbers of dissertation abstracts identified and the difficulties we experienced in accessing their full texts. We also excluded conference abstracts without a corresponding full paper, as they were unlikely to provide sufficiently rich qualitative data. We retrieved the full texts of all abstracts identified as potentially relevant by one or both review authors. For both the title/abstract and full-text screening, review authors resolved disagreements through discussion or, when required, by seeking a third review author's opinion. Where appropriate, we contacted the study authors for further information. Where the same study, using the same sample and methods, was presented in different reports, we collated these reports so that each study (rather than each report) is the unit of interest in the review.

Translation of languages other than English

Due to the challenges associated with, and resources required for, translating papers reporting qualitative research, we only selected articles published in languages spoken by the review authors, namely English and French. For the titles or abstracts that were published in languages other than English or French, we performed an initial translation through open-source software (Google Translate). If this translation indicated inclusion, or if the translation was inadequate to make a decision, we retrieved the full text of the paper. Those full texts published in languages other than English or French are marked as such in the Characteristics of studies awaiting classification and are included in the PRISMA diagram (Figure 1 Page 2021).

Figure 1. Study flow diagram

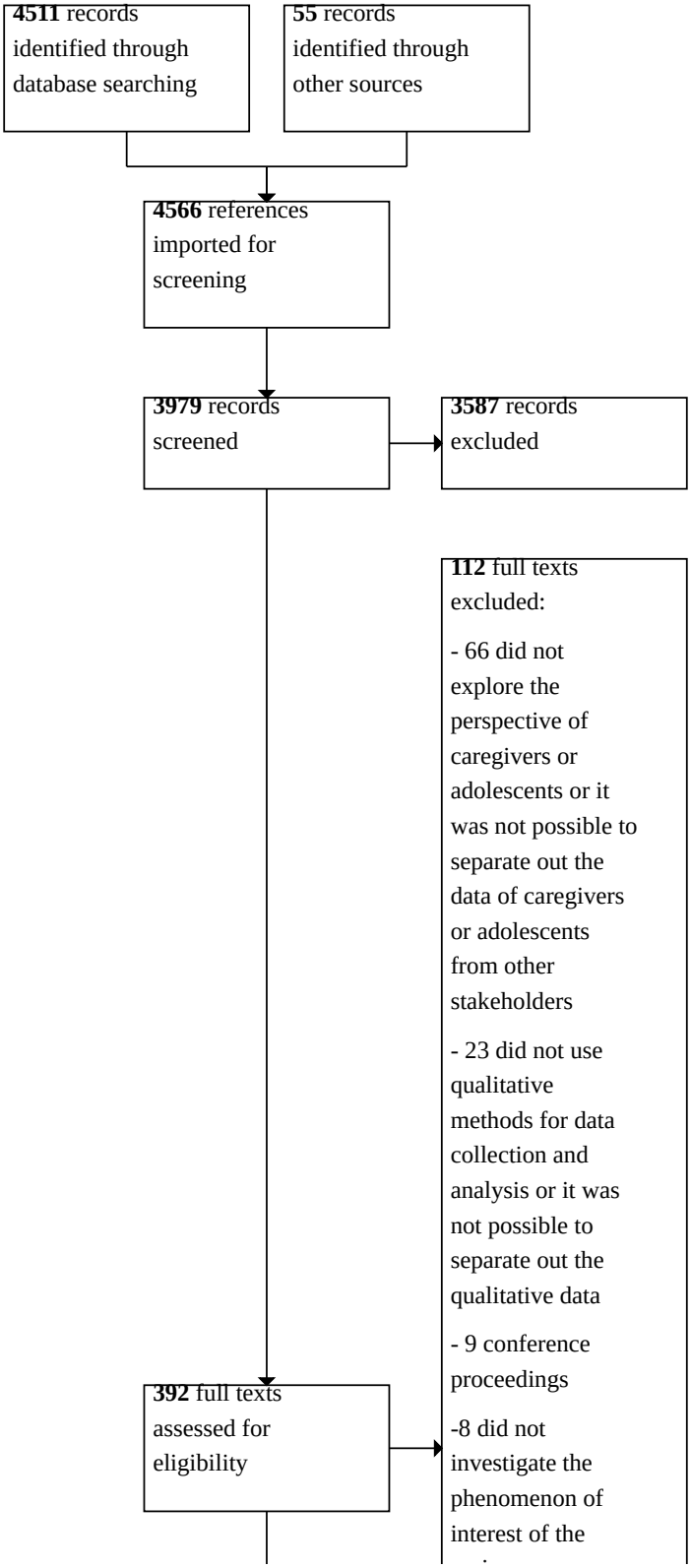
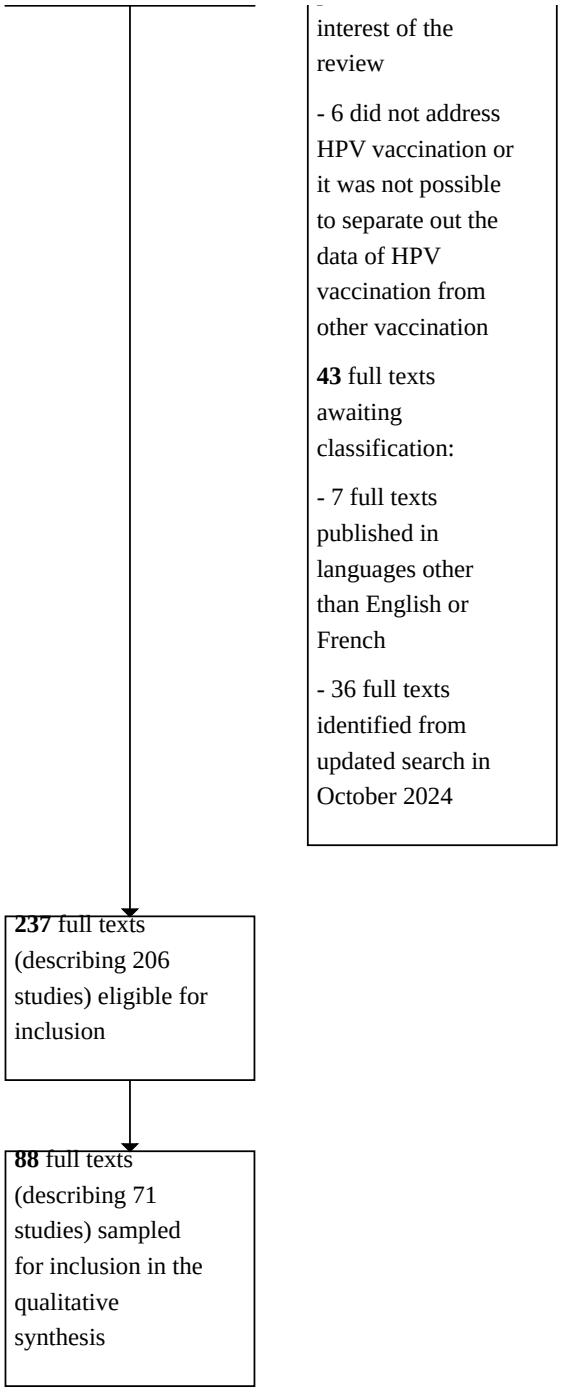


Figure 1. (Continued)



Sampling of studies

In contrast to reviews of quantitative data, the inclusion of large numbers of primary studies in qualitative evidence syntheses can impair the quality of the analysis (EPOC 2017). Large volumes of data may hinder a detailed and in-depth engagement with the data. Moreover, unlike reviews of quantitative data that aim to be exhaustive in order to achieve statistical generalisability, syntheses of qualitative studies aim for depth of understanding and conceptual generalisability (Hannes 2013).

We considered the number of studies that met our inclusion criteria ('eligible studies') to be too large to analyse with sufficient depth. Therefore, we purposefully sampled a selection of studies to be included in the synthesis ('sampled studies'; Suri 2011). Here we drew heavily on the approach employed by Ames and colleagues (Ames 2017; Ames 2019a), and guidance provided

by Cochrane Effective Practice and Organisation of Care (EPOC 2017). Ames and colleagues developed and applied a three-step sampling framework, which prioritised studies representing a wide geographic spread, those comprising rich data, and studies where the focus closely resembled the synthesis objectives (Ames 2017). They subsequently adapted this approach to combine data richness and the relevance of the data in relation to the synthesis objectives (Ames 2019a). We followed this revised two-step sampling framework, but also added a third criterion iteratively during the early stages of the analysis: the HPV vaccination gender focus.

We devised our three-step sampling approach based on the eligible studies identified from the first round of searches conducted in November 2019. We then applied these criteria (geographical spread; richness and relevance; HPV vaccination gender focus) to sample from the eligible studies identified in subsequent search updates.

Drawing on Ames 2019a, we first considered the geographical distribution of the eligible studies. Our review sought to develop a global understanding of the factors that influence caregiver and adolescent views and practices regarding HPV vaccination of adolescents, including similarities and differences across varying settings. As such, we felt it was important to ensure our review comprised a representative geographical spread of findings. Therefore, we extracted information on income level (HIC, MIC, LIC) and the WHO region of all eligible studies. The majority of the studies that met the inclusion criteria took place in HICs. We therefore sampled all studies that were conducted in LICs or MICs. We returned to considering the regional distribution of the studies after our second sampling step.

Our second sampling step involved assessing the remaining eligible studies from HICs in terms of the richness of their data in relation to the objectives of our synthesis. Rich data that are relevant to the synthesis objectives enable review authors to understand the meaning and context of study findings better, and to gain improved insights into the phenomenon of interest (Ames 2019a; Cooper 2021). Here we used the revised 1 to 5 scale for assessing the richness and relevance of the data developed by Ames 2019a, in which 1 denotes studies that contribute the least data to the synthesis objective and 5 denotes studies that contribute the most. Using this scale, two review authors (SC, NAJ) independently scored the remaining eligible studies, which had not been sampled in the previous step. We agreed that studies that scored 4 or 5 should be sampled. We resolved disagreements about whether a study would be sampled through discussion between the two review authors.

Next, we examined the regional distribution of the eligible studies, and assessed whether the six WHO regions were adequately represented in the sampled studies. Here we found that all WHO regions were represented in the sampled studies. We therefore agreed that the regional distribution of sampled studies was adequate, and as such made the decision not to undertake any further sampling in relation to geographical spread.

Early on in our analysis, gender, and potential differences in the views and practices around HPV vaccination for adolescent men and women, emerged as an important issue. We therefore decided to add another sampling criterion: HPV vaccination gender focus, and extracted this information from the eligible studies. The large majority of studies focused on HPV vaccination for adolescent women. We therefore sampled studies that explored views and practices around HPV vaccination for genders other than women. In all cases, this comprised studies that examined HPV vaccination for adolescent men.

Applying these sampling criteria across several search updates led to a final total of 71 studies from 88 articles to be included in the analysis.

Details of the sampled studies are included in the Characteristics of included studies and under Included studies in the reference list. Details of the studies that met our inclusion criteria but were not sampled ('eligible studies') are included in Appendix 2 and under Additional references in the reference list.

Data extraction

We extracted contextual and methodological data for each sampled study using a form designed specifically for this review. We recorded the following information.

- First study author
- Date of publication
- Country of study
- Context, including urban/rural, HIC, LIC, MIC, LMIC, WHO region
- Participant group and gender of participants (parent, caregiver, adolescent; men, women)
- Number of participants
- HPV vaccine type
- HPV vaccine gender focus
- Study design
- Objectives
- Guiding theoretical or conceptual framework
- Data collection and analysis methods

Assessment of the methodological limitations in included studies

Our inclusion criteria specified that included studies needed to use qualitative methods for both data collection and analysis. This constituted a basic quality threshold, as we excluded studies that used qualitative methods to collect data but not to analyse these data. In addition, two review authors (SC, NAJ) independently assessed methodological limitations for each study using criteria employed in previous Cochrane reviews (Ames 2017; Ames 2019b; Houghton 2020; Karimi-Shahanjarini 2019; Munabi-Babigumira 2017). These criteria were originally based on the Critical Appraisal Skills Programme (CASP) tool (CASP 2018), but they have since gone through several iterations. For instance, we did not include questions about the appropriateness of qualitative methodology or the specific research design used, as these were already covered in our inclusion criteria. We resolved disagreements through discussion between the two review authors (SC, NAJ) or through consultation with a third review author (BS). The adapted tool includes the following eight questions, which we used to assess methodological limitations.

1. Are the setting(s) and context described adequately?
2. Is the sampling strategy described, and is this appropriate?
3. Is the data collection strategy described and justified?

4. Is the data analysis described, and is this appropriate?
5. Are the claims made/findings supported by sufficient evidence?
6. Is there evidence of reflexivity?
7. Does the study demonstrate sensitivity to ethical concerns?
8. Any other concerns?

We conducted a pilot on three sampled studies to assess the feasibility of using this tool and to ensure the integrity of the assessment. We did not use our quality assessments to exclude studies, but rather to judge the relative contribution of each study to the review findings and as part of the assessment of how much confidence we have in each finding (see below). Our assessments for each study are reported in the methodological limitations table in Appendix 3.

Data management, analysis and synthesis

We used a thematic synthesis approach as described by Thomas 2008. Thematic analysis develops and organises findings into themes using inductive and 'constant comparison' methods (Miles 2013). Thematic synthesis is one of several approaches recommended by the Cochrane Qualitative Review Methods Group (Noyes 2018), and is an appropriate synthesis method for exploring questions about people's perspectives and experiences (Harden 2004).

After an initial familiarisation with and immersion in the articles, we conducted line-by-line coding of the findings of the articles. These 'data-driven codes' facilitated the translation of findings from one study to another. The first review author (SC) selected five articles that were highly relevant to the review question, and used these as a starting point to build a coding list. She and one other review author (NAJ) independently conducted line-by-line coding according to the content and meaning of the relevant findings of the five articles. They subsequently discussed the 'free' codes, developed an initial coding list, and independently tested this list on an additional five articles to determine if and how well the concepts translated from one study to another. The two review authors (SC, NAJ) subsequently discussed the codes that emerged from the data and agreed on a preliminary coding framework.

SC and NAJ then coded all the studies (including the 10 used to develop the coding framework) line by line, using the agreed coding framework, adding new codes as necessary. Relevant findings, reported anywhere in the primary qualitative studies, were coded. If one of the review authors thought a new code should be added, or a current code should be revised, the two review authors discussed it. If they agreed that changes should be made, they adapted the coding framework and revisited the articles that had already been coded to decide if the new codes applied or not. This process continued until data from all of the sampled studies had been extracted. Coding was done predominantly in NVivo, a qualitative data management programme. We coded some of the more critical social science studies manually, as the review authors found this facilitated a deeper engagement with these studies and their use of more complex theory and concepts.

SC and NAJ then independently explored similarities and differences between the codes, then, through discussion, they jointly condensed and merged codes of similar content, and organised similar codes into 'descriptive themes'. Together they wrote a narrative summary of the descriptive themes, which they shared with the other review authors for input. Thereafter, SC and NAJ worked together to generate 'analytical themes'. While the generation of descriptive themes remains 'close' to the primary studies, analytical themes involve review authors 'going beyond' the primary studies to address the review question directly and potentially yield interpretive explanations or hypotheses (Thomas 2008). We had already decided that we were interested in the factors that influence caregiver and adolescent views and practices regarding HPV vaccination of adolescents, within the more general data on views, experiences, practices, intentions, decision-making and so forth. We developed 'analytical themes' by moving between the descriptive themes, their constituent codes, and relevant individual study findings. As part of this process, we also examined the various conceptual or theoretical models developed or used by the studies included in the review, and those developed in the existing literature external to the studies included in the review (see 'Description of the topic'). Here we found the various socio-ecological models of the drivers of vaccination (Callréus 2010; Sturm 2005), including the WHO's 'Vaccine Hesitancy Determinants Matrix' (Larson 2014; WHO 2013b). While these models informed our interpretations, none were able to fully 'hold' or account for all of our findings. That is, while our findings could similarly be organised into multiple and interrelated levels of influence (e.g. individual, interpersonal, organisational, community, societal etc.), both the specific influencing factors and categories of influence that emerged through our analysis did not neatly fit into any one existing socio-ecological model of vaccination. Once we had developed preliminary 'analytical themes', they were presented to the other review authors for feedback and refinement. We discussed and re-worked the themes until we reached consensus, which resulted in eight 'analytical themes' in the end.

As part of the analysis, both when developing the 'descriptive' and 'analytical' themes, we also explored potential subgroup differences in the factors that influence acceptance of HPV vaccination. These included, for example, potential variations within and across settings (e.g. LIC versus MIC versus HICs; rural versus urban areas; differences between WHO regions), population groups (e.g. adolescents versus caregivers; adolescent men versus adolescent women; younger adolescents versus older adolescents), vaccination setting or delivery strategy (e.g. healthcare facility versus fixed outreach sites versus mobile outreach site), and vaccine doses (e.g. first versus second versus third doses). Here, our use of NVivo for the analysis proved helpful, as the various query processes and visualisation tools of this software allowed these subgroup comparisons to be done relatively easily. With the support of these techniques, we identified some potential subgroup differences when developing the descriptive themes, which we report in the results. We did not identify differences between subgroups regarding the analytical themes.

Implications for practice

Once we had finalised our review findings, we examined each finding to identify factors that could influence the design and implementation of interventions to promote acceptance or uptake of HPV vaccination for adolescents. Based on this, we developed prompts for future policy- and decision-makers. These prompts are presented in the 'Implications for practice' section. These prompts are not intended to be recommendations but are phrased as questions to help policy- and decision-makers consider the implications of the review findings within their context.

Assessment of confidence in the synthesis findings

Three review authors (SC, NAJ, BS) used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to summarise our confidence in each finding (Lewin 2018). CERQual assesses confidence in the evidence, based on the following four key components.

1. Methodological limitations of included studies: the extent to which there are concerns about the design or conduct of the primary studies that contributed evidence to an individual review finding.
2. Coherence of the review finding: an assessment of how clear and cogent the fit is between the data from the primary studies and a review finding that synthesises those data. By cogent, we mean well-supported or compelling.
3. Adequacy of the data that contribute to a review finding: an overall judgement of the degree of richness and quantity of data that support a review finding.
4. Relevance of the included studies to the review question: the extent to which the body of evidence from the primary studies that support a review finding is applicable to the context (perspective or population, phenomenon of interest, setting) specified in the review question.

After considering each of the four components, we made a judgement about the overall confidence in the evidence that supported the review finding. We judged confidence as high, moderate, low, or very low. We based the final assessment on consensus amongst the review authors. All findings started as high confidence and were then graded down if there were important concerns regarding any of the CERQual components.

Summary of qualitative findings tables

To facilitate understanding and use of the review findings, we present them in a series of summary of qualitative findings (SoQF) tables (see Summary of findings 1; Summary of findings 2; Summary of findings 3; Summary of findings 4; Summary of findings 5; Summary of findings 6; Summary of findings 7; Summary of findings 8). The tables display a structured summary of each review finding and references to the studies that contribute data to each finding. They also provide our assessment of confidence in the evidence, as well as an explanation of this assessment, based on the GRADE-CERQual approach (Lewin 2018). We report all review findings that we assessed using GRADE-CERQual in the SoQF tables, regardless of their associated level of confidence.

We present detailed descriptions of our confidence assessment in the evidence profiles (Appendix 4).

Integrating the review findings with the Cochrane intervention review

As part of our data synthesis, we explored how we could integrate the findings from our review with the findings from the related Cochrane review of intervention effectiveness, which focused on interventions to improve vaccination uptake amongst adolescents (Abdullahi 2020). To do this, we utilised a matrix model approach similar to one used previously by others (Ames 2017; Ames 2019b; Candy 2011; Munabi-Babigumira 2017). Specifically, we investigated whether the factors identified by our review as influencing caregivers' and adolescents' views and practices regarding HPV vaccination of adolescents were reflected in, or targeted by, the interventions evaluated in the studies in Abdullahi 2020.

To create the matrix, we undertook the following steps. Firstly, we reviewed our eight overarching themes of factors that influence caregivers' or adolescents' views and practices around HPV vaccination of adolescents, and devised questions that reflected their central idea or meaning. Theme five ('Social networks, communities and the media') contained various distinct core ideas and so, for this theme, we created two separate questions to reflect this. In total, we therefore developed nine key questions reflecting the overarching factors that influence caregivers' or adolescents' views and practices around HPV vaccination of adolescents identified in our review. Secondly, we created a table listing these nine questions. We then assessed whether the underlying theories or components of the interventions evaluated in the studies in the related intervention review reflected or targeted the influencing factors. We did this by creating a summary of the underlying theories or components of each intervention, and then applied the nine questions to each intervention. Each question could be answered as 'yes', 'no' or 'partially', to indicate whether the influencing factor was reflected in the underlying theories or components of the intervention. We listed all the relevant studies from Abdullahi 2020 in our matrix table and added our assessment for each of the nine questions. See Figure 2.

Figure 2. Matrix model applying key findings from the qualitative synthesis to studies included in the Cochrane review of interventions (Abdullahi 2020)

Studies included in relevant Cochrane effectiveness review (Abdullahi 2020)	Was the intervention designed to address the following factors?								
	1	2	3	4	5	6	7	8	9
Cates 2014	Y	Y	N	P	N	Y	N	Y	P
Diclemente 2015	Y	Y	N	N	P	Y	N	N	N
Fiks 2016	N	N	N	N	N	N	N	P	P
Gargano 2015	Y	Y	N	Y	N	N	N	N	N
Grandahl 2016	Y	Y	N	N	N	N	N	P	N
Mantzari 2015	N	N	N	N	N	N	N	N	Y
Paskett 2016	Y	Y	N	Y	N	N	N	Y	N
Perkins 2015	N	N	N	N	N	N	N	Y	P
Rickert 2015	P	P	N	N	N	N	N	N	N
Staras 2015	Y	Y	N	N	N	N	N	N	P
Szilagyi 2015	N	N	N	N	N	N	N	P	P
Watson-Jones 2012	N	N	N	N	N	N	N	N	Y
Winer 2016	Y	Y	N	Y	N	N	N	P	N

Y = Yes; N = No; P = Partially

1. Has a potential lack of biomedical knowledge about HPV and HPV vaccination amongst parents and/or adolescents been considered, and the impact this may have on their HPV vaccination views and practices?
2. Have parents' and/or adolescents' perceptions of the risks and benefits (or lack thereof) associated with vaccination been considered, and the impact this may have on their HPV vaccination views and practices?
3. Have parents' and/or adolescents' views and experiences of other vaccines and vaccination programmes been considered, and the impact this may have on their HPV vaccination views and practices?
4. Have the decision-making dynamics between adolescents and their caregivers been considered, and the impact this may have on who the primary decision-maker(s) regarding HPV vaccination may be?
5. Have the social networks and communities (e.g. extended relatives, peers, traditional or religious leaders) to which parents and/or adolescents are affiliated been considered and potentially included?
6. Has the role of the media (e.g. social media, the internet, television, online and print newspapers, radio) in influencing parents' and/or adolescents' HPV vaccination views and practices been incorporated?
7. Have socio-cultural beliefs and practices (e.g. regarding adolescence, sexuality, gender, parenting, health) been considered, and the meanings, concerns or questions about HPV vaccination these may give rise to?
8. Have parents' and/or adolescents' perceptions of the authorities associated with HPV vaccination programmes (e.g. teachers and the school, pharmaceutical industry, government, science and biomedicine, healthcare professionals) been considered? Has an attempt been made to address potential distrust, or build on potential trust, of authorities associated with HPV vaccination programmes?
9. Has an attempt been made to address the supply-side barriers (e.g. access challenges, vaccine costs, language barriers, feminised programmes, delivery logistics) that may impact on parents' and/or adolescents' HPV vaccination views and practices?

We only assessed trials from the related Cochrane review that included interventions for HPV vaccination. This comprised 13 studies in total, 11 that focused specifically on HPV vaccination and two that included interventions that targeted HPV vaccination together with tetanus–diphtheria–acellular–pertussis (TdaP), meningococcal conjugate, and influenza vaccination for adolescents. We gathered information about the interventions only from the publications included in Abdullahi 2020; we did not search for additional information in related publications or from study authors.

RESULTS

Results of the search

Our searches returned 4566 records; 4511 from database searches and 55 from other sources. After removing 587 duplicates, we screened the titles and abstracts of the 3979 remaining records. We excluded 3587 records that we considered to be clearly irrelevant and retrieved the full-text articles of the remaining 392 records. During the full-text review, we excluded 112 full texts for different reasons (see Characteristics of excluded studies) and listed the seven full texts published in languages other than English or French as awaiting classification (see Characteristics of studies awaiting classification). We identified 36 eligible study reports from the updated search in October 2024 and have added these to 'Studies awaiting classification' (see Characteristics of studies awaiting classification). A total of 237 eligible full texts (describing 206 studies) were therefore included in our review, and we sampled 88 of these full texts (describing 71 studies) for inclusion in the analysis (see Characteristics of included studies). Appendix 2 includes details about the 135 studies that met our inclusion criteria but were not sampled. Figure 1 illustrates the study selection process in a PRISMA flow diagram (Page 2021).

All the sampled studies were published between January 2008 and February 2023.

Description of the studies

In this section, we describe the studies that we included and sampled. More details of these studies are included in the Characteristics of included studies table and under Included studies in the reference list. Details of the studies that met our inclusion criteria but were not sampled are included in Appendix 2 and under Additional references in the reference list.

Setting

Thirty-five studies were conducted in HICs, including 15 in the USA, four in the UK, three in Canada, two each in Australia, Sweden and Romania, and one each in France, Ireland, Japan, Chile, Denmark, the Netherlands, and Hong Kong. Twenty-six studies were conducted in MICs, including three each in India and Kenya, two each in Nigeria, Brazil, South Africa, China, Colombia and Tanzania, and one each in the Dominican Republic, Indonesia, Mongolia, Peru, Vietnam, Pakistan, Cameroon, and Zambia. Eight studies were conducted in LICs, including six in Uganda, and one each in Malawi and Ethiopia. Two studies were conducted in multiple MICs and HICs: Francis 2011 was conducted in the USA and South Africa, and Islam 2018 was conducted in Argentina, Malaysia, South Africa, South Korea, and Spain. Regarding WHO regions, 25 studies were conducted in the Americas, 19 studies in Africa, 12 studies in Europe, four studies in South-East Asia, eight studies in the Western Pacific, and one study was conducted in the Eastern Mediterranean. Francis 2011 was conducted in Africa and the Americas and Islam 2018 was conducted in Africa, the Americas, Western Pacific, and Europe.

Respondents

We included studies that explored the views and experiences of caregivers or adolescents, or both, with 39 studies on caregivers only, 24 studies on both caregivers and adolescents, and eight studies on adolescents only.

Vaccine gender focus

Of all the studies, 50 focused on the HPV vaccine for women only, 11 focused on the HPV vaccine for men only, and 10 focused on the HPV vaccine for men and women.

Methods

Of all the studies, 39 conducted individual interviews, 20 conducted focus group discussions and eight conducted both individual interviews and focus group discussions. Bunton 2013 conducted participatory workshops; Cooper 2010 conducted individual interviews, focus group discussions and observations of vaccination days at school; Fisher 2020 conducted individual interviews and observations of vaccination days at school; and Pop 2015 was an ethnographic study that spanned eight years and used multiple data collection methods, including observations, informal conversations, in-depth, semi-structured interviews and focus group discussions.

Studies drew on a range of social theories or theoretical frameworks, including, Grounded Theory, Discourse Theory, Social Phenomenology, Poststructuralism, Symbolic Interactionism, various iterations of Social Ecological Conceptual Frameworks, PEN-3 Cultural Model, Health Belief Model (HBM), Theory of Planned Behaviour, Consolidated Framework for Implementation Research, Integrative Model of Behavioural Prediction (IM), and the Capability, Opportunity, Motivation, and Behaviour (COM-B) model.

Methodological limitations of the studies

Most studies provided descriptions, even if lacking in detail, of the sampling and data collection and analysis methods employed, and most studies also provided evidence, even if thin, to support the claims made. About half of the studies described, at least to some degree, the setting(s) and context in which the research took place. Across most studies, we found no or minimal evidence of researcher reflexivity. Specifically, reflections and reporting of study authors' own views and practices regarding vaccination, and how these may have impacted on the research processes and findings, were mostly lacking. This omission is of particular concern for the topic of vaccination, which can be a contentious and emotive issue.

Most studies conducted individual or focus group interviews for data collection, which we considered appropriate methods for investigating people's views and experiences. However, far fewer studies employed multiple data collection strategies and very few included participant or non-participant observations. Social desirability bias, for example, where study participants report more accepting attitudes towards vaccines if they perceive that researchers hold a pro-vaccine stance, is a concern for research on vaccination (Glenton 2021). The use of multiple data collection strategies, including more observational methods, would have

helped reduce this potential bias and provide opportunities for data triangulation, ultimately enhancing the methodological rigour of the studies and the trustworthiness of the findings.

Details of the assessments of methodological limitations for individual studies can be found in Appendix 3.

Confidence in the review findings

We used the GRADE-CERQual approach to grade our confidence in 51 review findings. We graded 26 findings as high confidence, 17 as moderate confidence, 5 as low confidence and 3 as very low confidence. Our GRADE-CERQual assessment for each review finding is captured in the SoQF tables (see Summary of findings 1; Summary of findings 2; Summary of findings 3; Summary of findings 4; Summary of findings 5; Summary of findings 6; Summary of findings 7; Summary of findings 8). A detailed explanation of each assessment is shown in the evidence profiles (Appendix 4).

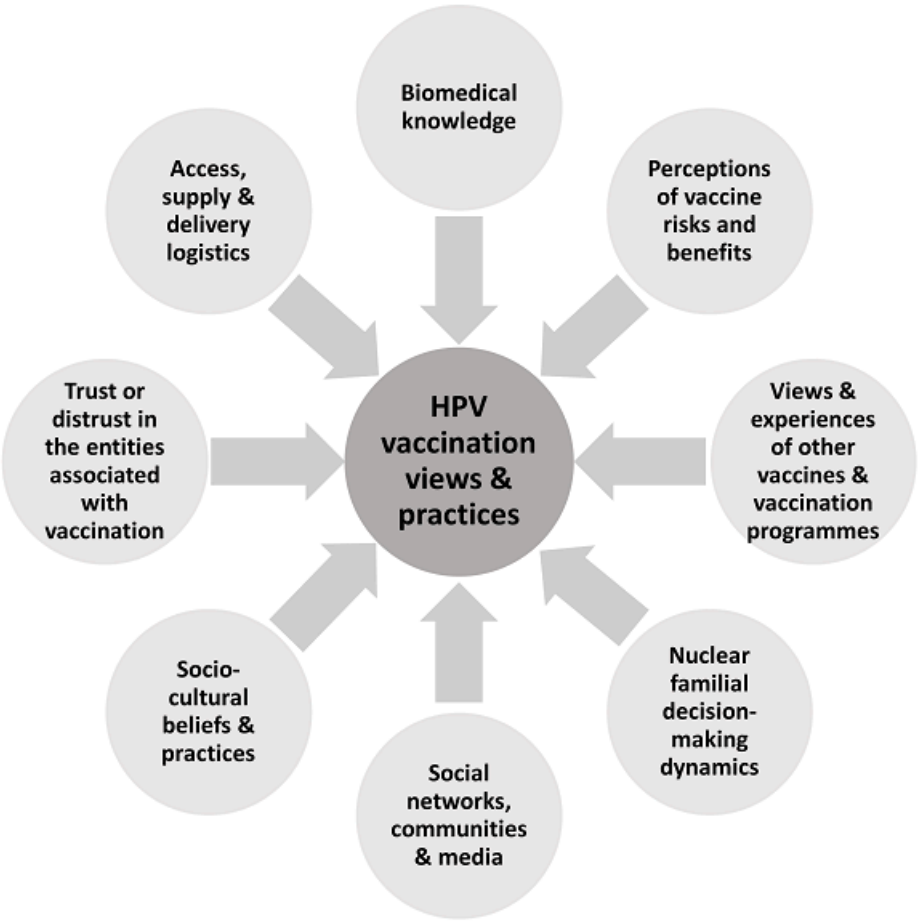
Our main concerns were connected to the methodological limitations of the studies. Common methodological limitations included limited evidence of researcher reflexivity and sensitivity to ethical considerations, as well as often poor reporting of particularly the study setting and sampling approach. Some findings were assessed as being only partially relevant, mainly because the studies that contributed to the finding came from specific countries (e.g. only HICs); a small range of geographical settings (e.g. only Europe or the Americas), included a subset of the population of interest (e.g. only white parents from high socio-economic groups); or focused only on HPV vaccination for women.

We downgraded some findings due to concerns about coherence, usually because of some disconfirming or ambiguous data. We found certain differences in HPV vaccination views or practices in relation to place, gender, socio-economic status, or between caregivers and adolescents. In some cases, we reflected this variability in the data by downgrading some of our coherence assessments. Moreover, some of the review findings were interpretive or explanatory in nature, and as such, often comprised multiple aspects. In cases where there was strong evidence for some aspects of the review finding, but insufficient evidence to support other aspects, we downgraded the review finding due to concerns about coherence.

Review findings

Our analysis identified and organised the study findings within eight overarching themes. Each theme represents a category of factors that may influence caregivers' and adolescents' views and practices regarding HPV vaccination. These themes are depicted graphically in Figure 3.

Figure 3. Conceptual framework: factors that influence caregivers' and adolescents' HPV vaccination views and practices



1. Biomedical knowledge
2. Perceptions of the risks and benefits (or lack thereof) of HPV vaccination
3. Views and experiences of other vaccines and vaccination programmes
4. Nuclear familial decision-making dynamics
5. Social networks, communities and the media
6. Socio-cultural beliefs and practices
7. Trust or distrust in the institutions, systems and experts associated with vaccination
8. Access, supply and delivery logistics.

The eight themes are discussed below, each with a description of the theme and a summary of each finding. Any potential differences we identified within or across contexts, population groups, vaccination setting or delivery strategy or vaccine dosage, we report in the respective review finding below.

Theme 1: Biomedical knowledge

Finding 1

Biomedical knowledge about HPV and HPV vaccination was often limited amongst caregivers and adolescents (high confidence).

Studies across diverse settings, contexts, and population groups reported that biomedical knowledge about HPV and HPV vaccination was often limited amongst caregivers and adolescents (Albert 2019; Alexander 2012; Ali 2022; Ambali 2022; Balogun 2018; Bowen 2014; Bunton 2013; Burke 2015; Chau 2021 Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Craciun 2012; Creed 2021; Dalmau 2020; De Fouw 2023; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Harries 2009; Holroyd 2022; Jackson 2016; Joseph 2015; Katahoire 2008; Katz 2013; Kisaakye 2018; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Marlow 2009; Muresianu 2022; Patrick 2022; Paul 2014; Perez 2015; Perkins 2013; Rail 2018; Reiter 2014; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015; Warner 2015). Some caregivers and adolescents had not heard about HPV nor the HPV vaccine prior to being involved in the study. Others conveyed a basic awareness of HPV being an STI and that the HPV vaccination could prevent cervical cancer, but did not appear to have much understanding beyond this. More specific knowledge that was commonly lacking included, for example, how HPV is acquired and the range of risks associated with it; what HPV vaccination protects against; the optimal age for HPV vaccination; dosing schedules and associated time intervals; and the availability and benefits of vaccination for men.

Finding 2

A lack of biomedical knowledge about HPV and HPV vaccination contributed to reducing many caregivers' and adolescents' acceptance of the vaccine, including influencing their decision to delay or decline it, or generating concerns that they had accepted the vaccine or were expected to accept it without being properly informed. Providing caregivers and adolescents with biomedical information about HPV and HPV vaccination could enhance acceptance of it (moderate confidence).

The widespread lack of biomedical knowledge about HPV and HPV vaccination appeared to influence views and practices in complex and diverse ways. In many cases, it contributed to reducing acceptance of vaccination. For example, various studies found that limited biomedical knowledge about HPV and HPV vaccination was more common amongst those caregivers who had declined HPV vaccination for their daughters, compared to those who had accepted vaccination (Cordoba-Sanchez 2019; Gordon 2011; Holroyd 2022; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Patrick 2022). Similarly, in many studies, both caregivers and adolescents themselves recognised their limited knowledge on the topic and expressed frustration or disappointment about the inadequate information they had received (Beyen 2022; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2019; Craciun 2012; Creed 2021; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Madhivanan 2009; Patrick 2022; Rail 2018; Venderbos 2022; Vermandere 2015). Many of these study participants reported explicitly how this lack of knowledge contributed to their decision to delay vaccination until they received more information, or to decline HPV vaccination (Ambali 2022; Bartolini 2012; Cooper 2010; Craciun 2012; Galbraith-Gyan 2019; Grandahl 2019; Patrick 2022; Perez 2015; Remes 2012; Roncancio 2019; Venderbos 2022; Warner 2015). As one participant stated categorically, "I believe that not being informed about the vaccine is what makes it most difficult for me to vaccinate my child" (Roncancio 2019, USA, participant quote). Some caregivers and adolescents suggested that inadequate knowledge results in misconceptions and suspicions about the vaccine and, in turn, reduced acceptance: "We have heard rumors that the government has a program to prevent child birth… and they haven't given us adequate or detailed information so we start to suspect that this vaccine could be one of them and that is why people don't want to come" (Patrick 2022, Uganda, participant quote).

For some study participants, their lack of knowledge appeared to generate concerns that they had accepted HPV vaccination or were expected to accept it without being properly informed (Bunton 2013; Craciun 2012; Fisher 2020; Gordon 2011; Rail 2018; Venderbos 2022). According to them, this undermined their informed consent as it was given "without full information" (Beyen 2022), thus, "no conscious choice" was made (Venderbos 2022), or as one adolescent girl succinctly remarked, "Really, we didn't have informed consent because we didn't know what they were doing to us" (Bunton 2013, Australia, participant quote).

A number of studies also found that providing caregivers and adolescents with biomedical information about HPV vaccination could potentially enhance their acceptance of it. For example, some caregivers and adolescents described how attending educational meetings or receiving written information about the vaccine helped them better understand the benefits of the vaccine, which in turn made them more accepting of it (Ambali 2022; Bartolini 2012; Beyen 2022; Cordoba-Sanchez 2019; Cover 2012; Grandahl 2019; Kucheba 2021; Mitchell 2021; Turiho 2017; Warner 2015). As one caregiver described: "when they came and educated us and gave us the forms, we read and understood that this vaccine is very important and that is how I was courageous enough to let my daughter take part in the vaccination" (Mitchell 2021, Tanzania, participant quote). Similarly, in various studies, participants responded positively when research staff explained the purpose and benefits of the vaccine, with many indicating how the provision of this information made them more willing

to receive the vaccine for themselves or their adolescent (Ambali 2022; Getrich 2014; Grandahl 2019; Madhivanan 2009; Mitchell 2021; Perkins 2013; Vermandere 2015). Relatedly, in many studies, caregivers and adolescents reported that if they were to receive more information about the vaccine, they may be more likely to accept it. Capturing the sentiments of many other study participants, one adolescent explained, "If I know what it [the vaccine] is, or what it's actually doing to me and it's good, then I would take it" (Cooper 2010, Australia, participant quote).

Finding 3

A lack of biomedical knowledge about HPV and HPV vaccination did not impact on many caregivers' and adolescents' acceptance of the vaccine - they accepted it despite having limited biomedical knowledge about it (moderate confidence).

Several studies revealed how a lack of biomedical knowledge about HPV vaccination may not have an impact on its acceptance. That is, these studies showed how despite study participants revealing or explicitly acknowledging low levels of knowledge about HPV vaccination, these same participants had consented to, or expressed a desire for, vaccination (Ambali 2022; Balogun 2018; Chiang 2015; Dalmau 2020; Friedman 2013; Getrich 2014; Harries 2009; Joseph 2015; Katahoire 2008; Madhivanan 2009; Paul 2014; Rail 2018; Reiter 2014; Remes 2012; Stephens 2013; Turiho 2017).

Finding 4

A lack of biomedical knowledge about HPV and HPV vaccination contributed to enhancing some caregivers' and adolescents' acceptance of the vaccine. These individuals held beliefs that did not align with biomedical understandings yet served as strong motivators to receive the vaccine (moderate confidence).

Findings from various studies showed how a lack of biomedical knowledge about HPV vaccination may enhance acceptance of it in some instances (Alexander 2012; De Fouw 2023; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Harries 2009; Katz 2013; Turiho 2017; Vermandere 2015; Wakimizu 2015). Many caregivers' and adolescents' understandings of HPV vaccination and its benefits were incongruent with a biomedical perspective. These included, for example, the belief that HPV vaccination protects against HIV/AIDS (see Finding 15 for more details), or prevents women from getting pregnant (Turiho 2017), or that infertility is an inevitable outcome of cervical cancer (see Finding 11 for more details). While these views do not align with a biomedical understanding of HPV vaccination, they served as strong motivators for many caregivers and adolescents to receive vaccination.

Theme 2: Perceptions of the risks and benefits (or lack thereof) of HPV vaccination

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by their perceptions of the risks and benefits (or lack thereof) associated with vaccination. In this section we unpack separately several specific perceived risks and benefits. These perceptions were, however, frequently interrelated and interacted to influence study participants' views and practices regarding HPV vaccination. That is, caregivers' and adolescents' vaccination views and practices were often the outcome of weighing up what were conceived of as the multiple risks and benefits of vaccination versus the multiple risks and benefits of non-vaccination.

Finding 5

Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its many short-term side effects, including discomfort, pain, swelling or cracked skin at the injection site, dizziness, headache, fever and fainting. The number of vaccine doses required for different vaccination schedules contributed to increasing concerns about side effects for some, whilst decreasing concerns for others (high confidence).

Many caregivers and adolescents spoke in detail about their worries about the safety of the vaccine, and in particular the potential for short-term side effects (Ali 2022; Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Gutierrez 2013; Harries 2009; Islam 2018; Jackson 2016; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Perkins 2013; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Turiho 2017; Wakimizu 2015; Warner 2015). Here a wide range of potential side effects were mentioned, including worries about mild discomfort, swelling or "cracked" skin at the injection site, pain during and immediately after injection, and dizziness, headache, fever and fainting. For example, one adolescent explained how "I heard from a friend that she received the vaccine, and it was different from an ordinary injection and really painful because it was inserted into muscle. I am very sensitive to pain, so I was afraid that I would not be able to stand it" (Wakimizu 2015, Japan, participant quote). Similar sentiments were expressed by a mother when describing her fears about the side effects of the vaccine: "The news… showed symptoms of fainting in several schools, they fainted very often and presented pain… Their joints hurt, some of them couldn't almost move, then I was frightened and I preferred not to vaccinate my daughter" (Cordoba-Sanchez 2019, Colombia, participant quote).

Various studies revealed how concerns about side effects were influenced by different vaccination schedules. That is, the two- or three-dose vaccination schedule recommended for the different types of HPV vaccines appeared to increase worries about side effects for some people, but also decrease worries about side effects for others. This appeared to be dependent upon, for the most part, how the initial vaccine dose was experienced. Various caregivers and adolescents described how, because the side effects they experienced after receiving the first vaccine dose were absent or mild and short term, they felt less afraid and more willing to accept subsequent doses (Cover 2012; Turiho 2017). As one adolescent explained, "I first feared taking the injection because I thought my arm would swell… I thought I would bleed very much after the injection but there was no bleeding… At the first injection, I was worried but for the second one, I was confident and not fearing anything" (Turiho 2017, Uganda, participant quote). In direct contrast, other study participants explained how the negative side effects they had experienced themselves or witnessed in others with the first dose had increased their concerns about side effects and in turn their hesitancy for subsequent vaccine doses (Turiho 2017; Wakimizu 2015; Warner 2015).

A few caregivers worried that a two-dose schedule would include the same amount of antigen as the three-dose schedule in fewer injections and would therefore be "too much medicine" (Mitchell 2021), in one go and in turn give rise to greater side effects (Islam

2018; Mitchell 2021). As one mother indicated, “Okay, because maybe then the dose is much larger and there might be more side effects and such, right? Like, we also have to take that into account. Putting three doses in one.” (Islam 2018, Spain, participant quote). These caregivers were therefore more willing to accept a three-dose vaccination schedule compared to a two-dose schedule.

Finding 6

Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its various serious and long-term adverse effects. Negative reproductive health effects for women, including infertility, were a particularly prominent concern (high confidence).

Many caregivers’ and adolescents’ concerns about the vaccine’s safety centred on what they perceived as the serious and longer-term adverse effects (Adeyanju 2022; Alexander 2012; Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Bunton 2013; Chau 2021; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Craciun 2012; Creed 2021; De Fouw 2023; de Oliveira 2019; Elit 2022; Evans 2021; Fielding 2018; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Harries 2009; Katahoire 2008; Katz 2013; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Patrick 2022; Rail 2018; Reich 2010; Reiter 2014; Remes 2012; Siu 2014; Turiho 2017; Venderbos 2022; Vermandere 2015; Wakimizu 2015; Ward 2017; Warner 2015). Here a wide range of perceived potential adverse effects were reported.

Fears that the HPV vaccine may cause infertility in girls were a particularly prominent concern across diverse study settings and populations (Adeyanju 2022; Bartolini 2012; Cover 2012; Craciun 2012; De Fouw 2023; Elit 2022; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Harries 2009; Kucheba 2021; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Remes 2012; Turiho 2017; Vermandere 2015; Warner 2015). The studies were indeed saturated with comments about how the vaccine could “harm the girl’s fertility” (Vermandere 2015), “destroy the eggs that a girl has” (Remes 2012), “spoil the womb of girls” (Njuguna 2021), or “become sterilised because of that injection” (Bartolini 2012). Some caregivers and adolescents expressed suspicion that the vaccine might be a deliberate tool to impair girls’ fertility and in turn reduce population growth (Beyen 2022; Craciun 2012; De Fouw 2023; Elit 2022; Patrick 2022; Remes 2012; Turiho 2017). As one adolescent expressed, “I do not trust it since it has been widely spoken that it [HPV vaccine] is to reduce the number of communities, especially the number of Oromos and hence I couldn’t be sure on it” (Beyen 2022, Ethiopia, participant quote). In one study in the Netherlands, concerns that the vaccine might also impact negatively on men's fertility emerged (Venderbos 2022).

Many caregivers feared that the vaccine could lead to other reproductive health problems for their daughters, in addition to infertility. These problems included causing early puberty; childbirth complications; uterine infections; and negative effects on a girl’s menstrual cycle, such as heavy bleeding, irregularities or persistent pain (Kucheba 2021; Turiho 2017; Warner 2015). Some caregivers feared that the vaccine might actually cause (rather than prevent) HPV or cervical cancer (Cooper 2010; Craciun 2012; Kucheba 2021; Madhivanan 2009; Patrick 2022; Remes 2012; Turiho 2017; Ward 2017). Other perceived potential adverse health effects of the vaccine highlighted by caregivers and adolescents included causing Ebola (Kucheba 2021), HIV (Katz 2013), chronic fatigue syndrome (Creed 2021), autism (Bowen 2014), autoimmune conditions (Venderbos 2022), paralysis or muscle diseases (de Oliveira 2019; Venderbos 2022), obesity and diabetes (Ward 2017), central nervous system problems (Cordoba-Sanchez 2019), or mental or intellectual deficiencies (Reich 2010; Reiter 2014; Turiho 2017). Some caregivers and adolescents worried that the vaccine may worsen existing health conditions (Chiang 2015; Kucheba 2021; Turiho 2017), while others feared it may impair a woman’s “natural” (Cover 2012), or “normal” (Bartolini 2012), or “physical” (Fielding 2018) development. Numerous caregivers described feeling terrified that their children may die as a result of the vaccine (Alexander 2012; Bowen 2014; Cooper 2010; Gordon 2011; Katahoire 2008; Kucheba 2021; Rail 2018; Reich 2010; Reiter 2014; Turiho 2017; Wakimizu 2015; Warner 2015).

Numerous caregivers and adolescents did not mention any specific perceived adverse effects of the vaccine, but rather framed their concerns in more general terms (Balogun 2018; Bartolini 2012; Bowen 2014; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; de Oliveira 2019; Evans 2021; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Siu 2014; Turiho 2017; Ward 2017) That is, they spoke about how the vaccine “has risks” (Fielding 2018), is “dangerous” (Bunton 2013; Cordoba-Sanchez 2019), or is “harmful to one’s health” (Siu 2014), and could “cause damage in your body”(Balogun 2018), and "problems" (de Oliveira 2019), or as one caregiver explained “I’m just scared of the results and what might happen” (Galbraith-Gyan 2019).

Finding 7

Many caregivers and adolescents were less accepting of HPV vaccination due to their uncertainty about the effectiveness of the vaccine (high confidence).

Numerous caregivers and adolescents expressed uncertainty about the effectiveness of the vaccine (Adeyanju 2022; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Islam 2018; Jackson 2016; Joseph 2015; Kucheba 2021; Mitchell 2021; Njuguna 2021; Perkins 2013; Rendle 2017; Siu 2014; Turiho 2017; Wakimizu 2015; Ward 2017). These study participants spoke about the “lack of evidence of long-term efficacy” (Creed 2021), “that there is no medical evidence to support that it is definitely effective” (Fielding 2018) or “no guarantee of effectiveness” (de Oliveira 2019), and therefore their “fear that it won’t work” (Perkins 2013), or as one caregiver put it, “there have been uncertainties of whether it can actually work” (Njuguna 2021). Some caregivers’ concerns centred specifically on the duration of protection offered by the vaccine, and whether a vaccine given at a young age would offer protection later in life (Turiho 2017). Other caregivers’ apprehensions related particularly to the different vaccine schedules, and whether a two-dose schedule would have a lower efficacy compared to a three-dose schedule (Islam 2018; Mitchell 2021).

Finding 8

Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about the relative ‘newness’ of the vaccine, which contributed to uncertainty regarding its safety and effectiveness. Some caregivers wished to delay HPV vaccination for their adolescent until they felt sufficient evidence had accumulated about its risks and benefits (high confidence).

Concerns about the HPV vaccine being a relatively 'new vaccine' was a particularly salient theme in caregivers' and adolescents' narratives across a range of study settings and population groups (Bartolini 2012; Bowen 2014; Burke 2015; Cooper 2010; Cover 2012; Craciun 2012; Dalmau 2020; Elit 2022; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Gordon 2011; Joseph 2015; Katahoire 2008; Kucheba 2021; Liebermann 2020a; Njuguna 2021; Perkins 2013; Rail 2018; Rendle 2017; Siu 2014; Turiho 2017; Venderbos 2022; Vermandere 2015; Wakimizu 2015; Ward 2017).

Many study participants framed their concerns about the safety and effectiveness of the HPV vaccine in relation to what they perceived as its relative 'newness' or 'novelty'. According to them, the vaccine had not been tested nor been on the market for an extensive period of time, and therefore they felt that its short- and longer-term safety and effectiveness had not yet been established. Here, some caregivers made the distinction between their uncertainty surrounding the HPV vaccine and what they saw as the tried-and-tested nature of established childhood vaccines. This is clearly captured by one mother's narrative where she elucidates why she accepted routine childhood vaccines for her daughter but not the HPV vaccine. "Childhood vaccines are more. . . mastered. The vaccines they give to small children, all these vaccines, they're good! They've been studied for years and years and years…. But it's true that for… Gardasil, there isn't the same hindsight! In the end, I don't want to be a guinea pig..." (Ward 2017, France, participant quote). Similarly, many other caregivers spoke about not wanting their adolescent being used as a "guinea pig" (Gordon 2011; Katahoire 2008; Liebermann 2020a; Turiho 2017; Vermandere 2015), or "white mouse" (Siu 2014), or as an "experiment" (Cover 2012; Craciun 2012; Liebermann 2020a), for what was perceived as a new vaccine.

As such, many of these caregivers expressed a desire to delay vaccination for their child until the vaccine had been on the market for a longer period of time to allow for the evidence about its risks and benefits to accumulate. This view was clearly conveyed by one caregiver's remark: "Maybe after some more years, when the safety of this vaccine has been proved, then I may consider taking my daughter to be vaccinated, but definitely not at the moment" (Siu 2014, Hong Kong, participant quote).

Finding 9

Many adolescents were less accepting of HPV vaccination due to their fear or dislike of needles (high confidence).

A common reason many adolescents gave for not wanting the vaccine was a fear or dislike of needles (Alexander 2012; Balogun 2018; Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Jackson 2016; Katahoire 2008; Njuguna 2021; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Wakimizu 2015). Many adolescents across study contexts and population groups described that they "feared injection" (Rujumba 2021), were "afraid of the needle" (Cordoba-Sanchez 2019), or had a "needle phobia" (Grandahl 2019) or "a phobia of needles" (Cooper 2010). While most adolescents talked about their fear in general terms, some spoke specifically about dreading the moment when the needle pierces the skin, or the particular sensation associated with vaccination (Alexander 2012; Cooper 2010). As one adolescent highlighted: "It's just the way they feel when they go into you, and you feel the actual liquid going in" (Cooper 2010, Australia, participant quote).

Finding 10

Many caregivers were less accepting of HPV vaccination due to their concern that it would promote what they perceived as 'inappropriate' sexual practices, including the initiation of sex, promiscuity or unsafe sexual practices (high confidence).

Numerous caregivers across a range of countries, contexts, and populations were concerned that HPV vaccination would encourage what they perceived as 'inappropriate' sexual practices, in particular the initiation of sex, promiscuity and unsafe sexual practices (Albert 2019; Alexander 2012; Ambali 2022; Balogun 2018; Bartolini 2012; Cooper 2010; de Oliveira 2019; Evans 2021; Fielding 2018; Fisher 2020; Francis 2011; Kucheba 2021; Perkins 2013; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Warner 2015).

Many caregivers were worried that their adolescent may view being vaccinated against HPV as tacit permission for sex. That is, they worried that if they gave permission to receive the vaccine, their adolescent would assume they had also been given permission for sexual debut (Alexander 2012; Ambali 2022; Bartolini 2012; Cooper 2010; de Oliveira 2019; Evans 2021; Francis 2011; Kucheba 2021; Siu 2014; Stephens 2013). It was indeed commonplace for caregivers to portray HPV vaccination as "giving an out for you kids to have sex" (Francis 2011), "carte blanche to start having sex" (Rendle 2017), "an incentive for girls to start sex earlier" (de Oliveira 2019), or as one caregiver argued, "You do not know what you are putting into those children's minds. Are you telling them that it is ok; you can go ahead and be active sexually because there is this preventive measure that the Ministry has put in place?" (Kucheba 2021, Zambia, participant quote).

Many caregivers also expressed trepidation that their adolescent would become sexually promiscuous after receiving the vaccine (Albert 2019; Ambali 2022; Balogun 2018; Bartolini 2012; Cooper 2010; de Oliveira 2019; Evans 2021; Fisher 2020; Francis 2011; Kucheba 2021; Reiter 2014; Siu 2014; Stephens 2013; Warner 2015). For these caregivers, they worried the vaccine might be perceived by their adolescent as a license to "have sex whenever you want" (Warner 2015), "go and sleep around" (Francis 2011), "have sexual relations with anyone" (Bartolini 2012), "think that she is free, she can do anything" (Ambali 2022), or as summed up by one caregiver: "I think that the teenager… will let herself be influenced, she will realize that she is already protected and that she will not have a problem anymore, and that she can enjoy sex as you please and often very wrongly" (de Oliveira 2019, Brazil, participant quote). As alluded to by this caregiver's comment, many other caregivers were similarly anxious that vaccination would also give their adolescent a false sense of safety and in turn promote unsafe sexual practices (de Oliveira 2019; Fielding 2018; Kucheba 2021; Perkins 2013; Rendle 2017; Stephens 2013). Here many caregivers talked about their fear that, if their child was vaccinated, it might lead them to "thinking she's okay" (Rendle 2017), or "well I got the vaccine so I'm safe" (Perkins 2013), because "they believe in the wrong thing of what the HPV needle can do for her" (Stephens 2013).

Finding 11

Many caregivers and adolescents perceived cervical cancer to be a frequent and serious illness that causes immense pain, suffering and financial cost. This contributed to increasing their HPV vaccination acceptance, particularly amongst those with personal experiences of cervical cancer and those from resource-limited settings (moderate confidence).

One of the most commonly cited perceived benefits of HPV vaccination amongst caregivers and adolescents across diverse settings and populations was the prevention of cervical cancer. This appeared to be underscored by a commonly held understanding of cervical cancer as a frequent and serious illness that causes immense pain, suffering and financial cost (Albert 2019; Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Creed 2021; Dalmau 2020; De Fouw 2023; de Oliveira 2019; Elit 2022; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Harries 2009; Jackson 2016; Joseph 2015; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Patrick 2022; Remes 2012; Turiho 2017; Vermandere 2015; Wakimizu 2015; Ward 2017).

When talking about cervical cancer, many study participants used words such as “awful” (Cover 2012), “devastating” (Galbraith-Gyan 2019), “scary” (Fielding 2018; Ward 2017), “dangerous” (Albert, 2019; Cordoba-Sanchez 2019), and a “bad disease” (Ambali 2022), that is “fatal” (Balogun 2018), “deadly” (Cover 2012; Kucheba 2021), or “a killer” (Elit 2022; Gordon 2011). Lots of caregivers and adolescents were particularly concerned about infertility, which they perceived as an inevitable outcome of cervical cancer (De Fouw 2023; Friedman 2013; Harries 2009; Turiho 2017; Vermandere 2015; Wakimizu 2015). This view was shared by one study participant, who said, “When one hears the term cervical cancer especially when your child has it, you get scared. You then ask yourself whether she will ever give birth… Because when she has cervical cancer, she might not give birth and will finally die, so a caregiver loses hope” (Vermandere 2015, Kenya, participant quote). Other caregivers’ and adolescents’ concerns about cervical cancer centred around the financial implications of the illness (Ambali 2022; Bartolini 2012; Cover 2012; De Fouw 2023; Elit 2022; Friedman 2013; Turiho 2017; Vermandere 2015), and the associated “financial problems” (Galbraith-Gyan 2019), or amount of money that “would be spent treating cervical cancer in future” (Turiho 2017).

These perceptions of cervical cancer appeared to serve as strong motivators for several caregivers and adolescents to receive the vaccine. Numerous study participants stated explicitly that their reason for accepting HPV vaccination was because of their fear of cervical cancer and its sequelae. For example, vaccine acceptance to prevent infertility is clearly conveyed by this adolescent’s remark, “I know I may lose my womb… I want to avoid it at any cost. I want to have a baby in the future. So, I think it is better to have an injection, even though it is burdensome now” (Wakimizu 2015, Japan, participant quote). Similarly, many caregivers unambiguously attributed their acceptance of HPV vaccination to the perceived financial savings associated with preventing cervical cancer. This caregiver put it simply: “If the disease did occur, we could not afford the treatment. So it would be better if she got vaccination” (Cover 2012, Vietnam, participant quote).

Whilst fears about the pain and suffering caused by cervical cancer served as a stimulus for vaccination generally, it emerged as a particularly strong motivator for caregivers with personal experience of the illness (Bartolini 2012; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; de Oliveira 2019; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Madhivanan 2009; Mitchell 2021; Turiho 2017). That is, caregivers who had themselves experienced cervical cancer, or who had witnessed it in a relative, friend, or someone else close to them, spoke in detail about the pain and suffering caused by the illness. Many explained how this first-hand experience made them especially accepting of a preventative measure against it. One caregiver said, “We have seen what happened to some of our friends who got cervical cancer… No parent would want to see their daughter suffer from that dangerous disease especially after learning about its prevention” (Turiho 2017, Uganda, participant quote). Moreover, whilst caregivers across socio-economic settings highlighted the perceived financial savings associated with HPV vaccination, this issue appeared particularly pertinent amongst those from resource-limited settings (Ambali 2022; Bartolini 2012; Cover 2012; Elit 2022; Friedman 2013; Madhivanan 2009; Mitchell 2021; Turiho 2017; Vermandere 2015). Participants in these settings most often highlighted the expensive, inaccessible and unaffordable nature of treatment for cervical cancer, and how this was a key reason for their acceptance of the HPV vaccine. As one mother explained, "the first [consideration] was that I am poor. Because of poverty I will not be able to treat my child if she gets that disease because it is expensive to treat; what can I do? So I accepted" (Mitchell 2021, Tanzania, participant quote).

Finding 12

Some caregivers perceived cervical cancer and other HPV-related cancers to be illnesses that are not easily transmitted and increasingly preventable, detectable and treatable. This contributed to reducing their acceptance of HPV vaccination, as the prevention of cancer, including cervical cancer, was not seen as a significant benefit of vaccination (low confidence).

In studies conducted in various HICs - Canada, the USA, France, the Netherlands and Hong Kong - it was established that some caregivers' hesitancy towards HPV vaccination was underscored by a perception of HPV-related cancers, including cervical cancer, as illnesses that are not easily transmitted and are increasingly preventable, detectable and treatable (Albert 2019; Bowen 2014; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Ward 2017). For these caregivers, HPV is transmitted only through sexual contact, and is therefore distinguishable from other diseases commonly targeted by vaccines, which reportedly are easily spread through respiratory droplets or casual contact (e.g. measles or polio). According to these caregivers, the risk of HPV infection and HPV-related cancers is therefore low, which makes HPV vaccination unnecessary. As one mother explained when describing why she did not accept the HPV vaccine for her daughter, “I am more motivated to take my daughter to receive the pneumonia [pneumococcal] vaccine, because pneumonia can kill and it can be easily transmitted through air... Cervical cancer is not that easily transmitted, unless you have sex. My daughter is still young, and still has a long time before getting married, so I do not think that she can get cervical cancer in the near future” (Siu 2014, Hong Kong, participant quote). Another mother conveyed a similar perspective when explaining why she did not support HPV vaccination for her son: “This [cancer associated with HPV] is a disease you get if you

have a lot of sex. But other diseases, such as mumps or rubella, are contagious in a different way. If you get that, you did not ask for it. I am not saying with this type of cancer, that you ask for it, not at all. But you can make the chance smaller by behaving differently" (Venderbos 2022, Netherlands, participant quote).

Many of these caregivers also felt that, while it would be awful if their daughter developed cervical cancer, strategies to detect it early (e.g. routine screening programmes such as Pap tests) and treatment have vastly improved (Bowen 2014; Reich 2010). For them, this meant that cervical cancer has become less serious and life-threatening. One mother aptly captured these views in the following statement: "The reality is that if you get routine Pap smears… it is extraordinarily rare for HPV to turn into cervical cancer if you have Pap smears to detect it and then treat it. Because they can treat it. They can burn the cells, they can do a lot of, you know. And it's— with preventative treatments, you know cervical cancer is completely preventable. I'd rather— I'd rather teach her safe sex practices" (Reich 2010, USA, participant quote). As reflected in this mother's comment, and similarly articulated by other caregivers (Albert 2019; Rail 2018; Venderbos 2022; Ward 2017), some were of the view that there are many other, and potentially more effective, methods for preventing cervical cancer and other HPV-related cancers, than HPV vaccination (e.g. teaching safe sex, regulating and monitoring sexual activities). As one parent enquired, "Can't you just use condoms, similarly with AIDS and sexual transmitted diseases? Is a vaccination really needed? Or maybe education and information is sufficient?" (Venderbos 2022, Netherlands, participant quote). (See Finding 37 for more details.)

For these caregivers then, prevention of cancer was not a particularly significant benefit of HPV vaccination, which in turn reduced their acceptance of it. As one mother put it simply, "I do not think that the protective value of the cervical cancer vaccine for my daughter is high enough to motivate me to take her to be vaccinated" (Siu 2014, Hong Kong, participant quote).

Finding 13

Some caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other cancers besides cervical cancer, which in turn contributed to increasing their acceptance of it. This was a particularly common motivator of HPV vaccination for adolescent men (high confidence).

Some caregivers and adolescents were in favour of HPV vaccination due to its perceived benefit of providing protection against other cancers besides cervical cancer (Alexander 2012; Cover 2012; Creed 2021; Galbraith-Gyan 2019; Grandahl 2019; Joseph 2015; Patrick 2022; Perkins 2013; Venderbos 2022; Wakimizu 2015). Here study participants did not provide details about which particular cancers they thought the vaccine prevented, with a tendency to talk in general terms about the "very important reasons for preventing cancer" (Perkins 2013), or as explained by one caregiver "I have seen the number of people who have died of cancer so if you see that there is an opportunity for your child or person to be vaccinated it encourages us so you say let me give it a try" (Patrick 2022, Uganda, participant quote). While this benefit was seen as relevant to men and women, it was a particularly common reason reported amongst adolescent men and their caregivers for accepting the vaccine for themselves or their sons (Alexander 2012; Grandahl 2019; Joseph 2015; Perkins 2013; Venderbos 2022).

Finding 14

Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against HPV infection, which in turn contributed to increasing their acceptance of it. This was a particularly common motivator of HPV vaccination for adolescent men (high confidence).

Protection against HPV infection was a commonly reported benefit of HPV vaccination and in turn a motivator for HPV vaccination acceptance amongst caregivers and adolescents (Alexander 2012; Ambali 2022; Cordoba-Sanchez 2019; Galbraith-Gyan 2019; Getrich 2014; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Njuguna 2021; Paul 2014; Perkins 2013; Roncancio 2019; Venderbos 2022; Vermandere 2015). While this benefit was seen as relevant to men and women, it was one of the most commonly reported reasons for accepting HPV vaccination for men (Alexander 2012; Galbraith-Gyan 2019; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Paul 2014; Venderbos 2022; Vermandere 2015).

Many study participants referred to men as "carriers of the virus" (Vermandere 2015), and were of the view that vaccinating them would be an "altruistic" act (Grandahl 2019), to help "prevent women from getting HPV" (Joseph 2015). As one caregiver put it, "I think it is a good thing that boys will be included in the national immunization program. If you can better protect girls by vaccinating boys, this could only be beneficial" (Venderbos 2022, Netherlands, participant quote). Others perceived vaccination of men as beneficial for preventing or reducing the transmission of HPV infection more generally (Joseph 2015; Perkins 2013). As one adolescent boy explained, "The main reasons for vaccinating boys? Yes, but it would definitely be to stop the virus from spreading. That's because everybody is helped if it would go away… And if you eradicate all forms of it, the faster the better, I'm for it. So that's why I would like to consider taking the vaccine, if it works." (Grandahl 2019, Sweden, participant quote). A few adolescent boys and their caregivers saw a benefit specifically for men themselves, emphasising how HPV vaccination would help to protect boys from HPV infection (Grandahl 2019; Gutierrez 2013; Paul 2014; Perkins 2013). One adolescent boy stated it simply: "I want to protect myself against it [HPV infection]" (Gutierrez 2013, USA, participant quote).

Finding 15

Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other STIs besides HPV, including genital herpes, gonorrhoea and HIV/AIDS. This in turn contributed to increasing their HPV vaccination acceptance. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings in which endemic sexual and gender-based violence was perceived to make women particularly vulnerable to STIs (high confidence).

Many caregivers and adolescents from diverse settings and populations thought that HPV vaccination could provide protection against other STIs, in addition to HPV, which served as an important motivator for them to accept vaccination (Alexander 2012; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Grandahl 2019; Harries 2009; Joseph 2015; Katz 2013; Perkins 2013; Turiho 2017). Numerous study participants did not indicate which specific STIs they thought vaccination would protect against, commonly indicating that vaccination prevents "many illnesses because of sex" (Getrich 2014), or "STDs

I guess..." or "Not only that particular one [HPV]..." (Cooper 2010). Other caregivers and adolescents cited specific STIs they believed the vaccine would prevent, including genital herpes (Alexander 2012; Cordoba-Sanchez 2019; Galbraith-Gyan 2019), gonorrhoea (Alexander 2012), and, most frequently, HIV (Alexander 2012; Galbraith-Gyan 2019; Harries 2009; Katz 2013; Turiho 2017).

The view that HPV vaccination would provide protection against other STIs, and especially HIV, was perceived as particularly important for caregivers from socio-economically disadvantaged settings (Francis 2011; Getrich 2014; Katz 2013). Many caregivers from these contexts spoke about the widespread sexual and gender-based violence in their communities, which they described as making girls uniquely vulnerable. These caregivers were therefore highly motivated for their daughters to receive the vaccine as they felt it would serve as a "harm-reduction" strategy (Katz 2013), in this context. This concern about sexual violence is conveyed by one mother's explanation for why she supported her daughter receiving the HPV vaccine: "I feel certain about vaccinating my child because there is AIDS and HIV out there and we all are aware of it. My child can be raped… but I am at peace [knowing] that she… will be protected against sexually transmitted diseases" (Katz 2013, South Africa, participant quote).

Finding 16

Many caregivers and adolescents perceived HPV vaccination as beneficial for health promotion and disease prevention generally, which contributed to increasing their acceptance of it. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings, where preventing illness and associated financial burden were frequently viewed as very important (moderate confidence).

Numerous caregivers and adolescents, across diverse study settings, contexts and populations, spoke about the benefits of HPV vaccination in general terms and without much specificity (Albert 2019; Alexander 2012; Ambali 2022; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cordoba-Sanchez 2022; Cover 2012; Creed 2021; de Oliveira 2019; Elit 2022; Francis 2011; Galbraith-Gyan 2019). The studies were saturated with comments about the general health-promoting benefits of the HPV vaccine, providing "a chance to be healthy" (Francis 2011), "keep you healthy" (Alexander 2012), and "live healthy lives" (Turiho 2017). Similarly, many study participants talked about the general disease prevention benefits of HPV vaccination, often attributing their acceptance of the vaccine to its ability "to prevent disease" (Paul 2014), "protect us from diseases" (Patrick 2022), "to protect them so they don't get the illness" (Joseph 2015), "protect her from something bad" (Roncancio 2019), "protect them in the future" (Burke 2015), "to protect my daughter's life" (Cordoba-Sanchez 2022), or to "avoid future distress" (Elit 2022). One mother highlighted the preventive health issue explicitly, "It is a prevention, a prevention for her future life, an opportunity" (de Oliveira 2019).

Sentiments about the contribution of HPV vaccination towards general disease prevention and health promotion were a driver of its acceptance for participants across socio-economic groups. However, it appeared to be a particularly important motivator amongst caregivers from socio-economically disadvantaged settings (Burke 2015; Elit 2022; Francis 2011; Getrich 2014; Katz 2013; Madhivanan 2009). Many caregivers in these settings discussed the difficulties they experience in keeping their children safe and healthy within a context of limited resources. They emphasised their wish for a "better life" (Katz 2013), for their children, indicating that they would accept anything that would provide them with "a chance to be healthy" (Francis 2011). A number of these caregivers also stressed the importance of disease prevention measures to avoid the financial costs that commonly occur with illness. As this caregiver explained when talking about why she accepted the HPV vaccine for her daughter, "We have to take necessary measures to prevent diseases. Once our body gets weakened, we cannot do anything. As we are poor, we cannot spend money if something happens to our children" (Madhivanan 2009, India, participant quote).

Finding 17

Some caregivers perceived HPV vaccination as beneficial only for the individual who receives it and therefore thought herd immunity was not an advantage. This contributed to reducing these caregivers' HPV vaccination acceptance due to their sense of collective responsibility as a driver for vaccination (very low confidence).

Two studies - one based in England (Gordon 2011), and one in the USA (Reich 2010) - showed that some caregivers were of the opinion that herd immunity is not an advantage of HPV vaccination, which in turn reduced their acceptance of it. These caregivers explained how, unlike many other vaccines that provide benefit to others not receiving the vaccine (e.g. pregnant women, immune-compromised individuals, infants), HPV vaccination only protects the individual who receives it. Moreover, and according to these caregivers, unlike other diseases commonly targeted by most vaccines that are easily transmitted through respiratory droplets and casual contact (e.g. measles or polio), HPV is transmitted only through sexual contact (see Finding 12 for more details). These caregivers therefore felt that the issue of herd immunity was not relevant for HPV vaccination, unlike vaccination for these other diseases. As one mother indicated, "I don't think it can be caught and therefore I don't feel I have a communal responsibility to accept the vaccine, whereas I would do if it was something that is based on a majority having it in order for it to be successful and work" (Gordon 2011, England, participant quote). For this mother and various other caregivers, this perceived lack of collective responsibility reduced their acceptance of the HPV vaccine for their adolescents.

Finding 18

Many adolescents and caregivers perceived HPV vaccination to be beneficial and necessary only for people who are, or are about to become, sexually active. Numerous adolescents indicated that they were not yet sexually active, and many caregivers thought their adolescent was not yet having sex nor would be in the foreseeable future. This in turn contributed to reducing HPV vaccination acceptance for these adolescents and caregivers (high confidence).

Many adolescents and caregivers across diverse study settings, contexts and population groups perceived the HPV vaccine to be beneficial only for people who are, or are about to become, sexually active (Alexander 2012; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Lismidiati 2019; Madhivanan 2009; Perkins 2013; Reich 2010; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Wakimizu 2015). Many

adolescents indicated that they were not yet having sex, and in turn considered the vaccine unnecessary for themselves (Alexander 2012; Galbraith-Gyan 2019; Getrich 2014; Wakimizu 2015). As one adolescent responded to the question of whether she would receive the vaccine, "I'm not sexually active so… No… If I started having sex, I would jump to it. But right now, I'm just like, I don't want to get a shot. I'm not doing anything. But it's definitely something I would think about being sexually active" (Galbraith-Gyan 2019, USA, participant quote).

Similarly, many caregivers were of the opinion that their adolescent was not yet sexually active, nor were they likely to become sexually active in the foreseeable future (Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Lismidiati 2019; Madhivanan 2009; Perkins 2013; Reich 2010; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022). The studies were saturated with caregiver narratives about how "she is not having sex now" (Stephens 2013), "my son is not engaging in sexual activities" (Perkins 2013), or, as one caregiver asserted, "I'm sure all parents say this, but I'm 100% certain she's not sexually active" (Rendle 2017, USA, participant quote). With a perception of their adolescent as not having sex, and an understanding of HPV vaccination as needed only by people who have begun or are about to begin engaging in sex, many caregivers thought the vaccine was unnecessary for their adolescent. For example, sharing the sentiments of many other caregivers, one mother claimed, "No use for her to be vaccinated now…there are still many years ahead for her to get married. There will not be any point if she is vaccinated now; the vaccine will just be wasted" (Siu 2014, Hong Kong, participant quote).

Many caregivers indicated that they would consider accepting the vaccine for their adolescent when they were older and had started having sex (Chau 2021; Cover 2012; Gordon 2011; Reich 2010; Siu 2014). This is clearly reflected in the ubiquitous comments made by caregivers about how their adolescent "wasn't sexual at all. So then we decided to wait" (Reich 2010), that "she will become sexually active in the next six years and will be exposed to the disease then… so I would volunteer to take my daughter…for vaccination" (Cover 2012, Vietnam, participant quote), or as one caregiver explained "My feeling was that they could wait... they are both religious, chances are they won't have sex before marriage… they could have it [HPV vaccine] when they are 18" (Gordon 2011, England, participant quote).

Finding 19

Some caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who have not yet engaged in sexual activities. This contributed to reducing acceptance of HPV vaccination amongst adolescents who were already sexually active or caregivers who suspected their adolescent was already sexually active (very low confidence).

Two studies - one in Australia (Cooper 2010), and one in Uganda (Turiho 2017) - reported that some caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for those who have not yet engaged in sexual activities. Having already initiated sex themselves, or suspecting that their adolescent was already sexually active, they assumed that "the vaccination will not help" (Turiho 2017). This view contributed to reducing acceptance of HPV vaccination for themselves or their adolescent.

Finding 20

Many caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who engage in what was seen as 'inappropriate' sexual practices, including promiscuity, having multiple sexual partners or premarital sex. Numerous adolescents and caregivers characterised themselves or their adolescent as practising monogamy, sexual restraint or abstinence until marriage, which contributed to reducing their acceptance of HPV vaccination (moderate confidence).

Many caregivers and adolescents across diverse settings, contexts and population groups were of the opinion that HPV vaccination is beneficial and necessary only for individuals who engage in what they perceived as 'inappropriate' sexual practices (Albert 2019; Balogun 2018; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Harries 2009; Jackson 2016; Joseph 2015; Katahoire 2008; Liebermann 2020a; Madhivanan 2009; Paul 2014; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015). What was considered 'inappropriate' tended to include promiscuity, multiple sexual partners and premarital sex, in contrast to conceptualisations of 'appropriate' sexual practices, which were commonly associated with notions of monogamy, fidelity, sexual restraint and particularly abstinence until marriage. These perceptions emerged as shaped, at least in part, by socio-cultural beliefs and practices around sexuality, and associated representations of HPV infection and cervical cancer (see Finding 35 for more details).

When talking about the HPV vaccine, the studies were saturated with comments made by caregivers and adolescents about how "I feel like if… you are a little risky, you should get it" (Galbraith-Gyan 2019), or "for the boys and girls who start very early [with having sex] and have different partners, for that group this would be ideal" (Venderbos 2022), and so the vaccine is "aimed at people that's more sexually active" (Jackson 2016), or "good for those who live in precarious and promiscuous conditions" (Pop 2015), or have "a crazy sex life" (Cordoba-Sanchez 2022), or as one adolescent explained "It depends on what kind of a person you are. If you're, like, free-spirited and want to go sleep with everybody, then maybe it's a good idea for you to get the vaccination. But, if you're more introverted, a 'to yourself' kind of a person, or a Christian, then maybe not" (Gutierrez 2013, USA, participant quote).

Numerous study participants viewed themselves, or their adolescent, as not engaging in such apparent 'inappropriate' sexual practices. There was indeed a common tendency for caregivers to describe their own adolescents as "very conservative… she won't fool around… She is very good, well-behaved" (Fielding 2018), "My girls are good girls and they hang out with good girls" (Getrich 2014), "Our young ones, they're clean… our girls aren't promiscuous" (Jackson 2016), "No one in my family has illegal sex" (Madhivanan 2009), and "I am confident my girls will not be like that" (Cooper 2010).

This common understanding of HPV vaccination as beneficial for 'others' who engage in supposedly 'undesirable' sexual practices ultimately reduced acceptance of vaccination for many study participants. This is captured by a caregiver's explanation for why

she did not feel her daughter needed the vaccine: "Only those who are promiscuous need to be vaccinated. I trust that my daughters will be morally behaved and be good women when they grow up" (Siu 2014, Hong Kong, participant quote).

Theme 3: Views and experiences of other vaccines and vaccination programmes

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by their views and experiences of other vaccines and vaccination programmes. That is, their acceptance of HPV vaccination (or not) may have less to do with the HPV vaccination specifically, and more about their relationship with other vaccines and vaccination more generally. For some, this relationship may comprise an almost routine response to vaccination, and by extension, HPV vaccination. Others may hold particular opinions about, and previous experiences with, other vaccines and vaccination which may in turn shape their HPV vaccination views and practices. In both cases, the influence of views and experiences of other vaccines and vaccination programmes appeared to go in both directions, that is, enhancing HPV vaccination acceptance in some cases whilst reducing acceptance in others.

Finding 21

Some adolescents' and caregivers' views and practices around HPV vaccination formed part of a routine response to vaccines and vaccination more generally. This contributed to both increasing and decreasing HPV vaccination acceptance, depending on their routine response (high confidence).

The studies illustrated how some adolescents' and caregivers' views and practices around HPV vaccination were part and parcel of a more 'automatic' or default position towards vaccines and vaccination in general (Bowen 2014; Bunton 2013; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Jackson 2016; Marlow 2009; Perkins 2013; Rail 2018; Roncancio 2019; Venderbos 2022; Ward 2017). That is, their HPV vaccination decision, like with other vaccines, did not entail much thought or deliberation, but was rather a routine response towards vaccination (or not) more generally. This appeared to be the case for both routinised acceptance and nonacceptance of the HPV vaccine.

For several adolescents and caregivers, their acceptance of the HPV vaccine was essentially part of their automatic acceptance of all vaccines and vaccination more generally (Bunton 2013; Chiang 2015; Cooper 2010; Dalmau 2020; Gordon 2011; Grandahl 2019; Jackson 2016; Marlow 2009; Perkins 2013; Rail 2018; Roncancio 2019; Venderbos 2022). These individuals tended to describe the HPV vaccine as "just another vaccine" (Chiang 2015), that you "just did without too much thought" (Marlow 2009), or "did not even have to think about" (Venderbos 2022). Or, as one caregiver remarked, "I've just taken it as granted that one gets your child vaccinated against everything" (Gordon 2011, England, participant quote).

Many caregivers even expressed surprise at the notion that someone would actively choose not to vaccinate their adolescent, as one caregiver asked, "Are there cases where parents refuse [vaccination]?" (Chiang 2015, Brazil, participant quote). Therefore, HPV vaccination for these adolescents and caregivers emerged as an automatic or habitual practice that generated little deliberation; they gave consent as part of a routine response to vaccination. Various study authors suggested that this may reflect a prominent culture of vaccination generally, where the decision to vaccinate appears to be less of an independent decision and more of a social expectation (Bunton 2013; Chiang 2015; Gordon 2011).

Studies conducted in various HICs - Australia, France, Sweden, USA, Canada - suggested that nonacceptance of the HPV vaccine may also be a routine response for some adolescents and caregivers. These individuals appeared to be explicitly anti-vaccination, attributing their refusal of HPV vaccination to their eschewal of vaccination in general (Bowen 2014; Cooper 2010; Galbraith-Gyan 2019; Grandahl 2019; Rail 2018; Ward 2017). As one adolescent put it simply when describing her hesitancy towards the HPV vaccine, "Well I don't get immunizations. I've never had any" (Cooper 2010, Australia, participant quote). Therefore, these adolescents and caregivers did not actively engage in the decision process around HPV vaccination nor express any unique concerns associated with the HPV vaccine specifically. Rather, their nonacceptance of the vaccine appeared to be part of a more routine rejection of vaccination generally.

Finding 22

Some caregivers' and adolescents' views and practices around HPV vaccination were influenced by their views and experiences of other vaccines or vaccination programmes. A belief that vaccination is generally beneficial, witnessing the benefits of other vaccines, or having positive personal experiences receiving other vaccines contributed to increasing HPV vaccination acceptance amongst various caregivers and adolescents. In contrast, witnessing adverse effects of other vaccines or having negative personal experiences receiving other vaccines contributed to decreasing HPV vaccination acceptance amongst various caregivers and adolescents (high confidence).

Some caregivers' and adolescents' views and practices around HPV vaccination appeared to be influenced by their opinions about, and previous experiences with, other vaccines or vaccination programmes (Bartolini 2012; Burke 2015; Chau 2021; Chiang 2015; Cover 2012; Creed 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Katahoire 2008; Kucheba 2021; Madhivanan 2009; Mitchell 2021; Patrick 2022; Paul 2014; Reich 2010; Remes 2012; Turiho 2017; Vermandere 2015; Ward 2017). This influence emerged as operating in both directions, enhancing and reducing acceptance of the HPV vaccine depending on the nature of their views or experiences with other vaccines.

Several caregivers and adolescents attributed their acceptance of HPV vaccination to their views about the major benefits of vaccination more generally (Bartolini 2012; Burke 2015; Chau 2021; Chiang 2015; Cover 2012; Galbraith-Gyan 2019; Jackson 2016; Katahoire 2008; Paul 2014; Remes 2012; Ward 2017). Here, broad statements were commonly made about how "Immunization is the best way of prevention" (Cover 2012), "when you are immunized, nothing disturbs you in future" (Katahoire 2008), "I always have my daughters vaccinated because it protects life" (Bartolini 2012), "vaccines, they're a way to fight a disease" (Ward 2017), "when children are vaccinated, they grow up healthy and do not get that disease" (Remes 2012).

Other caregivers related their acceptance of HPV vaccination to the major benefits they had personally witnessed of other vaccines and vaccination programmes (Bartolini 2012; Chiang 2015; Cover 2012; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Madhivanan 2009; Mitchell 2021; Paul 2014; Remes 2012; Turiho 2017; Ward 2017). These caregivers told stories about how, prior to the introduction of vaccination, many childhood deaths and disabilities had occurred in their communities. Some recalled painful personal experiences of witnessing vaccine-preventable disease outbreaks, such as polio, measles, whooping cough and meningitis. They described seeing how vaccination had significantly reduced the burden of these illnesses, which for them was a stimulus to accept HPV vaccination in the hope that it would have similar positive effects. As one mother explained, "Many children here used to die from the 6 killer diseases before immunizations began; but the children are now healthy… Around the year 1989, a family here lost four of its members to measles and we all saw it. Who do you think can stop their child from any vaccination after that incident?" (Turiho 2017, Uganda, participant quote). Another mother shared similar sentiments: "When I was growing up, so many people were dying of smallpox and a lot of children died due to measles but […] now even measles […] does [not] kill a lot of children and I can see that even smallpox has vanished… so that was something that was […] motivating me a lot …" (Mitchell 2021, Tanzania, participant quote). Some caregivers and adolescents also described having positive personal experiences receiving other vaccines, such as having minimal side effects and no adverse events (Bartolini 2012; Gordon 2011; Jackson 2016). This in turn enhanced their acceptance of HPV vaccination, as they felt more confident that it too would have minimal risks or negative effects. As one adolescent said: "They've already vaccinated me against hepatitis B and nothing happened to me; so, mom, let me be vaccinated" (Bartolini 2012, Peru, participant quote).

In direct contrast, many caregivers attributed their hesitancy towards, or nonacceptance of, HPV vaccination to the negative experiences they had had with other vaccines or vaccination programmes (Bartolini 2012; Creed 2021; Jackson 2016; Kucheba 2021; Reich 2010; Remes 2012; Turiho 2017; Vermandere 2015; Ward 2017). Here, various caregivers recalled stories of adverse effects of other vaccines, including the polio, diphtheria-tetanus-pertussis, hepatitis B, influenza and the MMR (measles, mumps, rubella) vaccines. For them, these events served as an important reason to doubt the safety or effectiveness of the HPV vaccine. For example, when speaking about polio vaccination, one caregiver recounted "Vaccination was done [in Ibanda] some years ago and some kids died. We lost confidence in vaccinations after that incident" (Turiho 2017, Uganda, participant quote). Similar sentiments were shared by another caregiver: "Like you see when they [Government] said that they had brought vaccines for hepatitis and then we went and got them but later they told us that the vaccines were fake. So now we have that fear that when we hear government programs like these [HPV vaccination] we are reluctant to go" (Patrick 2022, Uganda, participant quote).

Other caregivers and adolescents described memories of unpleasant experiences, such as side effects and adverse events, they themselves had had with other vaccines, which in turn made them reluctant to receive the HPV vaccine. As explained by this adolescent: "At my old school they gave me a vaccination for measles. Then some few days when I closed school, I got sick of the same measles. That's why my dad refused me to get vaccinated" (Kucheba 2021, Zambia, participant quote).

For a few caregivers, having not been vaccinated against a particular disease, and having not experienced any negative health consequences because of this, made them feel that HPV vaccination was unnecessary. For example, in justifying why she did not support HPV vaccination, one mother explained, "I ain't got the BCG and nothing's happened to me, so [laughs] can't be that bad" (Jackson 2016, England, participant quote).

Theme 4: Nuclear familial decision-making dynamics

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by the complex decision-making dynamics between adolescents and their primary caregivers. A diversity of dynamics emerged across the studies, which appeared to shape who was perceived to be the primary decision-maker(s) regarding HPV vaccination. Our analysis suggested four main scenarios in this regard, which we unpack separately in this section: the perception that 1) the caregiver(s) is the decision-maker, 2) the adolescent is the decision-maker, 3) the adolescent should be the decision-maker, and 4) decision-making is a process shared between caregiver(s) and adolescents. Where caregivers were involved, the role of paternal and maternal caregivers varied across studies.

Finding 23

Sometimes the decision around HPV vaccination was perceived to be made by the caregiver(s), with limited or no involvement of the adolescent. Some adolescents were supportive of this parental decision-making authority, whereas others resented not being consulted, particularly when they held contrasting HPV vaccination views to their caregiver(s). In both cases, HPV vaccination could be received, delayed or declined, depending on the caregivers' views (high confidence).

Studies from various countries, both in HICs (USA, Australia, England) and LMICs (Brazil, Zambia, Colombia, Cameroon) revealed that in some instances the decision around HPV vaccination was made (or perceived to be made) by the caregiver(s), with no or minimal involvement of the adolescent (Alexander 2012; Bowen 2014; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Elit 2022; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Warner 2015). In these studies, various caregivers - both those who accepted and declined HPV vaccination for their adolescent - indicated that they did not discuss the matter with their adolescent, believing that at their adolescent's young age it was up to the caregivers to make decisions for them. As expressed by one mother, "Whether they like to be vaccinated or not is not their problem. They are still little children so they have no say. I am the one to decide together with their father. The children do not have a choice" (Elit 2022, Cameroon, participant quote). In agreement with this sentiment, another mother described her interaction with her son around HPV vaccination: "I looked at him and he looked at me and I said, "You're gonna get that." I mean, it wasn't even a question. He's 15 years old" (Alexander 2012, USA, participant quote).

Various adolescents confirmed this view that caregiver(s) are in charge of the decision around HPV vaccination (Alexander 2012; Cooper 2010; Cordoba-Sanchez 2022; Fisher 2020; Galbraith-Gyan 2019). As one adolescent indicated, expressing the views of many others, "It's like your parents are the boss of you, sort of. You

don't choose, 'oh I'm going to get a cervical cancer vaccination.' It's not your choice" (Cooper 2010, Australia, participant quote). Some adolescents appeared to be supportive of deferring power to their caregiver(s), expressing a preference or an expectation that their caregiver(s) be responsible for making the decision (Cordoba-Sanchez 2022; Fisher 2020). Other adolescents resented this parental authority and complained about not being consulted and having little to no say in the decision. Adolescent discomfort was particularly evident when adolescents held contrasting views to their caregiver(s) about the vaccine, in cases of both accepting and rejecting the vaccine (Alexander 2012; Cooper 2010; Cordoba-Sanchez 2022; Fisher 2020; Galbraith-Gyan 2019). For example, in response to being asked whether she was involved in the decision around vaccination, one adolescent replied: "No. I never do. I knew I had to get them…. I always feel like I don't want to do it, but I have to do it because they [my parents] tell me to (Galbraith-Gyan 2019, USA, participant quote). In other cases, adolescents wanted vaccination yet their caregiver(s) were against it, resulting in frustration, as reflected in this adolescent's words: "I wanted to get the vaccine, but it still doesn't make a difference because it's up to my parents ultimately" (Galbraith-Gyan 2019, USA, participant quote).

Finding 24

Sometimes the decision around HPV vaccination was perceived to be made by the adolescent. This was potentially more common amongst older adolescent men and men who have sex with men; in households where primary caregiver(s) were absent; or when adolescents held contrasting HPV vaccination views to their caregiver(s). In all cases, HPV vaccination could be received, delayed or declined, depending on the adolescent's views (moderate confidence).

In various studies - in the USA, Australia, Sweden, England, Romania, South Africa- it emerged that the decision around HPV vaccination was perceived to be made by the adolescent with limited or no involvement of caregivers (Alexander 2012; Bowen 2014; Cooper 2010; Craciun 2012; Fisher 2020; Grandahl 2019; Gutierrez 2013; Joseph 2015; Katz 2013; Pop 2015). The reasons for this materialised as diverse and context-specific.

For example, two studies in HICs - Sweden (Grandahl 2019), and the USA (Gutierrez 2013) - were both conducted amongst older adolescent men. The participants in both studies reported making the HPV vaccine decision themselves, with no or minimal involvement of their caregiver(s). According to them, their caregiver(s) no longer had the authority over their choices and therefore the decision on whether to receive the vaccine or not was theirs to make. Many reported neither discussing the vaccine with his caregiver(s) nor asking for their advice on the subject. As one adolescent indicated, "Well, what I feel is… this is perhaps not something you discuss with them. It's sort of my own decision" (Grandahl 2019, Sweden, participant quote). One of the studies found that this perspective was more salient amongst men who have sex with men, which the study author attributed to the fact that these individuals may have made their own healthcare decisions in the past, particularly in relation to sexual health (Gutierrez 2013).

The setting of another study conducted in South Africa was characterised by endemic poverty and households where primary caregiver(s) are often absent, and here HPV vaccination decision-making was also found to be predominantly youth-driven (Katz 2013). That is, adolescents exercised a high level of self-reliance and autonomy around healthcare decision-making, ultimately leading them to play a significant role in choosing whether to accept the vaccine. Many adolescents in this study described not discussing the matter with their caregiver and often considered caregiver consent a formality.

In two studies, both conducted in HICs - Australia (Cooper 2010), and England (Fisher 2020) - some adolescents made the decision around HPV vaccination by going against their caregiver(s)' wishes, both in cases to receive and decline vaccination. In these instances, there may have been discussion between adolescents and caregiver(s), or the decision may have been made by the caregiver(s). Yet, as reported by both caregivers and adolescents, the adolescent was able to go against the decision by employing various strategies. For example, in instances where they wished to receive the vaccine, but their caregivers were against it, they might sign the consent form on behalf of their caregiver(s). As one adolescent recounted, "We got given like a big sheet and my mum didn't want me to get that [the HPV vaccine] or the meningitis I think, so I signed them myself and got it done anyway" (Fisher 2020, England, participant quote). In situations where the adolescent did not want to receive the vaccine, but their caregiver(s) had decided they should, some adolescents avoided it by simply not attending school on the day of vaccination or not giving their caregiver(s) the consent form, as one mother suggested "I think that's why my daughter wasn't like 'mum can you sign this?' [HPV vaccine consent form], you know, 'cos she didn't want it" (Fisher 2020, England, participant quote).

Finding 25

Various caregivers held a view that the decision around HPV vaccination should be made by adolescents because it is the adolescent's body and sexuality. Some of these caregivers therefore delayed HPV vaccination until their adolescent was older and thought to be more equipped to make the decision themselves (low confidence).

In studies conducted in the USA (Alexander 2012; Bowen 2014; Joseph 2015), and Romania (Craciun 2012; Pop 2015), some caregivers were of the opinion that the decision around HPV vaccination should be made by their adolescent. In explaining this view, some caregivers felt that it is the adolescent's body and therefore should be their choice. As one mother recounted the advice she had given to her daughter, "this is your body and I'm not gonna make that decision for you. Here's the information, you know, read up, when we go to the doctor you know, for the next time, talk with them, ask as many questions as you want, and then it's your judgment" (Bowen 2014, USA, participant quote). Relatedly, other caregivers felt that, because the vaccine is related to sex, this is a realm where each individual should be able to make personal decisions themselves (Alexander 2012; Joseph 2015). As one father explained, "I mean because, it's like sex is their own, that's up to them to make that decision. It's their sexual decision, so as far as forcing them, it's like forcing them to carry a condom in their pocket (Alexander 2012, USA, participant quote). Some caregivers who held this view felt that their adolescent was currently too young to make this decision and indicated putting off the decision until their adolescent is older and "can decide for themselves" (Craciun 2012).

Finding 26

Sometimes the decision around HPV vaccination was perceived to be a consultative process and made jointly between the caregiver(s) and adolescent. When views differed, the ultimate decision was perceived to reside with the caregiver(s) in some instances and the adolescent in others. In both cases, HPV vaccination could be received, delayed or declined, depending on the views of the final decision-maker (high confidence).

It emerged from studies conducted in various HIC and LMIC settings - USA, Australia, Japan, England, Sweden, Brazil, Peru, Columbia - that in many cases both caregiver(s) and adolescents are involved in the decision-making process around HPV vaccination (Alexander 2012; Bartolini 2012; Bowen 2014; Cooper 2010; Cordoba-Sanchez 2019; de Oliveira 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Wakimizu 2015). Numerous caregivers indicated that they wanted to be involved in the decision-making process, while others reported consulting with their adolescent and seeking their views about the matter (Alexander 2012; Bartolini 2012; Bowen 2014; Cooper 2010; Cordoba-Sanchez 2019; de Oliveira 2019; Getrich 2014; Gordon 2011). Similarly, many adolescents reported having conversations with their caregiver(s) about HPV vaccination where they were able to share and discuss their perspectives (Alexander 2012; Cooper 2010; Cordoba-Sanchez 2019; Getrich 2014; Grandahl 2019; Wakimizu 2015).

Indeed, many study participants - both caregivers and adolescents - referred to the HPV vaccination decision-making as a "shared" (Getrich 2014), or "mutual" or "interactive" (Alexander 2012), or a "joint" process (Gordon 2011), of "negotiation" (Bartolini 2012). When caregiver and adolescent HPV vaccination views differed, various outcomes ensued. Often, caregiver(s) had the final say, with adolescents either supporting or being unhappy with the ultimate decision (Cooper 2010; Getrich 2014; Gordon 2011; Wakimizu 2015). In other cases, the final choice was left to the adolescent (Alexander 2012; Bartolini 2012; Bowen 2014; Cordoba-Sanchez 2019; de Oliveira 2019). Here, caregivers explained how they elicited and deferred to the preference of their adolescent. As one caregiver said, recounting the conversation with her adolescent, "My daughter did not want to be vaccinated, said flatly no. And so daughter if you do not want it, I won't force you" (Bartolini 2012, Peru, participant quote).

Finding 27

Often HPV vaccination decision-making comprised either paternal or maternal caregiver involvement, rather than both. Which caregiver was involved was frequently influenced by who was primarily responsible for making decisions about the household or child-rearing. In all cases, HPV vaccination could be received, delayed or declined, depending on the views of the caregiver involved (moderate confidence).

Where caregivers were involved in the decision-making around HPV vaccination - either as the primary decision-maker or jointly with their adolescent - the role of paternal and maternal caregivers varied across studies. In a few cases, mothers described the HPV vaccination decision-making process as one in which she and her husband or partner were jointly involved (Bartolini 2012; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Gordon 2011). In most instances, however, it emerged that HPV vaccination decision-making lay either with paternal (Adeyanju 2022; Ambali 2022; Bartolini 2012; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Fielding 2018; Jackson 2016; Madhivanan 2009; Njuguna 2021; Roncancio 2019), or maternal caregivers (Adeyanju 2022; Ambali 2022; Bartolini 2012; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Fielding 2018; Jackson 2016; Madhivanan 2009; Njuguna 2021; Roncancio 2019), but not both.

In various studies - conducted in the USA, India, England and Scotland, Peru, Nigeria, Uganda, Cameroon, Colombia, China, Malawi, Pakistan, and Kenya - it emerged that the locus of HPV vaccination decision-making resided primarily with the father (Adeyanju 2022; Ali 2022; Ambali 2022; Bartolini 2012; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Fielding 2018; Jackson 2016; Madhivanan 2009; Njuguna 2021; Roncancio 2019). These studies found that, while there may be discussions between caregivers on the matter, the ultimate decision-maker would be the father. As some mothers explained, "If her dad said yes, I said yes, too" (Bartolini 2012) or "if [the] father says no, then no one can argue with him" (Ali 2022) or "If the father rejects it that means that I can't decide on my own" (Ambali 2022). This was frequently attributed to the position of the father as the primary decision-maker within the household more generally (Ambali 2022; Bartolini 2012; Madhivanan 2009).

In other cases, mothers (and sometimes grandmothers) appeared to be the primary caregivers involved in HPV vaccination decision-making, as identified in studies conducted in Columbia, Chile, USA, Australia, Nigeria, South Africa, China, England, and Uganda (Ambali 2022; Cooper 2010; Cordoba-Sanchez 2019; De Fouw 2023; Fielding 2018; Francis 2011; Gordon 2011; Muresianu 2022; Roncancio 2019). Here many mothers and adolescents indicated explicitly that fathers were uninvolved or provided very little input in discussions around HPV vaccination. Fathers were also often notably absent in study participants' descriptions of their decision-making process. Study participants suggested a range of potential reasons for the lack of paternal caregiver involvement. Some mothers and adolescent women were of the view that the decision around HPV vaccination tends to lie with mothers because fathers are "uninterested and ignorant about 'a female topic'" (Fielding 2018, Hong Kong, participant quote). Other study participants suggested that mothers and other women household members (particularly grandmothers) are the primary HPV vaccination decision makers because they are responsible for household decision-making and child-rearing more broadly (Francis 2011; Gordon 2011). It was proposed that fathers have little involvement in these "matriarchal" families, and therefore, by extension, in HPV vaccination decision-making (Francis 2011). Various fathers - in studies from Uganda and Nigeria - indicated themselves that the decision should lie with women caregivers, attributing this to the fact that HPV is reportedly a "women's health issue" and therefore inappropriate for fathers to be involved in the decision (Ambali 2022; De Fouw 2023). As one father indicated, "In our culture as 'Bunyoro' people, those issues a girl only discusses with the mother. A man can never enter into such discussions" (De Fouw 2023). Another study with fathers in Chile similarly revealed how gender roles and associated norms prevented fathers from being more involved in this regard (e.g. that conversations about sex and sexuality were more suited to mothers or the father being at work and the mother being at home; Muresianu 2022). Many fathers in this study, however, did not support this situation and wished to participate in the decision-making pertaining to their children's sexual and reproductive health.

Theme 5: Social networks, communities and the media

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by their extended familial and social relations and networks. Here we unpack four entities that emerged as playing a particularly important role: 1) extended family members (outside the nuclear family); 2) peers; 3) traditional or religious leaders; and 4) the media. Many study participants reported actively consulting these entities for guidance or information, whilst others conveyed more subtle ways in which these entities influenced their HPV vaccination views and practices. The influence of these relations and networks appears to operate in both directions, enhancing HPV vaccination acceptance in some cases whilst reducing acceptance in others, depending on the views and practices of these relations and networks.

Finding 28

Various caregivers' and adolescents' views and practices around HPV vaccination were influenced by the HPV vaccination views and practices of their extended family members. This contributed to both increasing or decreasing HPV vaccination acceptance, depending on family members' views and practices (high confidence).

Caregivers and adolescents in studies conducted in diverse settings reported reaching out to extended family members (outside the nuclear family) for information and advice on HPV vaccination (Ali 2022; Bartolini 2012; Cooper 2010; Cover 2012; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Gutierrez 2013; Holroyd 2022; Jackson 2016). Some caregivers and adolescents described how, when relatives provided reassurance around the HPV vaccine or shared their own views of vaccine acceptance, they too felt more favourably disposed towards the vaccine (Bartolini 2012; Cover 2012; Francis 2011; Getrich 2014; Gordon 2011). As one caregiver explained, "My mother, mother-in-law, and cousins urged that I should take my daughter to get vaccinated, that we were still poor and it was a great and rare chance to get this donation, and that I should take the girl to get vaccinated for good health" (Cover 2012, Vietnam, participant quote). In contrast, various caregivers and adolescents reported feeling more hesitant towards, or even refusing the vaccine, when extended family members said negative things, expressed fears, or verbalised any disapproval regarding HPV vaccination (Cooper 2010; Fielding 2018; Jackson 2016).

Finding 29

Adolescents' peers played an important role in shaping their HPV vaccination views and practices. When peers provided misinformation, discouraged vaccination, ridiculed those receiving the vaccine, or had negative reactions when they received the vaccine, this contributed to reducing HPV vaccination acceptance for many adolescents. In contrast, when vaccination rates amongst peer groups were high or when peers were witnessed receiving the vaccine without experiencing side effects, this contributed to enhancing HPV vaccination acceptance for many adolescents (high confidence).

Studies conducted in diverse countries and population groups showed that adolescents' peers play an important role in shaping their HPV vaccination views and practices (Beyen 2022; Cooper 2010; Fielding 2018; Friedman 2013; Getrich 2014; Katz 2013; Kucheba 2021; Patrick 2022; Roncancio 2019; Rujumba 2021; Wakimizu 2015). This influence emerged as complex and varied, both enhancing and reducing HPV vaccination acceptance in different instances.

Many caregivers reported that their adolescent's peers often provided misinformation, overtly discouraged vaccination or ridiculed those who received the vaccine, which in turn contributed to reducing their adolescent's acceptance of it (Cooper 2010; Friedman 2013; Kucheba 2021). This view was confirmed by some adolescents, who acknowledged that rumours about vaccine side effects and adverse reactions were circulated amongst their peers and had intensified their fears about vaccination (Beyen 2022; Cooper 2010; Getrich 2014; Katz 2013; Kucheba 2021; Rujumba 2021; Wakimizu 2015). For example, when explaining why she had become hesitant towards the vaccine, one adolescent said, "I just told some of my closer friends about it. I was like, 'I'm going to do this' and they're like, 'Oh, my God. Isn't that the one where they put the needle down your back?' They made it sound like an epidural" (Getrich 2014, USA, participant quote). Other adolescents described being teased by peers for receiving the vaccine (Beyen 2022), as one adolescent girl recounted, "They laugh at us, that hahaha, she has been injected, she has been injected with Ebola, especially boys, they would be mocking you that they have been injected, us we do not get injected" (Kucheba 2021, Zambia, participant quote).

Peers' reactions or perceived reactions about the actual administration of the vaccine was also found by one study conducted in Australia to negatively affect some adolescents' views and practices (Cooper 2010). Here both adolescents and caregivers talked about the intense fear reactions some adolescents experienced on receiving the vaccine, such as sobbing, screaming, and fainting. They described how observing these responses triggered others to have similar experiences. As one adolescent explained, "you see other people really traumatised... they are really scared and they all start freaking out. Your heart just starts racing and it's like you are scared and you don't want to get it done either" (Cooper 2010, Australia, participant quote). Similarly, some adolescents expressed apprehensions around being judged by peers for their own potential negative reactions to the vaccine. This too seems to have intensified their fears and hesitancy towards the vaccine. As one adolescent explained: "I was really scared that I'd faint and everyone would laugh at me" (Cooper 2010, Australia, participant quote).

Positive peer attitudes were also influential. Adolescents in four studies - in South Africa, Uganda, Japan and China - spoke about the influence of peers in encouraging vaccine acceptance (Fielding 2018; Katz 2013; Patrick 2022; Wakimizu 2015). Here they described how high vaccination rates in their immediate circle of friends helped to mitigate their fears and to feel more confident about the vaccine. Others spoke about how "my friend encouraged me" (Patrick 2022), or put pressure on them to receive the vaccine, which compelled them to be vaccinated: "About half the girls have already had all three injections of HPV vaccine in my class… My friend, who had a vaccination, says "Haven't you had a shot yet?" or "Are you thinking of your future?" So I became a little impatient" (Wakimizu 2015, Japan, participant quote). Some adolescents also described that their friends had been vaccinated without experiencing any apparent side effects, and how this reduced their concern about possible adverse effects

of vaccination. They indicated that this, in turn had made them more willing to receive the vaccine themselves (Fielding 2018).

Conversely, findings from one study suggested that adolescents may not necessarily be influenced by their peers. In this study conducted in the USA (Roncancio 2019), various adolescents reported explicitly not engaging with, or being influenced by, their peers around HPV vaccination. They explained that this was because they felt their friends lacked knowledge or had negative perceptions about the vaccine. As one adolescent stated, "My friends, the misinformed ones, always say that it could damage him in certain areas of his personal life. But I don't listen to them. I simply tell them that vaccinating is my decision and they must respect it" (Roncancio 2019, USA, participant quote).

Finding 30

Caregivers' peers played an important role in shaping their HPV vaccination views and practices. When their peers expressed concerns about the vaccine or declined it for their own adolescent, this contributed to reducing HPV vaccination acceptance amongst many caregivers. In contrast, when their peers accepted the vaccine for their own adolescent or when their peers' adolescent received the vaccine without experiencing negative effects, this contributed to enhancing HPV vaccination acceptance amongst many caregivers (moderate confidence).

Many caregivers in studies conducted in various settings reported explicitly that the attitudes of their own peers played an important role in their own views around HPV vaccination for their adolescents (Chiang 2015; Craciun 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Mitchell 2021; Njuguna 2021; Roncancio 2019; Turiho 2017; Venderbos 2022). Various mothers described actively seeking out friends, particularly other mothers, to discuss the vaccine with them and obtain their opinion (Chiang 2015; Craciun 2012; Galbraith-Gyan 2019; Getrich 2014; Roncancio 2019), or as one caregiver explained, "Before deciding, one asks to see what other caregivers have decided" (Craciun 2012, Romania, participant quote). Many mothers spoke about how acceptance of the vaccine amongst their peers enhanced their own acceptance (Chiang 2015; Craciun 2012; Galbraith-Gyan 2019; Getrich 2014; Roncancio 2019). For example, one grandmother recalled turning to a friend for advice: "I speak to my girlfriend and she recommended that I get it for her [her granddaughter]. Ninety-nine percent of the time, I take her advice" (Galbraith-Gyan 2019, USA, participant quote). Other caregivers described how if their friends' daughters had received the HPV vaccine without experiencing any apparent side effects, this reduced their concerns about possible vaccine adverse effects and in turn enhanced their acceptance of it (Fielding 2018; Mitchell 2021; Turiho 2017).

Other caregivers provided narratives about how concerns or refusals amongst their friends contributed to their own vaccine hesitancy (Chiang 2015; Craciun 2012; Galbraith-Gyan 2019; Getrich 2014; Roncancio 2019). For example, in explaining why she did not accept the HPV vaccine for her adolescent, one mother said, "The friends that I do have in my circle is small, no one was an advocate for it. All of us were kind of against it even if we didn't know why. We just knew we were against it … it didn't sound right" (Galbraith-Gyan 2019, USA, participant quote).

By contrast, some studies suggested that the attitudes of peers may not necessarily influence caregivers' views and practices about HPV vaccination (Chiang 2015; Galbraith-Gyan 2019; Roncancio 2019; Venderbos 2022). Various caregivers declared that they did not engage their peers during their HPV vaccine decision-making. Some attributed this to the fact that their friends perpetuated fears and misinformation about the vaccine, which they felt was unhelpful. Others ascribed this to what they perceived as the 'personal' nature of vaccine decision-making: "I would not discuss the decision for the HPV vaccination with people close to me. Others' choices would make me insecure or maybe I offend others with my choices. No, this is a personal decision between my husband and I" (Venderbos 2022, Netherlands, participant quote). Other caregivers described engaging with, and listening to, their friends' opinions, yet not being influenced by these, as articulated by this mother "She [coworker] said: 'If I had a daughter the same age as yours, I wouldn't take her.' But I didn't pay attention to her comment. I ignored it and didn't care." (Chiang 2015, Brazil, participant quote).

Finding 31

Some caregivers' HPV vaccination views and practices were influenced by the HPV vaccination views and practices of traditional or religious leaders. This contributed to both increasing or decreasing acceptance of HPV vaccination, depending on the views and practices of traditional or religious leaders (high confidence).

Some caregivers in studies conducted in the USA, Nigeria, Uganda, and the Dominican Republic spoke about the influence of traditional or religious leaders on the HPV vaccination views and practices of themselves or other caregivers (Balogun 2018; Galbraith-Gyan 2019; Liebermann 2020a; Turiho 2017). One of these studies showed how this influence might enhance acceptance of the vaccine, as one mother who consulted her pastor described their conversation: "I told Pastor X about getting X the shots. She said it was a good idea. She was like, do you think that X wants to have sex?…She said it was a good idea for the vaccination and that I did need to get her some birth control when she expressed that she thought she may be ready" (Galbraith-Gyan 2019, USA, participant quote). However, three studies found that the influence of traditional or religious leaders may reduce acceptance (Balogun 2018; Liebermann 2020a; Turiho 2017). One caregiver described this influence as due to the restrictions the church places on discussion and education on sexual health: "Part of the misinformation has to do with the Church, which does not want people talking about sex. The Church here has power, whatever the Church says you have to follow" (Liebermann 2020a, Dominican Republic, participant quote). Other caregivers spoke about traditional or religious "cult-like groups" actively discouraging their members from vaccinating their children, as this caregiver explained, "Some religions such as… advise their believers not to take their children for vaccination… Cult members believe that their God protects the children; so they do not see need to vaccinate their children" (Turiho 2017, Uganda, participant quote).

Finding 32

Many caregivers' and adolescents' views and practices around HPV vaccination were influenced by the information they received about the vaccine from the media. Negative media messages about HPV vaccination contributed to increasing

fears and doubts, or a decision to delay or decline it. In contrast, positive media messages about HPV vaccination contributed to enhancing confidence in it or a decision to receive it (moderate confidence).

The media emerged as playing a particularly powerful role in shaping many caregivers' and adolescents' HPV vaccination views and practices across diverse study contexts, settings and population groups (Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Grandahl 2019; Jackson 2016; Kucheba 2021; Liebermann 2020a; Nordtug 2021; Siu 2014; Wakimizu 2015; Ward 2017). Various types of media were highlighted in the studies as influential, including the internet, television, online and print newspapers, radio, and social media platforms such as Facebook and Twitter. When talking about their decision-making process, many study participants discussed in detail the influence of the media. Some described actively seeking out information about the HPV vaccine from the media, whilst others indicated coming across such information inadvertently while browsing through media sources. In both cases, it emerged from various studies that the media might influence HPV vaccination decisions in both directions, enhancing and reducing acceptance, depending on the messages conveyed.

Findings from numerous studies suggested that negative media coverage contributed to some caregivers' and adolescents' hesitancy towards the vaccine or their decision to decline vaccination. Many study participants spoke about hearing negative news stories about the vaccine, including about serious side effects and cases of adverse events. They reported how these stories affected them, including fostering fear and doubt, prompting increased questioning of the vaccine, and for some, contributing to their decision to delay or refuse vaccination (Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; de Oliveira 2019; Fielding 2018; Galbraith-Gyan 2019; Kucheba 2021; Liebermann 2020a; Nordtug 2021; Siu 2014; Wakimizu 2015; Ward 2017). As one mother explained, "I saw on the news when the girls from the coast were vaccinated and they fainted, so there is no one in my family who has received those vaccines" (Cordoba-Sanchez 2022, Colombia, participant quote). Similarly, many caregivers described seeing "scare stories" (Fisher 2020), about the vaccine on news and social media platforms which in turn "made me more uncomfortable" (Galbraith-Gyan 2019), or "so afraid" (Cover 2012). Some caregivers described a direct influence of negative media coverage on their HPV vaccination practices, reporting how, after hearing negative media coverage about the vaccine, they concluded "you don't want to have it done" (Fisher 2020), "I'm just going to hold off for now" (Galbraith-Gyan 2019), or as one caregiver stated categorically "that's what stopped me. It was as simple as that" (Gordon 2011).

Many studies also showed how positive media coverage contributed to some caregivers' and adolescents' increased acceptance of the vaccine (Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Creed 2021; Fielding 2018; Galbraith-Gyan 2019; Nordtug 2021; Ward 2017). Numerous study participants recalled the positive messages they had heard in the media, often as part of government mass media campaigns, which highlighted the benefits and safety of the vaccine. As one caregiver described, "...just the adverts on TV. It just brought across the idea to most people that this is the thing that is going to stop you getting cervical cancer" (Cooper 2010, Australia, participant quote). Many described how seeing these positive media representations helped to increase their confidence in the vaccine, assuage concerns they may have had, or facilitated their decision to have themselves or their adolescent vaccinated. As one caregiver explained, "In the beginning, (I) was slightly concerned about side effects. Recently, I heard from the radio that many people have been vaccinated. I feel nothing, feel assured." (Fielding 2018, China, participant quote).

Various studies found, however, that the role of the media in influencing HPV vaccination views and practices may be more complex than a straightforward positive or negative influence (Creed 2021; Fisher 2020; Galbraith-Gyan 2019; Grandahl 2019; Jackson 2016; Liebermann 2020a; Ward 2017). For example, two studies - one in France (Ward 2017), and one in Denmark (Nordtug 2021) - found that some caregivers actively seek out information from the media, which supports their already-established attitudes towards the vaccine. Thus, as argued by one of the study authors (Ward 2017), in such instances, media sources were less about shaping vaccination views and practices and more about being used to justify or provide reassurance for vaccination decisions.

Some studies also revealed how many caregivers and adolescents are often distrustful of media sources, and therefore do not act upon the information they receive from the media or respond to it with caution (Creed 2021; Fisher 2020; Galbraith-Gyan 2019; Grandahl 2019; Jackson 2016; Liebermann 2020a; Nordtug 2021; Ward 2017). Indeed, a number of study participants depicted the media as "distorting information" (Liebermann 2020a), providing information that is "unbalanced and hysterical" (Creed 2021), or as a caregiver put it, "The internet's just full of nonsense, people making stories up... that could be anybody that's put that on there. No, I definitely don't trust, I would never ever rely on information on the internet unless it was a proper NHS website or summat like that" (Jackson 2016, England, participant quote). Many of these study participants reported explicitly how their inherent distrust of media sources means that the information diffused through these channels does not influence their views and practices (Galbraith-Gyan 2019; Jackson 2016). Others described taking information obtained from the media into account when making a decision about HPV vaccination, yet recognising its legitimacy and reliability could be compromised and therefore always viewing such information with caution (Creed 2021; Fisher 2020; Galbraith-Gyan 2019; Jackson 2016; Liebermann 2020a; Nordtug 2021; Ward 2017).

Theme 6: Socio-cultural beliefs and practices

Caregivers' and adolescents' views and practices regarding HPV vaccination may be shaped by a complex array of interrelated socio-cultural beliefs and practices regarding adolescence, sexuality, gender, parenting and health. In this section we describe separately four particular beliefs and practices that emerged from the studies as influential, and unpack how they operated to affect caregivers and adolescents' views and practices around HPV vaccination. These comprise socio-cultural beliefs and practices surrounding 1) adolescent sexuality, 2) sexuality, 3) parenting, and 4) religious beliefs.

Finding 33

Several caregivers viewed adolescence, particularly amongst women, as a time of 'sexual innocence' and 'purity'. HPV

vaccination appeared to threaten this view, by obliging caregivers to think of their adolescent as a sexual being or to initiate conversations about sex with them. This in turn contributed to decreasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for women (moderate confidence).

Finding 33 and Finding 34 are interrelated, so we have combined details for both findings under Finding 34.

Finding 34

Several caregivers viewed adolescence, and particularly in men, as a time of 'sexual curiosity' and 'experimentation' that is largely outside of parental control. This in turn contributed to increasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for men (moderate confidence).

As previously demonstrated, many caregivers' perceptions of the risks and benefits (or lack thereof) of HPV vaccination were underscored by an assessment of their own adolescent's likelihood of engaging in sex and particular types of sexual practices (see Findings 18, 19 and 20 for more details). The findings from various studies revealed how these assessments were informed, at least in part, by socio-cultural beliefs and practices regarding adolescent sexuality. Here two different beliefs and practices emerged as potentially at play: adolescence as a time of 'sexual innocence' and adolescence as a time of 'sexual experimentation'. These beliefs and practices appeared to shape caregivers' understandings of adolescence in contrasting ways, and in turn their views around HPV vaccination. These beliefs and practices also emerged as distinctly gendered, which seemed to contribute to gender differences in the acceptance of HPV vaccination.

Several studies illustrated how adolescence, and especially early adolescence, is often associated with sexual innocence and purity (Alexander 2012; Bowen 2014; Cooper 2010; Cover 2012; de Oliveira 2019; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Gordon 2011; Joseph 2015; Lismidiati 2019; Madhivanan 2009; Pop 2015; Reich 2010; Rendle 2017; Siu 2014; Stephens 2013). That is, representations of chaste and pristine prepubescent bodies (and particularly women's prepubescent bodies) are common in many settings, with the assumption that these bodies are not and should not be engaging in sexual activities. This ideal may have contributed, at least in part, to numerous caregivers' perception of their adolescent as not yet sexually active nor likely to be in the foreseeable future (see Finding 18 for more details). These values regarding the appropriate timing of sexual initiation are also clearly evident in the types of strong assertions many caregivers made about the importance of adolescent virginity, such as: "Are you really gonna have your 14 year old out there having sex?" (Reich 2010), or "nine years old is a child… will never let a nine-year-old child have sex" (de Oliveira 2019), or "She is not having sex now and I don't want her having sex now" (Stephens 2013).

Various findings from many studies suggest that this representation of adolescence is potentially disrupted by the HPV vaccination (Alexander 2012; Balogun 2018; Bowen 2014; Cooper 2010; Creed 2021; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Katz 2013; Kucheba 2021; Lismidiati 2019; Madhivanan 2009; Perkins 2013; Pop 2015; Reich 2010; Reiter 2014; Remes 2012; Stephens 2013; Warner 2015). That is, the vaccine obliges caregivers to contend with the idea that their adolescent is or will be a sexual actor who could get an STI. As articulated by a study author, "The HPV vaccine thus required the acknowledgement of these girls as sexual subjects, and parental resistance to it was also a resistance to the potential subjectification of their daughters as sexual beings" (Pop 2015, Romania, author quote). This is pertinently conveyed by one caregiver who, when describing her hesitancy towards the HPV vaccine for her daughter, admitted, "Because I felt like it [the HPV vaccine] indicated that my daughter was going to be sexually active. And you know, maybe I'm in denial. You're not going to want to think of that. That at twelve years-old she's going to be sexually active" (Francis 2011, South Africa, participant quote). Expressing a similar sentiment, another caregiver posed the rhetorical question when talking about her resistance to the HPV vaccine: "Do I want to hear that my 12-year old is having—she wants to have sex? No. No, I don't want to hear that" (Reich 2010, USA, participant quote). Other caregivers spoke about how an HPV infection would signal to them that their adolescent was having sex, or as one mother put it "would mean that she's sexually active and that would rock our world completely… I guess we would have to deal with that shock and then deal with the fact that she's sick you know" (Galbraith-Gyan 2019, USA, participant quote).

For some of these caregivers, the act of vaccination may even equate to what one study author described as a "symbolic defloration" of their adolescent, literally contaminating their supposed 'innocent' state (Pop 2015). This is potentially reflected in many caregivers' considerable fear that the vaccine will encourage the initiation of sex, promiscuity and unsafe sexual practices (see Finding 10 for more details). It is also potentially exhibited in the concern voiced by many caregivers that the vaccine necessitates them having conversations about sexual matters with their adolescent (Alexander 2012; Balogun 2018; Bowen 2014; Cooper 2010; Cordoba-Sanchez 2022; Fielding 2018; Fisher 2020; Francis 2011; Gordon 2011; Jackson 2016; Katz 2013; Lismidiati 2019; Reiter 2014; Stephens 2013; Venderbos 2022; Warner 2015). Several caregivers described such conversations as "difficult" (Katz 2013), or "tricky" (Fisher 2020), as making them feel "uncomfortable" (Warner 2015), and something "we try to avoid" (Warner 2015). Many of these caregivers attributed these difficulties explicitly to the fact that sex and STIs are considered "taboo" topics and not readily discussed in their communities generally and particularly amongst young adolescents (Balogun 2018; Friedman 2013; Galbraith-Gyan 2019; Lismidiati 2019; Muresianu 2022; Reiter 2014; Warner 2015). Other caregivers ascribed these difficulties to the age at which the HPV vaccine required them to have these conversations. They suggested that their adolescent "may not be ready" (Venderbos 2022), and that it is "inappropriate" (Gordon 2011; Kucheba 2021; Venderbos 2022), "too early" (Cooper 2010), "quite a tricky age to have those sorts of conversations" (Fisher 2020), or as one caregiver lamented "How to communicate, how to talk about it? Will they understand?" (Lismidiati 2019). Many of these caregivers described delaying these conversations and HPV vaccination until their adolescent had reached what they saw as a "more suitable age" (Gordon 2011), or was "old enough" (Cooper 2010), or "mature enough" (Lismidiati 2019; Perkins 2013; Remes 2012), to "know a little about the world" (Madhivanan 2009), "more able to understand" (Creed 2021), and "hear certain terms or pieces of information" (Kucheba 2021). In sum, all of these sentiments appear to be entangled, at least in part, with the commonly held

idea of adolescents as sexually innocent, which HPV vaccination threatens to violate.

In direct contrast, several studies revealed how caregivers' views and practices around HPV vaccination may be influenced by a contrasting, yet similarly common social norm regarding adolescence in many settings. This social norm understands adolescence as a time of sexual curiosity and experimentation, one that is largely outside of parental control (Albert 2019; Alexander 2012; Balogun 2018; Chiang 2015; Gordon 2011; Gutierrez 2013; Harries 2009; Katz 2013; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Rendle 2017). This was clearly evident in several caregivers' narratives about how "nowadays" children are initiating their sexual lives sooner and often recklessly (Albert 2019; Alexander 2012; Balogun 2018; Chiang 2015; Gordon 2011; Harries 2009; Katz 2013; Perkins 2013). Talk was commonplace amongst these caregivers about how "young males, nowdays, are so fast to get in bed with a female" (Gutierrez 2013), how "kids now a days are just too active" (Alexander 2012), "very sexually active now at a very early age" (Harries 2009), "much more promiscuous today than they were 50 years ago" (Perkins 2013), or as one caregiver explained, "you can see how kids are these days. They have sex at an early age and end up being pregnant and things like that" (Katz 2013). Many of these caregivers also acknowledged that adolescents' sexual lives are largely out of direct parental control. They worried about the fact that "they're sexually active even when you don't know" (Perkins 2013), and that caregivers cannot ensure safe sex is practised, or as one caregiver described it "I can't put him in a condom and hold him in there" (Alexander 2012).

This representation of adolescence appears to contribute to increasing many caregivers' acceptance of HPV vaccination for their adolescent. That is, the vaccine was seen as a way of protecting adolescents during this time of supposed sexual experimentation outside of parental control. As one caregiver said when explaining why he supported HPV vaccination, "Well adolescents are more apt to experiment with things, and they're not going to tell their parents they're doing it, so you're taking precautions against it" (Perkins 2013, USA, participant quote). Similarly, another caregiver described, "Today's generation is too advanced so I think there is a need for the [HPV] vaccine. Today's youth doesn't care about anything. They get drugged up, they drink, all to lie with anyone" (Chiang 2015, Brazil, participant quote).

These contrasting socio-cultural beliefs and practices regarding adolescent sexuality - one of 'innocence' and one of 'experimentation' - were applied to both girls and boys across the studies. However, they often included a gendered dimension. That is, various studies showed how caregivers more often associated adolescent girls with ideals of sexual innocence and virginity, while the norm of adolescents being sexually experimental were more frequently associated with adolescent boys (Alexander 2012; Balogun 2018; Chiang 2015; Harries 2009; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Rendle 2017; Siu 2014). As one caregiver stated explicitly, sharing the sentiments of many other caregivers: "Mostly boys do wrong and we don't know where he is going and what habits he has. Whereas girls' parents, at least for a while, we will be back of her tracking what she is doing. So in my opinion if the vaccine is given to boys it will be good because he will also get this virus if he has bad behavior habits" (Paul 2014, India, participant quote).

As reflected in this caregiver's comment, perceived gender differences within the realm of adolescent sexuality also contributed to perceived gender differences in acceptance of HPV vaccination. Some caregivers stated explicitly that vaccinating men earlier was more important because they felt that boys took more sexual risks at younger ages than girls (Paul 2014; Perkins 2013). Many caregivers also highlighted the perceived sexually experimental nature of adolescent boys as a central factor in their acceptance of vaccination for them (Alexander 2012; Gutierrez 2013; Perkins 2013). Our analysis also established that the themes around both adolescent sexual innocence and concerns about the vaccine encouraging initiation of sex and promiscuity were more common amongst caregivers considering vaccination for their daughters compared to caregivers considering vaccination for their sons. Various studies that explore HPV vaccination acceptance for both boys and girls also explicitly note these gender differences (Balogun 2018; Rail 2018; Reich 2010; Rendle 2017).

Finding 35

Several caregivers and adolescents associated HPV infection and its sequelae with what they perceived as 'bad' and 'inappropriate' sexual practices that 'others' engage in, including promiscuity, multiple sexual partners or sex before marriage. This in turn contributed to decreasing acceptance of HPV vaccination, particularly for women, amongst many of these caregivers and adolescents, as they considered it personally unnecessary or potentially stigmatising to receive (moderate confidence).

The studies demonstrated that numerous caregivers' and adolescents' views and practices surrounding HPV vaccination were shaped by socio-cultural beliefs and practices regarding sexuality more broadly, in addition to adolescent sexuality specifically. Across the studies, many caregivers and adolescents conveyed strong views regarding what they deemed to be 'appropriate' sexual behaviours. These behaviours also tended to be tied to narrow moral codes- 'good' versus 'bad'; 'right' versus 'wrong'; 'responsible' versus 'irresponsible'. These values were clearly reflected in the way many caregivers portrayed their own adolescent, commonly using words such as "well-behaved" (Getrich 2014), "good women" (Siu 2014), and "they're clean…our girls aren't promiscuous" (Jackson 2016) (see Finding 20 for more details). These moral sentiments regarding supposedly appropriate sexual activity also emerged more explicitly when caregivers described their opinions about sex. Here, strong statements were frequently made, such as "I don't believe in sex before marriage" (Joseph 2015), "I think that premarital sex is wrong" (Francis 2011), "abstinence is the best key" (Reich 2010), or "we don't believe you should have sex before your marriage, you certainly shouldn't sleep around" (Gordon 2011), or "within our religion, we assume, or at least, that is how we educate our children, that there should only be sexual contact if you are married" (Venderbos 2022).

As suggested in this last quotation, various studies highlighted how these views were often informed by religious beliefs, but also other social and cultural norms and expectations around sexuality (Balogun 2018; Cooper 2010; Fielding 2018; Fisher 2020; Francis 2011; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Joseph 2015; Liebermann 2020a; Njuguna 2021; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022). That is, it was suggested that in many settings,

monogamy, fidelity and sexual restraint (as opposed to promiscuity and multiple sexual partners) and particularly abstinence until marriage, are commonly valued as 'good' and 'appropriate' sexual practices.

These normative ideas about sexuality appeared to inform many study participants' perceptions of HPV infection and cervical cancer. That is, for many caregivers and adolescents, HPV infection and consequent cervical cancer were associated with behaving in ways that diverge from supposedly 'appropriate' sexual behaviours (Balogun 2018; Cooper 2010; De Fouw 2023; Fielding 2018; Friedman 2013; Gordon 2011; Gutierrez 2013; Katahoire 2008; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Vermandere 2015). They thus tended to represent both HPV infection and cervical cancer as the consequence of violating sociocultural and religious expectations around sexuality. This is clearly reflected in the types of comments made by study participants that cervical cancer and HPV infection occur when a woman "sleeps around" (Balogun 2018), or "because she was very promiscuous" (Cooper 2010), or "irresponsible sex" (De Fouw 2023), or "by sexual intercourse that is not protected and dirty" (Balogun 2018), or as one caregiver put it: "I believe that if a woman is moral and faithful, she does not need to worry about cervical cancer" (Siu 2014). Some study participants referred to these conditions as a "disgrace" (Balogun 2018), that are highly stigmatised within the community (De Fouw 2023), or as one adolescent remarked, "Basically, getting it [HPV] would mean you have done something you shouldn't have done in the first place"(Galbraith-Gyan 2019, USA, participant quote).

These moralistic representations of cervical cancer and HPV infection played a strong role in shaping many study participants' views and practices around HPV vaccination. By associating HPV infection and cervical cancer with 'undesirable' sexual practices of 'others', by extension, HPV vaccination was understood as beneficial or necessary only for those 'others' who engage in such practices. Ultimately, this chain of logic appeared to reduce many caregivers' and adolescents' acceptance of HPV vaccination for themselves or their own adolescent (see Finding 20 for more details). In addition to being perceived as unnecessary, a few caregivers worried that receiving HPV vaccination may also impact negatively on their daughter's reputation, as it would signify that she was sexually promiscuous or engaging in premarital sex (Balogun 2018; Gordon 2011; Jackson 2016). As articulated by this caregiver: "It could be perceived as making an assumption about the child that actually could disadvantage them, and certainly in the very religious community in terms of arranged marriages, I have no idea what the effect is going to be" (Gordon 2011, England, participant quote).

Similar to adolescent sexuality (see Findings 33 and 34), socio-cultural beliefs and practices regarding sexuality more generally appeared to be differentiated by gender. That is, whilst the ideals of abstinence, monogamy, fidelity and sexual restraint emerged in many studies as important generally, they materialised as particularly essential for women. This was noted by various study authors (Balogun 2018; Chiang 2015; Harries 2009; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Rendle 2017; Siu 2014). For example, Balogun and colleagues, in their study investigating acceptance of HPV vaccination for adolescent men and women in Ibadan, Nigeria, note how "Many did not feel men too should avoid being promiscuous. This portrays the societal expectation that women were to be sexually faithful to their partners, but this was not usually expected from men" (Balogun 2018, Nigeria, author quote). Similarly, Siu in her study exploring mothers' perceptions around HPV vaccination for their daughters in Hong Kong, indicates that "Patriarchal sexual values prevail in Hong Kong… and virginity is an important cultural ideal for unmarried women in Chinese communities. Because the HPV vaccine possesses a symbolic meaning that violates this Chinese cultural value, it is unsurprising that the participants were not supportive of the vaccination for their daughters" (Siu 2014, Hong Kong, author quote). As described in this quotation and highlighted by other studies, these gendered ideals of sexuality contributed to gendered differences in the acceptance of HPV vaccination. That is, our analysis indicated that the celebration of virginity amongst women and denouncement of premarital sex, and associated influence on HPV vaccination acceptance, emerged as a more common theme in studies focused on HPV vaccination for adolescent women compared to those focused on adolescent men. Moreover, various studies that examined HPV vaccination acceptance for men and women found that, although not exclusive to young girls, concerns about promiscuity amongst women seemed to be more heightened in caregivers considering delaying vaccination for their daughters than in caregivers considering when and if to vaccinate their sons (Balogun 2018; Rail 2018; Reich 2010; Rendle 2017).

Finding 36

Many caregivers associated 'good' parenting with taking personal responsibility for the promotion and protection of adolescent sexual health, and perceived HPV vaccination as a means to facilitate this responsibility. Some of them perceived HPV vaccination as providing an opportunity to educate their adolescent, whilst others perceived it as enabling them to avoid blame if negative health outcomes ensued despite receipt of the vaccine. In both cases these perceptions contributed to enhancing acceptance of HPV vaccination for many caregivers (low confidence).

Finding 36 and Finding 37 are interrelated, so we have combined details for both findings under Finding 37.

Finding 37

Many caregivers associated 'good' parenting with taking personal responsibility for the promotion and protection of adolescent sexual health and perceived HPV vaccination as sabotaging this responsibility. Some of these caregivers saw HPV vaccination as a 'passive' method of sexual health promotion and therefore less effective than, or undermining of, more 'active' methods. Others saw HPV vaccination as a form of state intrusion on their parental rights. In both cases these perceptions contributed to reducing acceptance of HPV vaccination for many of these caregivers (low confidence).

Findings from studies across diverse contexts, settings and populations suggest that it is common for caregivers to understand themselves as personally responsible for protecting and promoting their adolescents' health generally, and sexual health more specifically (Albert 2019; Bowen 2014; Burke 2015; Chiang 2015; Cordoba-Sanchez 2019; Craciun 2012; de Oliveira 2019; Galbraith-Gyan 2019; Jackson 2016; Joseph 2015; Katz 2013; Madhivanan 2009; Nordtug 2021; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Roncancio 2019; Siu 2014; Venderbos 2022; Ward 2017). As pertinently captured by one caregiver: "If we provide the necessary protection you know for our kids I think we are fulfilling our

roles as parents" (Perkins 2013, USA, participant quote). This commonly held view of parental responsibility for adolescent sexuality appeared to both promote and deter acceptance of HPV vaccination in varied and complex ways.

The findings from various studies suggest that HPV vaccination may serve as a means to facilitate this parental role of safeguarding their adolescents' sexual health (Burke 2015; Chiang 2015; Craciun 2012; de Oliveira 2019; Jackson 2016; Joseph 2015; Katz 2013; Madhivanan 2009; Nordtug 2021; Perkins 2013; Roncancio 2019). For some, it may be seen as an opportunity to educate their adolescent on sexual and reproductive health issues and associated positive healthy choices (Katz 2013; Perkins 2013; Roncancio 2019). As one caregiver explained, "If they have to get a shot to prevent them from getting something sexually transmitted they might think twice about actually having sex" (Perkins 2013, USA, participant quote). Other caregivers seemed to equate HPV vaccination with being a 'good' caregiver and, in contrast, a lack of vaccination a symbol of "uncaring" parenting or "just being lazy or neglectful" (Perkins 2013). For these caregivers, their HPV vaccination deliberations appeared to be entangled with feelings of blame and guilt. That is, because they felt responsible for their adolescent's (sexual) health, they described only having themselves to blame if their adolescent developed an illness because of being unvaccinated. These caregivers worried about the "heavy conscience" (de Oliveira 2019), "regret" (Madhivanan 2009), or "a type of guilt… for letting this happen" (Chiang 2015). Others worried that such a scenario would reflect badly on them as caregivers, who would ultimately be held accountable for the potential negative outcomes that ensue. These caregivers therefore described supporting HPV vaccination to avoid this: "So if she does get one of these diseases, no one can tell me that I didn't keep my daughter's vaccination card up to date… This is why I prefer to always keep their vaccinations up to date... both to protect them and so that others don't have anything to say about me in the future" (Chiang 2015, Brazil, participant quote).

In direct contrast, studies conducted in various HICs - Canada (Albert 2019; Rail 2018), the USA (Bowen 2014; Galbraith-Gyan 2019; Reich 2010), France (Ward 2017), Romania (Pop 2015), the Netherlands (Venderbos 2022), and Hong Kong (Siu 2014) - suggested that many caregivers may perceive HPV vaccination as sabotaging their parental role of safeguarding their adolescents' sexual health. Some of these caregivers appeared to have a particular view of what 'responsible' parenting involves, which comprises implementing active or "deliberate parenting strategies" (Reich 2010), to manage adolescent sexuality and sexual health (Albert 2019; Bowen 2014; Galbraith-Gyan 2019; Rail 2018; Reich 2010; Venderbos 2022; Ward 2017). The studies identified that such strategies include, for example, teaching self-protection and how to lead responsible lives; having open conversations about sex, sexuality and relationships to empower a sense of autonomy and control; strong regulation of sexual activities by encouraging monogamy, abstinence or careful selection of sexual partners; closely monitoring adolescents' activities and whereabouts; and/or regular gynaecologist appointments and screening. Many of these caregivers equated the successful execution of these activities with what it means to be a 'good' and 'responsible' caregiver, as conveyed by this caregiver's narrative: "If you're the parent that you're supposed to be to begin with, you're gonna know what your child's doing… and it's about talking to our kids, it's what we need to be doing as parents… So, I mean you got 14 year- old girls getting out of the windows and running off with their boyfriend down the street or what not. Where's the parents? I mean they should know if they're getting in and out of their house or not. So that's the way I look at that. It's better to do that than it is to give them the shot [HPV vaccine] wondering what's gonna happen" (Reich 2010, USA, participant quote).

This view of 'responsible parenting' held by a number of caregivers appeared to reduce acceptance of HPV vaccination in various ways. As captured by the above quotation, many of these caregivers seemed to view HPV vaccination as providing "passive protection" and felt that more "active management" of sexual health was potentially more effective (Reich 2010). These caregivers spoke about how, rather than getting the vaccine, "I'd rather teach her safe sex practices" (Reich 2010), that "regular check-ups…to me seems like a much more reasonable way to deal with things" (Albert 2019), or as this caregiver put it: "I think I would go more for the screening and educating my child about how HPV is transmitted... I think we need to teach our children, especially our daughters, how to listen to their bodies, you know, pay attention to their bodies, take responsibility for that" (Bowen 2014, USA, participant quote).

Many caregivers also appeared to conceive HPV vaccination as a method of supposed "passive protection" that would undermine more 'active' methods of promoting sexual responsibility. That is, they worried that if vaccinated, their adolescent would think they "don't need to go in for… Pap smears or whatever" (Reich 2010, USA, participant quote) or as one mother put it when describing why she is reluctant to take her daughter to be vaccinated: "Not taking my daughter to be vaccinated will make her think more about the health consequences, such as getting cancer from having premarital sex. I think that this is more effective in educating my daughter about the bad consequences of having premarital sex. If she is vaccinated, then disease and cancer will no longer scare her" (Siu 2014, Hong Kong, participant quote). Other caregivers implied that HPV vaccination was unnecessary if these parenting strategies were being implemented (Albert 2019; Bowen 2014; Galbraith-Gyan 2019; Rail 2018; Reich 2010; Ward 2017), as articulated by this caregiver, "I know where she's at and can monitor things. So, I guess I just didn't really feel there was a big concern (for vaccination) for me" (Galbraith-Gyan 2019, USA, participant quote).

Finally, various caregivers also appeared to be of the opinion that HPV vaccination undermines their parental autonomy in relation to adolescent sexuality (Pop 2015; Rail 2018; Reich 2010). That is, they seemed to conceive HPV vaccination as (yet another) example of the intrusive reach of science, medicine and the state, ultimately undermining their parental roles and rights over their children's sexual health. As one mother asked rhetorically after describing how she could not foresee any alternative to refusing the vaccine for her daughters, "How could I allow them (the health care providers) to take over my children?" (Pop 2015, Romania, participant quote). For some of these caregivers, refusing the HPV vaccine for their daughters was therefore a form of resistance against this perceived intrusion; a way for them to regain a sense of control and agency over their daughters' bodies and sexual well-being (Pop 2015; Rail 2018; Reich 2010).

Finding 38

Some caregivers and adolescents were less accepting of HPV vaccination due to the religious beliefs they held, and

the view that health and illness are governed by God and divine providence. They in turn perceived HPV vaccination as unnecessary or interfering with God's will (moderate confidence).

Some caregivers and adolescents held religious beliefs about health and illness, which may have impacted on their views and practices regarding HPV vaccination. That is, various studies found that some caregivers and adolescents believe that cervical cancer and HPV infection, like other matters of health and illness, are governed by God and divine logic. Some of these individuals felt that HPV vaccination will in turn have little effect (Evans 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Perkins 2013; Pop 2015; Vermandere 2015; Warner 2015). Others felt that HPV vaccination interfered with "God's will" (Pop 2015). In both cases, these views contributed to reducing HPV vaccination acceptance. As one mother explained, "I won't accept this vaccine for my girl…. It's better to let things follow their normal way and not to tamper with God's will" (Pop 2015, Romania, participant quote).

This finding, however, needs to be viewed with some caution. In several studies, participants described that religious belief might negatively impact the vaccination acceptance of other caregivers, rather than conveying such a belief themselves (Friedman 2013; Galbraith-Gyan 2019; Kucheba 2021; Perkins 2013; Vermandere 2015). Moreover, four studies reported refutational findings, suggesting that religious beliefs did not reduce HPV vaccination acceptance for many caregivers and adolescent (Cordoba-Sanchez 2019; Galbraith-Gyan 2019; Gordon 2011; Madhivanan 2009). Various participants in these studies who held strong religious beliefs stated explicitly that these did not impact on their HPV vaccination views, with many of them indicating that they had accepted the vaccine for themselves or their adolescent. For example, one caregiver from an orthodox Jewish community asserted, "It seems to me that Judaism suggests protecting your health is a good thing and it wouldn't have occurred to me that there was any way it [HPV vaccination] could conflict religiously" (Gordon 2011, England, participant quote). Similarly, a Christian mother stated, "The only way my religious beliefs affect me would be that I know the Bible says you should not have sex until you are married. Do I think that's realistic in this day and age? Hardly… So no, my religious belief would not hinder me… do this [HPV vaccination]" (Galbraith-Gyan 2019, USA, participant quote).

Theme 7: Trust or distrust in the institutions, systems or experts associated with vaccination

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by their trust or distrust in the institutions, systems or experts associated with vaccination. The studies identified five institutions, systems or experts as particularly important in this regard: 1) teachers and the school; 2) the pharmaceutical industry; 3) government; 4) science and biomedicine; and 5) healthcare professionals. In this section we highlight separately how trust or distrust in each of these entities permeated study participants' descriptions and impacted on their HPV vaccination views and practices. We also touch on some of the specific potential reasons for trust or distrust in each entity and unpack in more detail one possible contributor that emerged as cutting across the different institutions, systems or experts associated with vaccination- experiences of structural discrimination or exploitation (see Finding 46).

Finding 39

Trust in teachers and the school contributed to both enhancing and reducing various caregivers' acceptance of HPV vaccination. When HPV vaccination was provided at their adolescent's school, some caregivers were more inclined to consider it or to have confidence in it. When teachers communicated hesitancy or negative attitudes about HPV vaccination, this contributed to reducing HPV vaccination acceptance for some caregivers (high confidence).

Various caregivers in studies from diverse countries (Peru, Australia, Vietnam, Sweden, Canada, Columbia, and Cameroon) emphasised how their decision to vaccinate their adolescent (or not) was motivated by the sense of trust they had in their adolescent's school and its teachers (Bartolini 2012; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Elit 2022; Grandahl 2019; Rail 2018). According to these caregivers, over the years they had built a strong relationship of trust with the school, which in turn meant they had confidence that the institution and its teachers had their adolescent's best interests at heart. For them, this meant that if the school was providing HPV vaccination, they had faith that it would be beneficial for their adolescent. As one caregiver explained, "Here teachers too are educated and as such they know whatever an injection is good or not. If they accept that a vaccine should be given in school, who am I to say no." (Elit 2022, Cameroon, participant quote). Some caregivers explicitly indicated that they would not have considered HPV vaccination if it had not been provided at the school, as suggested by this caregiver: "If it hadn't come to school, it wouldn't have crossed my mind to do it...having it at school makes you more comfortable" (Cooper 2010, Australia, participant quote).

Trust in teachers may, however, also contribute to reducing caregivers' acceptance of the vaccine, as demonstrated in one study from Vietnam (Cover 2012). This study showed how a strong sense of trust in teachers means that if teachers communicate hesitancy or negative attitudes towards the vaccine, caregivers may feel similarly hesitant. This is clearly exemplified by one caregiver's explanation of why she had refused the vaccine for her daughter, "In our situation, I felt some suspicion as my daughter's teacher mentioned about various things [about the vaccine] scaring her..." (Cover 2012, Vietnam, participant quote).

Finding 40

Some caregivers and adolescents were less accepting of HPV vaccination due to their distrust of the pharmaceutical industry and its perceived profit motive, which they perceived to be corrupting vaccine development, testing and marketing (moderate confidence).

Some studies conducted in HICs such as Australia, France, Denmark, Romania, the USA, and Canada showed that caregivers' and adolescents' views and practices around the HPV vaccine may be influenced by their distrust of the pharmaceutical industry (Bowen 2014; Bunton 2013; Craciun 2012; Nordtug 2021; Perez 2015; Pop 2015; Reich 2010; Ward 2017). These caregivers and adolescents were particularly suspicious of the financial interests of drug companies, which they perceived to be a major force behind vaccines and vaccination programmes. According to them, "rich pharmaceuticals" (Bunton 2013), will "do and say anything in order to sell their products" (Craciun 2012), and to "buy their way in" (Nordtug 2021), and therefore "vaccines… they are nothing more than a means to increase profits for the pharmaceutical

companies" (Perez 2015), or "just a source of income for the pharmaceutical industry" (Pop 2015).

Some caregivers spoke in detail about how the profit motives of drug companies potentially corrupt the different aspects of HPV (and other) vaccine development, research and marketing. For example, one caregiver described her distrust of the research processes involved in vaccine development and testing and concluded, "I guess I just feel like things are rushed through so fast to get on the market without really due diligence done to safe— safety testing. And I feel it's a money thing. You know, they want to get out— go out there and make money. It's a business" (Reich 2010, USA, participant quote). Similarly, a few caregivers and adolescents articulated their distrust of the vaccine review and approval systems, and their belief that lobbying efforts of pharmaceutical companies can negatively influence regulatory agencies and government policy (Bunton 2013; Reich 2010). As one adolescent described, "When they sell these vaccines or medicines people think that the government is just doing it to try and help people … they don't know it's a pharmaceutical company making money, and I think its trickery" (Bunton 2013, Australia, participant quote). Ultimately, for many of these caregivers and adolescents, these views about the pharmaceutical industry and its profit motive contributed to their distrust in the safety and efficacy of the HPV vaccine, and in turn reduced their acceptance of it.

Finding 41

Trust in government and government-run programmes was associated with both enhancing and reducing caregivers' acceptance of HPV vaccination. Many caregivers expressed strong sentiments of trust in government, which in turn meant that their acceptance of HPV vaccination depended on it being formally approved or endorsed by government. When this occurred, it contributed to enhancing confidence in, and acceptance of, HPV vaccination for many caregivers. When this was absent, it contributed to reducing confidence in, and acceptance of, HPV vaccination for many caregivers (high confidence).

Many participants indicated explicitly that formal government approval and endorsement of HPV vaccination had played an integral role in their acceptance of it. This appeared to be mediated by what many study authors described as a type of taken-for-granted trust in government and government-run programmes, including immunisation programmes (Ambali 2022; Bunton 2013; Chau 2021; Chiang 2015; Cooper 2010; Cover 2012; Fielding 2018; Friedman 2013; Katahoire 2008; Madhivanan 2009; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Rail 2018; Remes 2012). Numerous caregivers and adolescents attributed their HPV vaccination acceptance to the fact that government was recommending it, which for them provided a guarantee of its safety and effectiveness. The studies were indeed saturated with the following types of remarks: "I'm sure that if they [Ministry of Health] say it is [effective], then it is" (Chiang 2015), "why would they [government] endorse something that's wrong?" (Bunton 2013), "government cannot harm people's health" (Cover 2012), "government can't…harm its people" (Patrick 2022), "If we get the vaccine from the government we are not afraid" (Madhivanan 2009), and "I know the government cannot do something malicious to children" (Remes 2012), or as one caregiver put it, "it is… recommended by the Danish Health Authority... So, I don't think there is necessarily more to consider than that" (Nordtug 2021).

For some of these caregivers and adolescents, their strong sense of trust in government meant that their acceptance of HPV vaccination depended on it being formally endorsed by government and included in the government immunisation schedule. These caregivers explained how the absence of government approval conveys the impression that the HPV vaccine is unimportant, unnecessary, or potentially unsafe, which in turn reduces their acceptance of it (Ambali 2022; Chau 2021; Cooper 2010; Dalmau 2020; Katahoire 2008; Madhivanan 2009; Nordtug 2021; Remes 2012; Siu 2014; Ward 2017).

Finding 42

Distrust of government and government-run programmes contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. These individuals questioned the motives of government and what it promotes, and by extension, were therefore sceptical of the benefits and safety of HPV vaccination (high confidence).

The HPV vaccination views and practices of some caregivers and adolescents were influenced by their distrust of government and government-run programmes, including healthcare (Bartolini 2012; Cooper 2010; Craciun 2012; Creed 2021; Elit 2022; Evans 2021; Friedman 2013; Kucheba 2021; Nordtug 2021; Patrick 2022; Pop 2015; Ward 2017). These study participants expressed distrust of government, questioning whether it really had the public's interests at heart. They were in turn suspicious of the real intentions of government interventions and advocacy. As one mother explained, "Don't trust the government period. So, if anything is out by the government…, you know, there's a distrust there" (Evans 2021, USA, participant quote). Sharing this view, another mother indicated "Some Anglophones are now scared of anything coming from the government of Cameroon such as vaccines because they have lost trust in the government" (Elit 2022, Cameroon, participant quote). As revealed in the studies, HPV vaccination is commonly a state-run and promoted public health intervention and was therefore distrusted by many of these caregivers as an extension of their more general distrust of government and what it advocates. As one mother argued, "I think that this [HPV] vaccine will cause more harm than good. The vaccination initiative is like other [campaigns] undertaken by the Ministry... Nothing good for our girls" (Pop 2015, Romania, participant quote).

Finding 43

Some caregivers' and adolescents' views and practices around HPV vaccination were shaped by their trust or distrust of science and biomedicine. Faith in the benefits and safety of scientific progress contributed to enhancing some caregivers' and adolescents' confidence in the benefits and safety of HPV vaccination and in turn enhanced their acceptance of it. Other caregivers' and adolescents' distrust of science and biomedicine contributed to reducing their confidence in the benefits and safety of HPV vaccination, and in turn reduced their acceptance of it (high confidence).

The HPV vaccination views and practices of some caregivers and adolescents were influenced by their trust or distrust of science and biomedicine (Bowen 2014; Chiang 2015; Cover 2012; Evans 2021; Friedman 2013; Islam 2018; Mitchell 2021; Rendle 2017; Stephens 2013; Ward 2017). A few studies identified how the strong culture of vaccine acceptance amongst various caregivers was most likely linked to an inherent faith in biomedicine and scientific progress

(Chiang 2015; Cover 2012; Islam 2018; Mitchell 2021; Ward 2017). These caregivers appeared to associate vaccines with "scientific advancement" (Cover 2012), or "scientific innovation" (Islam 2018), or "progress in medicine" (Ward 2017), or as one caregiver put it when talking about his support of the HPV vaccine, "I think that medicine is evolving more and more each day, looking for disease cures. I think it's great" (Chiang 2015). Some caregivers spoke specifically about the HPV vaccine as being "developed by professional doctors and scientists" and therefore "would be not harmful" (Cover 2012), or as one caregiver described, "My trust is through the seminars we received from the experts… because I am not an expert, I just agree with what I am told by them, as I said before I am doing this by faith […] they said it is a successful vaccine so I also trust it is going to be effective in her life" (Mitchell 2021, Tanzania, participant quote). This unquestioning faith in science and biomedicine, and by extension vaccines, therefore appeared to contribute to some caregivers' acceptance of HPV vaccination.

However, other caregivers and adolescents conveyed strong sentiments of distrust in science and biomedicine, and explicitly attributed their hesitancy towards the HPV vaccine to this distrust (Evans 2021; Friedman 2013; Mitchell 2021; Rendle 2017; Stephens 2013; Ward 2017). In explaining their concerns about the vaccine, these study participants spoke about "not trusting people in research" (Stephens 2013), and being "highly critical and highly distrusting of modern medicine" (Evans 2021), and in turn believing that "their children are only being used for research purposes and the vaccine would be of no help to their children" (Friedman 2013). Two studies - one conducted in France (Ward 2017), and the other in the USA (Rendle 2017) - suggested that this distrust of science and biomedicine, and by extension the HPV vaccine, may be part and parcel of a growing contemporary trend of scientific doubt and uncertainty in society, with people becoming increasingly sceptical of the impact of science on health. As one caregiver put it, "I think I'm less gullible than I was on the subject of medicine. In ageing, I find that you step back a little. It… is less the 'gospel truth', as we used to say" (Ward 2017, France, participant quote). Other studies found this distrust to be grounded in a history of exploitation and human rights abuses within biomedical research (Bowen 2014; Evans 2021; Stephens 2013; see Finding 46 for more details).

Finding 44

Trust in healthcare professionals was associated with both enhancing and reducing acceptance of HPV vaccination for numerous caregivers and adolescents. Many caregivers and adolescents held strong sentiments of trust in healthcare professionals for various reasons, including, as a routine response, the perceived training and expertise of healthcare professionals, experiences of good-quality relationships with them, or because healthcare professionals came from the same ethnic group as them. Consequently, many caregivers and adolescents followed the HPV vaccination recommendations of their healthcare professionals, or turned to them for advice, answers to their questions, help with making sense of information or reassurance. This contributed to both enhancing or reducing acceptance of HPV vaccination, depending on the views and practices of healthcare professionals (high confidence).

Many caregivers and adolescents conveyed strong sentiments of trust in healthcare professionals (Alexander 2012; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; Dalmau 2020; de Oliveira 2019; Elit 2022; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Islam 2018; Jackson 2016; Joseph 2015; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Lismidiati 2019; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Perkins 2013; Rendle 2017; Roncancio 2019; Siu 2014; Stephens 2013; Ward 2017; Warner 2015). The reasons for this trust emerged as variable and diverse across the studies. For some, their trust appeared to be almost automatic or routine (Nordtug 2021; Perkins 2013), with the assumption that "if the doctor recommends it, it must be the thing to do" (Burke 2015), or "they [health professionals] must think they [vaccinations] are good as they give them" (Jackson 2016), or as one caregiver captured this when she said: "If the doctor, the nurse said that this vaccine will prevent my daughter from having the disease in the future, then it isn't going to harm my daughter" (Chiang 2015). Other caregivers and adolescents attributed their confidence in healthcare professionals to the training, skills and knowledge they possess (Craciun 2012; Galbraith-Gyan 2019; Jackson 2016; Nordtug 2021; Stephens 2013). As one caregiver explained, "You cannot question a doctor to say, why are you bringing such things because he is a doctor! He has studied these things; he knows very well. So, what he says is what to follow (Kucheba 2021, Zambia, participant quote). Some caregivers' and adolescents' trust in healthcare professionals seemed to be related to their experiences of good-quality relationships, where they felt treated with respect and empathy (Bowen 2014; Cooper 2010; Jackson 2016). A few studies amongst ethnic minorities revealed that some caregivers trusted their healthcare professional because they were from the same ethnic group and therefore reportedly held the same beliefs and values as them (Bowen 2014; Gordon 2011; Stephens 2013). As pertinently depicted in this mother's statement: "At the clinic... my nurse and doctor over there, they are good at understanding me, see. You know [the nurse] was from a town nearby [participant's community in Haiti] so we the same mind about values. She looks out for us. If it will kill them, it will spread the disease—she going to tell me" (Stephens 2013, USA, participant quote).

Studies demonstrated that these strong sentiments of trust in healthcare professionals meant that the views and practices of these professionals had a significant influence on many caregivers' and adolescents' HPV vaccination decision-making. Numerous caregivers stated unequivocally that they directly followed the vaccination advice given to them by their healthcare professional (Burke 2015; Dalmau 2020; de Oliveira 2019; Elit 2022; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Gutierrez 2013; Islam 2018; Jackson 2016; Kucheba 2021; Patrick 2022; Paul 2014; Perkins 2013; Rendle 2017; Roncancio 2019; Warner 2015). This is reflected in the ubiquitous observations made by caregivers and adolescents that "If the doctor says that it is good, I am going to do it" (Roncancio 2019), or "we follow according to what [the doctor] suggested to us to do" (Paul 2014). Other caregivers spoke about turning to their healthcare professional if they were unsure or wanted reassurance (Cover 2012; Creed 2021; Fisher 2020; Jackson 2016; Mitchell 2021), if they had unanswered questions (Alexander 2012; Chiang 2015; Cover 2012), or to help them make better sense of the information they had received about HPV vaccination (Bowen 2014; Mitchell 2021; Warner 2015). For example, having described her initial doubts about whether to vaccinate her daughter or not, one mother explained how "We went back to see the doctor, she told me that it was on the vaccine calendar and that all that is part of the percentage of risk that was part of vaccination in general, so there

you are. I stopped hesitating. So they're vaccinated" (Ward 2017, France, participant quote). Another caregiver conveyed similar sentiments in her narrative: "I was one of those mothers who said that I would not give my daughter that vaccine, until recently, when I went to get a booster for my other 10-year-old son and I spoke with a doctor who explained to me that it was absolutely safe, so I began to think differently" (Cordoba-Sanchez 2022, Colombia, participant quote).

As reflected in the above quotations, the trust and in turn, the influence of healthcare professionals, contributed to enhancing acceptance of HPV vaccination for many caregivers and adolescents. However, numerous studies also showed how this trust and influence could also contribute to reducing HPV vaccination acceptance in some instances. For example, when healthcare professionals discouraged vaccinations or expressed their own hesitancies, it was found to produce or exacerbate concerns in some caregivers and adolescents (Cover 2012; Warner 2015 Galbraith-Gyan 2019; Rendle 2017; Ward 2017). As the following father explained, "What that professor said significantly influenced my decision. Working in health sector, he should be very knowledgeable in this issue. His remarks made me concerned, leading me to cancel the second dose [for my daughter]" (Cover 2012, Vietnam, participant quote). Relatedly, various studies revealed how when healthcare professionals do not officially endorse or promote HPV vaccination, reduced acceptance of it might ensue. For example, some caregivers stated that healthcare professional approval was necessary for them to agree to have their children receive the HPV vaccine, and if this did not occur, they would not accept it (Joseph 2015; Katahoire 2008; Kisaakye 2018; Ward 2017; Warner 2015). Other caregivers suggested that they became less confident in the vaccine or less inclined to accept if healthcare professionals failed to mention it to them or did not actively encourage it (Lismidiati 2019; Siu 2014; Ward 2017; Warner 2015). For these caregivers, this conveyed the message that the vaccine was relatively unimportant, as clearly reflected in the following mother's narrative: "Our family doctor, he does not mention anything about the cervical cancer vaccine. However, he encourages us to receive the influenza vaccination and pneumonia vaccination… I trust our family doctor, and he will not ask us to have any unnecessary vaccination. It seems to me that the influenza and pneumonia vaccinations are more necessary to health than cervical cancer vaccination. That's why I have never thought about taking my daughter to receive this vaccination." (Siu 2014, Hong Kong, participant quote).

Finding 45

Distrust of healthcare professionals contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. This distrust emerged from a generalised distrust of medicine; the perceived simplistic, unbalanced and contradictory vaccine information provided by healthcare professionals; or the perceived commercial interests or racism of healthcare professionals. Some caregivers and adolescents in turn questioned the motives of healthcare professionals and what they promoted, including HPV vaccination (moderate confidence).

Various caregivers and adolescents in studies conducted in Europe (Romania, France, England and Denmark), and the Americas (Canada and the USA) found a strong sense of distrust in healthcare professionals (Bowen 2014; Craciun 2012; Evans 2021; Gordon 2011; Nordtug 2021; Pop 2015; Rail 2018; Stephens 2013; Ward 2017). The reasons for this mistrust emerged as varied and diverse. Some perceived healthcare professionals as representing, and therefore tainted by, commercial interests (Craciun 2012; Pop 2015). Others spoke about healthcare professionals being "a bit too enthusiastic" and "insincere" (Craciun 2012), or "uninformative" and "pro-vaccine" (Gordon 2011), providing what they perceived as simplistic, unbalanced and at times contradictory information about vaccines (Rail 2018; Ward 2017). Others appeared to conceive healthcare professionals as representatives of the more remote systems of science and biomedicine, and therefore distrusted them by implication (Craciun 2012; Ward 2017). For some, their mistrust emerged as intimately connected to historical and contemporary forms of racism amongst healthcare professionals (Bowen 2014; Evans 2021; Stephens 2013; see Finding 46 for more details). Whilst the reasons for the distrust appeared to vary, the studies demonstrated that distrust in healthcare professionals may reduce some caregivers' and adolescents' acceptance of the HPV vaccine.

Finding 46

Some caregivers' and adolescents' distrust in the institutions, systems or experts associated with vaccination was grounded in their experiences of structural discrimination or exploitation. For many, such experiences contributed to reducing their confidence in the motives and actions of those in power, and in turn their acceptance of what they promote, including HPV vaccination (moderate confidence).

Studies conducted in the USA (Bowen 2014; Evans 2021; Stephens 2013), and Romania (Craciun 2012; Pop 2015), revealed that historical or contemporary experiences of structural discrimination or exploitation can create a fertile ground for distrust in the institutions, systems or experts associated with vaccination, and in turn reduce acceptance of HPV vaccination. This particular reason for distrust emerged as cutting across many of the institutions or experts associated with vaccination discussed in previous findings.

Three studies conducted amongst racial and ethnic minorities in the USA found that some caregivers' and adolescents' scepticism around the HPV vaccine had its roots in experiences of racial discrimination and exploitation, which has undermined trust in authorities (Bowen 2014; Evans 2021; Stephens 2013). For example, in a study conducted amongst immigrant Haitian mothers, various participants questioned if the HPV vaccine was being tested specifically on Haitians, and worried that they were being exposed to unfair research practices in a similar way to which they had been in the past (Stephens 2013). Participants in this study recalled the stereotyping of Haitians as disease carriers at the peak of the HIV/AIDS crisis, which, according to them, had led to an increase in immigration-related barriers and social stigmas. They were concerned that HPV vaccination would be similarly used as a reason to discriminate against their daughters. As one caregiver recalled, "People are always testing, testing on us… Haitians. Blacks... and poor people. This is like AIDS, no? Like that we carry this and we need this… You know, because I do not want [daughter] to be a test person they try it with like HIV" (Stephens 2013, USA, participant quote).

Similarly, a study conducted amongst mothers of adolescent black men in New Jersey in the USA found that many study participants had considerable concerns about, and resistance towards, allowing their sons to receive HPV vaccination (Evans

2021). These sentiments were found to reflect a deep-seated distrust in medical professionals and government officials, which was grounded in a belief that such authorities may be willing to harm racial and ethnic minorities. In unpacking this belief, the study illustrated how the long history of racial discrimination and exploitation in medical science in the USA continues to resonate in the minds of many black Americans. Several study participants spoke about various infamous examples (e.g. the Tuskegee syphilis study; the case of Henrietta Lacks) where black people were abused by medical research. The study author suggested that these abuses appear to have impacted profoundly on the attitudes of many black Americans toward the medical profession. As one mother explained, "Because historically African Americans... have been exposed to unfortunate medical events and have been experimented on and treated in very inhumane ways, that we probably have a greater sort of doubt and that could also work against us in some ways because we're sometimes less likely to get help and seek the treatment and prevention that we could because we just don't trust the medical professionals" (Evans 2021, USA, participant quote).

Furthermore, this study also highlighted how racial and ethnic discrimination is an ongoing feature of contemporary USA society, including within the healthcare system and many other domains of life. Various study participants spoke about the continued racism within health institutions that many black Americans experience. As one respondent put it, "I think that the Black community is highly critical and highly distrusting of modern medicine. . . . I think we are very distrusting of doctors... I think we're very fearful that someone is giving us something or testing things out" (Evans 2021, USA, participant quote). The study author argued that these racial injustices in the healthcare system also need to be placed within the wider context of continued structural racism in the USA, as reflected in racial health disparities such as incarceration rates; poverty; maternal and child mortality; and life expectancy. Therefore, and according to the study author, "When African Americans and other Black and brown groups interact with government health programs, experts in medical research, or medical professionals, they are not only interacting with institutions and programs that have a poor track record of racial discrimination, but they are doing so in the context of a racially biased political economy" (Evans 2021, USA, author quote). The study therefore highlights how historical and continued racial injustice has corroded trust in medical institutions and government authorities, which has contributed to various caregivers' unwillingness to allow their adolescents to receive HPV vaccination.

Albeit in a different context and population group, two studies conducted in Romania similarly identified how experiences of structural exploitation can significantly undermine trust in medical professionals and government authorities (Craciun 2012; Pop 2015). Both these studies demonstrated that some mothers' resistance towards the HPV vaccine needs to be understood within the Romanian cultural and historical context of reproductive and sexual exploitation. According to the authors of these studies, Romania's recent past is characterised by one of the most oppressive, state-driven pro-natalist policies. During this time, abortion was legally prohibited, modern contraception was unavailable, and women were often subjected to mandatory gynaecological check-ups at their workplace. The HPV vaccination refusal narratives of many study participants recounted memories of traumatic experiences from this era. Many described still distrusting state-run sexual and reproductive healthcare, and admitted deliberately choosing to circumvent official channels of care (e.g. Pap smears, gynaecologist check-ups). This distrust and avoidance emerged as extending to HPV vaccination. As one mother stated: "I think that this vaccine will cause more harm than good. The vaccination initiative is like other [campaigns] undertaken by the Ministry" (Pop 2015, Romania, participant quote). Similarly, many other mothers confessed that they feared the vaccine was yet another form of state exploitation of women's bodies, and therefore decided not to allow their daughters to receive it.

In summary, the above-mentioned studies highlight diverse cases of oppression that emerged out of the intricacies of specific political contexts and social relations. Yet they similarly reveal how historical or contemporary experiences of structural discrimination or exploitation can contribute to distrust of authorities. This may lead people to doubt that those in power have their best interests at heart, increasingly questioning the real intentions of their actions and what they promote. As demonstrated by the above studies, this may spill over into views and practices regarding HPV vaccination, ultimately contributing to reduced acceptance of it.

Theme 8: Access, supply and delivery logistics

Caregivers' and adolescents' views and practices regarding HPV vaccination may be influenced by their access to, and experiences of, HPV vaccination programmes and delivery services. That is, study findings showed that there is a potential interplay between access or supply-related and demand-related dimensions of HPV vaccination. In this section we discuss five ways in which this demand-supply interplay surrounding HPV vaccination emerged in the studies: 1) convenience (or inconvenience) of HPV vaccination services; 2) HPV vaccine cost; 3) language barriers in accessing HPV vaccination and information; 4) feminisation of HPV vaccination programmes; and 5) procedural aspects of school-based vaccination delivery.

Finding 47

Many caregivers' and adolescents' views and practices regarding HPV vaccination were influenced by the convenience, or inconvenience, they experienced in accessing it. Access barriers such as having to miss work and associated lost wages; lack of time and competing priorities; transportation challenges and costs; difficulties fitting in with vaccination schedules; vaccine stock-outs or limited availability; or a general lack of access to quality healthcare services contributed to reducing acceptance of HPV vaccination for many caregivers and adolescents (high confidence).

Studies from a range of settings and population groups revealed that convenience (or inconvenience) in accessing HPV vaccination may influence caregivers' and adolescents' HPV vaccination views and practices (Adeyanju 2022; Ali 2022; Bunton 2013; Chiang 2015; Cooper 2010; Elit 2022; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Islam 2018; Jackson 2016; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Mitchell 2021; Patrick 2022; Paul 2014; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Vermandere 2015; Wakimizu 2015).

Various caregivers and adolescents described facing significant barriers to accessing vaccination services, and how this in turn reduced their acceptance of them. These barriers included having to miss work for HPV vaccination appointments and

associated daily wages lost (Mitchell 2021; Paul 2014; Reiter 2014; Roncancio 2019), demands on time and competing priorities (Adeyanju 2022; Friedman 2013; Reiter 2014; Roncancio 2019), transportation difficulties and costs in accessing HPV vaccination services (Adeyanju 2022; Friedman 2013; Mitchell 2021; Reiter 2014; Roncancio 2019; Rujumba 2021; Vermandere 2015), difficulties fitting into HPV vaccination schedules (Roncancio 2019; Wakimizu 2015), or unpredictable vaccination schedules (Rujumba 2021), vaccine stock-outs or inadequate stock levels (Patrick 2022; Rujumba 2021), limited availability of healthcare professionals to provide vaccination (Rujumba 2021), and a general lack of access to quality healthcare services in their communities (Elit 2022; Patrick 2022; Reiter 2014). For example, one mother recounted the challenges she experienced with fitting vaccination into her work schedule: “For me, the only difficult thing about vaccinating my son are the hours I work. My work schedule, more than anything, makes it difficult to vaccinate him” (Roncancio 2019, USA, participant quote). Similarly, many study participants spoke about the transport difficulties and costs associated with accessing HPV vaccination services, as one caregiver stated: “I heard about it [the vaccination program] but I lacked transport to take my daughter for the vaccination” (Vermandere 2015, Kenya, participant quote). Other caregivers and adolescents spoke about how the unpredictable nature of scheduled vaccination sessions reduced their acceptance or deterred them from returning to vaccination sites: “Sometimes they [healthcare workers] say that there will be vaccination and the children wait even for three days in vain. In other cases, they [healthcare workers] come like at 2 o’clock when the children have gone for lunch and some do not return to school" (Rujumba 2021, Uganda, participant quote).

The studies suggested various factors that may help to improve the convenience of HPV vaccination services and in turn acceptance of them. Two studies - one in Tanzania (Mitchell 2021), and another multicountry study in Argentina, Malaysia, South Africa, South Korea, and Spain (Islam 2018) - found that reduced-dosage HPV vaccination schedules (e.g. one or two doses rather than a three-dose schedule) could reduce logistical barriers and costs and in turn improve access. As one caregiver explained, “I think that two doses, because of some mothers that sometimes don’t take them [daughters], they already have a hard time taking them to the outpatient clinic. … It would be easier for them” (Islam 2018, Argentina, participant quote).

Other studies found that providing HPV vaccination within schools was another factor that had, or could, enhance convenience and in turn acceptance of it (Bunton 2013; Chiang 2015; Cooper 2010; Friedman 2013; Grandahl 2019; Katahoire 2008; Kucheba 2021; Vermandere 2015). For example, one adolescent explained why he had accepted HPV vaccination: “I thought, oh well, I might as well… if I had to go to the doctors I probably wouldn’t have got it done…but because they came to you and took you out of class, so you didn’t have to do anything for it (Bunton 2013, USA, participant quote). Similarly, one caregiver described how “The advantages for me at school were that the organizing was taken away. All I had to do was sign the form and I knew it was taken care of. It wasn’t something I had to then think about having to do after school or make an appointment. It wasn’t anything extra. It was something that was done” (Cooper 2010, Australia, participant quote). Some caregivers did, however, raise concerns that school-based vaccination delivery does not necessarily enhance convenience and acceptability for everyone. Specifically, these caregivers indicated that such an approach would miss adolescents who do not attend school or who are absent from school on the day of vaccination (Friedman 2013; Jackson 2016; Kucheba 2021; Rujumba 2021; Turiho 2017). As one caregiver emphasised, “Vaccination was done only in schools. Why not even in the villages so that those girls who are not in school can also access it? That is what bothers me” (Turiho 2017, Uganda, participant quote).

Finding 48

Many caregivers’ and adolescents’ views and practices regarding HPV vaccination were influenced by the cost of the HPV vaccine. Having to pay for the vaccine contributed to reducing acceptance of it for many, whereas providing it for free or at a low cost contributed to increasing acceptance for many because it was perceived to be affordable or important. However, providing the HPV vaccine for free or at a low cost contributed to reducing some caregivers’ and adolescents’ acceptance of it because they equated low cost with low or inferior quality (high confidence).

The cost of the vaccine emerged as a significant factor influencing caregivers’ and adolescents’ HPV vaccination views and practices across diverse study settings and populations (Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chau 2021; Cover 2012; Craciun 2012; de Oliveira 2019; Elit 2022; Fielding 2018; Francis 2011; Grandahl 2019; Harries 2009; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Paul 2014; Reiter 2014; Roncancio 2019; Siu 2014; Vermandere 2015; Wakimizu 2015; Warner 2015).

For numerous caregivers and adolescents, the high cost of the vaccine served as a major deterrent to its acceptance (Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Elit 2022; Fielding 2018; Francis 2011; Liebermann 2020a; Lismidiati 2019; ; Madhivanan 2009; Reiter 2014; Roncancio 2019; ; Siu 2014; Vermandere 2015; Wakimizu 2015; Warner 2015). Many study participants across socio-economic groups spoke about how “the cost was very prohibitive” (Francis 2011), or “the constraint is the cost” (Lismidiati 2019), or as one caregiver stated unambiguously, “The most difficult thing about vaccinating is not having money to pay for the vaccine” (Roncancio 2019). Many caregivers and adolescents also referred to the HPV vaccine as “expensive” (Elit 2022; Liebermann 2020a; Lismidiati 2019; Siu 2014; Wakimizu 2015; Warner 2015), or "a lot of money" (Vermandere 2015), and therefore “out of my reach” (Roncancio 2019), or something that they “cannot afford” (Bunton 2013; Fielding 2018; Warner 2015).

Many studies suggested that providing the HPV vaccine for free or at a low cost may help to increase its acceptability. Several caregivers and adolescents indicated that they had accepted the vaccine because it was freely available or affordable, whilst others indicated that they would be more willing to accept it in such circumstances (Ambali 2022; Bartolini 2012; Bunton 2013; Chau 2021; Cover 2012; de Oliveira 2019; Elit 2022; Francis 2011; Grandahl 2019; Harries 2009; Lismidiati 2019; Madhivanan 2009; Paul 2014; Reiter 2014; Wakimizu 2015). Here, the studies were replete with statements about how "I wouldn’t have gone if it wasn’t free" (Bunton 2013), “if it cost money I probably wouldn’t get it” (Reiter 2014), or alternatively “it became free so that was what led me to consent” (de Oliveira 2019), or “we will take it if it is free” (Ambali 2022), or as one caregiver emphasised, “The only hindrance can be if the price is too expensive. Now that I have

learned the HPV vaccine is free, nothing can hinder me from asking my daughter to take it" (Elit 2022, Cameroon, participant quote).

Some studies reported that providing the HPV vaccine for free or at a low cost may also enhance acceptance through a more symbolic mechanism. That is, some caregivers and adolescents felt that when the vaccine is provided free of charge or heavily subsidised by government it signifies the importance of the vaccine (Bunton 2013; Siu 2014). Here it was common for study participants to talk about how "I think that it was given to us for free… like it was obviously something serious" or "if they're not making us pay… it must be important" (Bunton 2013, Australia, participant quote).

However, and in direct contrast, a few studies conducted in Romania, Vietnam, and South Africa found that when the HPV vaccine is offered free of charge it can generate suspicion in some caregivers (Cover 2012; Craciun 2012; Harries 2009). That is, some caregivers expressed concern that a 'cheaper' or 'free' vaccine may constitute "fake medicine" (Cover 2012), or mean that it is of a low or inferior quality. As one caregiver enquired, "Are they going to give us a cheaper vaccine with more side effects which we only see in 30 years and anything to do with the womb? Is it going to affect fertility later on in the child's life? That is something I would be a bit conscious about, a bit scared" (Harries 2009, South Africa, participant quote).

Finding 49

Various caregivers and adolescents from ethnic minority groups faced language barriers in accessing healthcare services and health information, including in relation to HPV vaccination. This contributed to reducing acceptance of HPV vaccination due to misunderstanding information about it, or decreasing willingness to seek vaccination services or confidence to engage in conversations with healthcare professionals (low confidence).

A few studies conducted amongst ethnic minorities in England and Scotland (Jackson 2016), and the USA (Burke 2015; Stephens 2013; Warner 2015), found that language barriers may reduce these communities' access to healthcare services and health information, including in relation to HPV vaccination. These studies found that ethnic minorities often face language challenges in accessing healthcare services, frequently relying on interpreters or bilingual healthcare professionals who may be in short supply. This materialised as potentially reducing caregivers' willingness to access healthcare services, including vaccination services. Moreover, some of these studies found that language barriers commonly experienced by ethnic minorities may reduce their willingness to attend vaccination appointments or their confidence to engage in conversations with healthcare professionals for fear of feeling humiliated or shamed (Burke 2015; Jackson 2016). This too was found to contribute to their reduced willingness to seek vaccination services and, in turn, acceptance of HPV vaccination. These studies also found that information about the HPV vaccine, provided both verbally by healthcare professionals and in written materials, is often in English. It was revealed that this may result in confusion and misunderstanding, and in turn reduce caregivers' confidence in the benefits and safety of the vaccine (Burke 2015; Stephens 2013; Warner 2015). For example, one Latino caregiver living in the USA described their frustration with the lack of comprehensible materials about the HPV vaccine, "I think we really need more information in Spanish to understand what HPV is. I went to the doctor last time with my daughters and he asked me, 'Do you want the [HPV] vaccine?' and I asked him, 'What is that?' He gave me a brochure in English not in Spanish" (Warner 2015, USA, participant quote).

Finding 50

Women-targeted HPV vaccination programmes in various settings contributed to reducing acceptance of HPV vaccination for many adolescents and caregivers. For some it perpetuated the view that the HPV vaccine is a 'female' vaccine and therefore unnecessary or emasculating and embarrassing for men to receive. Others were suspicious of the motives behind targeting women, which in turn reduced their acceptance of HPV vaccination for women. Some resented what they saw as the patriarchal norms of sexual and reproductive health being a woman's responsibility reinforced by women-targeted vaccination programmes. Others resented what they perceived as discrimination against men. Many of these caregivers and adolescents reported being more accepting of HPV vaccination for men and women when it was (or would be) gender-neutral, due to what they perceived as the promotion of equal responsibility and opportunity for sexual health (high confidence).

Studies across a range of settings and contexts reported that HPV vaccination programmes have traditionally targeted and, in many cases continue to target, only female adolescents (Adeyanju 2022; Bartolini 2012; Beyen 2022; Chau 2021; Chiang 2015; Cooper 2010; Craciun 2012; Friedman 2013; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Perkins 2013; Rail 2018; Reiter 2014; Remes 2012; Siu 2014; Venderbos 2022; Warner 2015). Findings from these studies suggest that this 'feminisation' has impacted in complex and diverse ways on the acceptance of HPV vaccination for men and women amongst many caregivers and adolescents.

It emerged from various studies how this widespread feminisation of HPV vaccination programmes has contributed to some caregivers' and adolescents' lacking awareness that HPV could be transmitted to, and cause illness in, men (Chau 2021; Cooper 2010; Gutierrez 2013; Perkins 2013; Reiter 2014; Siu 2014; Venderbos 2022; Warner 2015). The HPV vaccine was in turn commonly conceptualised as a women-only vaccine for the prevention of cervical cancer. This was clearly evident in the way several study participants described the HPV vaccine, commonly referring to it as the "cervical cancer vaccine" (Siu 2014), "the vaccine for the cervix" (Bartolini 2012), or "the cervix" or "vagina cancer needle" (Cooper 2010). This gendered perception of the HPV vaccine was one of the most commonly reported reasons for reduced acceptance of the vaccine amongst adolescent men and their caregivers. As this adolescent man stated, "Males do not have a womb so only women need the vaccination" (Chau 2021, China, participant quote). Sharing this perspective, one caregiver similarly explained, "I think that cervical cancer is cancer in the cervix. As far as I know, men don't have cervix, so I don't think that... I didn't know that boys needed to receive this vaccine" (Warner 2015, USA, participant quote). Many study participants also indicated that this perspective was widespread in their communities and suggested that it has led to concerns that receiving the vaccine might be emasculating and embarrassing for men. They reported that this perceived stigma has contributed to reduced acceptance of the vaccine amongst adolescent boys and their caregivers alike (Cooper 2010; Reiter 2014; Siu 2014).

Other study participants who were aware that HPV could be transmitted to, and cause illness in men, resented the woman-focus of vaccination programmes. These caregivers and adolescents considered it unfair and discriminatory to only vaccinate girls and felt that it was important to give boys and girls equal protection against HPV. They therefore supported the vaccination of boys within HPV vaccination programmes for its promotion of health equity (Chiang 2015; Friedman 2013; Gottvall 2017; Grandahl 2019; Joseph 2015; Perkins 2013; Remes 2012), as one adolescent man remarked: "If boys can be affected by HPV, then I do not understand why they are not yet offered [the vaccine]… if the vaccine is effective in both … or if both may get ill, then it is clear that both should have access to the vaccine" (Grandahl 2019, Sweden, participant quote).

For other caregivers, the 'feminisation' of vaccination programmes appeared to generate hesitancy towards accepting the vaccine for their daughters. Some of these caregivers were suspicious of the women-only focus of HPV vaccination and questioned the motives behind this (Adeyanju 2022; Beyen 2022; Gottvall 2017). One caregiver enquired "why are they not all vaccinated? It is actually really strange", while another caregiver thought that the reason for focusing exclusively on women was population control: "If it is not aimed to reduce the population growth why it has been given for females only?" (Beyen 2022, Ethiopia, participant quote). Furthermore, various caregivers who, having declined the vaccine for their daughter, indicated that if men were also offered the vaccine, they would be more willing to accept the vaccine for their daughter (Gottvall 2017). According to them, "then we know that it is a generally decided programme, that there is no gender quotas, but both boys and girls are to be vaccinated" (Gottvall 2017, Sweden, participant quote). Other caregivers' hesitancy towards accepting the vaccine for their daughters centred around what they perceived as the patriarchal gender norms being reinforced by women-targeted vaccination programmes (Craciun 2012; Rail 2018). That is, these caregivers felt that the 'feminisation' of HPV vaccination perpetuated sexist understandings of women as responsible for sexual and reproductive health issues. For these caregivers, gender-neutral HPV vaccination programmes were therefore important for promoting shared and equal responsibility for STIs.

Finding 51

Some adolescents' acceptance of HPV vaccination was enhanced when certain school-based delivery strategies were implemented, including using privacy screens and distraction techniques, reducing the numbers of adolescents waiting together for vaccination, and providing vaccination early in the day. These strategies helped to reduce fears and the impact of peers' negative reactions to vaccine administration amongst some adolescents, and in turn contributed to increasing their HPV vaccination acceptance (very low confidence).

One study conducted in Australia, which explored school-based vaccination experiences across several schools in Sydney, identified various vaccine delivery-related aspects that could influence HPV vaccination views and practices of adolescent women (Cooper 2010). These included using privacy screens and distraction techniques, considering the number of adolescents waiting together before vaccination, and rethinking the timing of vaccination. These vaccine delivery strategies were found to help reduce fears of HPV vaccination and the impact of peers' reactions to its administration, and in turn contribute to enhancing some adolescent women's acceptance of it.

For example, the study found that a lack of privacy screens often exacerbated fears, while using privacy screens reduced fears as those waiting to be vaccinated were unable to watch the vaccination process. Similarly, some schools assembled large groups of girls to be vaccinated at once, which meant that several adolescents waited together for long periods of time. This was found to cause greater collective anxiety and fear, as one adolescent noted: "When we had the whole year down there, I thought people got more scared, because everyone was talking about how they had it [the vaccination] and stuff" (Cooper 2010, Australia, participant quote). The study found that calling fewer adolescents at a time immediately before being vaccinated could help to reduce collective anxiety and fear. Study observations also reported that adolescents who were vaccinated in the morning were calmer than those vaccinated later in the day, potentially due to conversations that occurred during the day. Furthermore, vaccinating adolescents who were known to be very anxious about vaccinations in the morning was reported as having a positive effect on individual and collective anxieties. Finally, various adolescents in the study spoke about the distraction techniques that nurses used and how these helped to make them feel more comfortable and less anxious. These techniques included, for example, talking whilst administering the injection, using stress balls or puzzles, or allowing the use of iPods during vaccination days. As one adolescent recounted, "It's better when [the nurses] talk to you because then you're distracted… They had some balls and they gave you one of those to squeeze and you didn't feel the needle going in" (Cooper 2010, Australia, participant quote).

Results of integrating the review findings with the Cochrane intervention review

The results of our comparison of the findings from our qualitative evidence synthesis and the findings from the related Cochrane review of intervention effectiveness (Abdullahi 2020), are presented in the matrix in Figure 2. The matrix provides a summary of how the overarching factors that our review identified as influencing caregivers' and adolescents' HPV vaccination views and practices are (or are not) reflected in the underlying theories or components of the interventions in the studies included in Abdullahi 2020.

The following are links to the references of the thirteen relevant studies included in Abdullahi 2020, the related Cochrane review of intervention effectiveness: Cates 2014; DiClemente 2015; Fiks 2016; Gargano 2015; Grandahl 2016; Mantzari 2015; Paskett 2016; Perkins 2015; Rickert 2015; Staras 2015; Szilagyi 2015; Watson-Jones 2012; Winer 2016.

In summary, we found the following.

- The two most commonly targeted factors amongst the interventions were: 1) caregivers' and adolescents' lack of biomedical knowledge, and 2) their perceptions of the risks and benefits of HPV vaccination, with eight (62%) interventions reflecting or partially reflecting these influencing factors.
- Seven interventions (54%) addressed or partially addressed the supply-side barriers that may impact on caregivers' or adolescents' HPV vaccination views and practices, including, for example, supplying communication materials in multiple languages, providing service-level quality improvement

incentives or financial incentives to recipients, and various delivery strategies geared to improve the convenience of HPV vaccination. Seven interventions (54%) also considered or partially considered caregivers' or adolescents' perceptions of the authorities associated with HPV vaccination programmes. Five of these interventions specifically targeted (or included intervention components that specifically targeted) healthcare professionals.

- Four interventions (31%) considered or partially considered the decision-making dynamics between adolescents and their caregivers, for example, by simultaneously targeting multiple nuclear family members as part of the intervention. This was followed by two interventions (15%) that targeted the role of the media in influencing HPV vaccination views and practices - one of these comprised a social marketing campaign and the other a media-based communication strategy.
- Only one intervention (8%) partially addressed the social networks or communities with which caregivers or adolescents are affiliated, by incorporating peer norms in the communication strategy.
- No interventions considered: 1) adolescents' or caregivers' views and experiences of other vaccines and vaccination programmes or 2) socio-cultural beliefs and practices, for example, around adolescence, sexuality, gender, parenting, or health.
- Interventions with multiple components were more likely to include more elements that could be mapped onto the findings of our review than those with single components.

Review author reflexivity

Four review authors (SC, BS, NL, EM) are employed by the South African Medical Research Council and four review authors (JR, ACT, RB, NAJ) work at Universities: Stellenbosch University (JR), Sefako Makgatho Health Sciences University (RB) and the University of the Witwatersrand (NAJ) in South Africa and University of Yaounde 1 Cameroon (ACT). The ninth review author (CSW) is the Regional Adviser, Immunisation/Team Lead of the Vaccine-Preventable Diseases Programme for the World Health Organization Regional Office for Africa. Our review team comprises a mix of researchers with experience in social science qualitative research (SC, NAJ BMS, JR, NL, ACT), epidemiology (BMS, RB, CSW) and vaccinology (RB, CSW, EM).

All review authors believe that HPV vaccination for adolescents of all genders is a valuable individual and public health intervention, providing direct and indirect protection against high-risk HPV infection and its sequelae. All review authors also hold a view that individuals have a right to make their own healthcare decisions, including about HPV vaccination. All the children of review authors who were eligible for HPV vaccination received it. One member of the team had the experience of unintentionally delayed and incomplete HPV vaccination for her child, which provided her with a more nuanced experience of parental decision-making about HPV vaccinations. Reflecting on these personal values we hold, as well as our institutes' recommendations, we recognise that there are potential tensions between a public health perspective and individual choice. We also recognise that vaccination has become a contentious and emotive topic for many, including for many of the review authors.

Before undertaking the review, many of us had considerable prior knowledge of the research literature on vaccination and one of us (CSW) is actively involved with the implementation of immunisation programmes, including HPV vaccination. CSW is also an author on the related intervention review (Abdullahi 2020), and SC, BMS, NL, and CSW are authors of the related qualitative evidence synthesis of acceptance of childhood vaccination (Cooper 2021).

We recognise that all of these issues mentioned above - our prior knowledge and experiences, as well as our personal and professional values, assumptions and emotions - inevitably influenced the review process, including our interpretations of the data. We therefore attempted to hold a reflexive standpoint throughout all stages of the review, critically reflecting on these influences and employing strategies to minimise how they might inappropriately skew our methodological decisions and interpretations of the data. Two review authors (SC and NAJ) conducted the data extraction and analysis - at times independently and in some instances jointly. One of these authors (NAJ) had very little prior knowledge of the research literature on vaccination, nor had she been involved with any reviews of this literature. This combination of interpreters with minimal and considerable familiarity with the topic allowed us to approach the data with both an open mind and a deep understanding of the emerging issues. We believe this enabled the emergence of both novel and advanced interpretations. We also discussed progress and preliminary findings - verbally and through written feedback - with the larger team, with the aim of identifying assumptions in the data synthesis and exploring varying perspectives amongst review authors. These discussions were greatly enhanced by our having a multidisciplinary review team, which enabled both the exploration of multiple perspectives and productive contestation. We also used refutational analysis techniques ('disconfirming analyses') as an integral part of the data analysis. We identified various contradictions and refutations in the data, which we explored and reported in our results. This process deepened our interpretations and further enhanced the reflexive stance of the review team.

DISCUSSION

Summary of the main findings

Many complex factors may influence caregivers' and adolescents' HPV vaccination views and practices, which we categorised into eight overarching themes.

1. A lack of biomedical knowledge
2. Perceptions of a range of interrelated risks and benefits (or lack thereof) associated with HPV vaccination
3. Routine responses to vaccination generally, or more specific views or experiences of other vaccines and vaccination programmes
4. Complex nuclear familial decision-making dynamics
5. Extended familial and social relations and networks, particularly extended family members, peers, traditional or religious leaders, and the media
6. Interrelated socio-cultural beliefs and practices regarding adolescence, sexuality, gender, parenting, and health
7. Trust or distrust in the institutions, systems or experts associated with vaccination, most particularly teachers and the

school, the pharmaceutical industry, government, science and biomedicine, and healthcare professionals

8. Access to, and experiences of, HPV vaccination programmes and delivery services, such as the convenience (or lack thereof) of HPV vaccination services, the cost of the vaccine, language barriers, the feminisation of HPV vaccination programmes and procedural aspects of school-based vaccination delivery.

We did not identify any major differences in the occurrence of these overarching themes between subgroups. However, certain differences emerged in relation to place, gender and socio-economic status, and between caregivers and adolescents in various subthemes.

The related Cochrane review of intervention effectiveness tested interventions that most commonly targeted caregivers' and adolescents' lack of biomedical knowledge and their perceptions of the risks and benefits of HPV vaccination, with the other influencing factors identified by our review being underrepresented (Abdullahi 2020).

Comparison with other reviews and implications for the field

Cochrane qualitative review on routine childhood vaccination

The findings of our qualitative evidence synthesis have various commonalities and differences with the findings from a related Cochrane qualitative evidence synthesis on the factors that influence caregivers' views and practices regarding routine childhood vaccination (Cooper 2021). The broad themes identified by Cooper and colleagues as shaping views and practices of routine childhood vaccination were similarly revealed by our review. These included the influence of wider views and practices surrounding health, illness and parenting; the vaccination ideas and practices of social networks and communities; wider political issues and relations of power, and particularly, the impact these have on caregivers' trust (or distrust) in the entities associated with vaccination programmes; as well as issues relating to access to, and supply of, vaccination.

There were, however, various overarching themes identified in our review that did not emerge in the review on routine childhood vaccination (Cooper 2021). For example, the widespread lack of biomedical knowledge, and the complex ways in which this impacted upon views and practices surrounding HPV vaccination were not found in the case of routine childhood vaccination. Similarly, our review identified ubiquitous concerns about the safety and effectiveness of the HPV vaccine, anxieties that were not revealed (at least not to the same degree) in the review on routine childhood vaccination. This difference may relate to the perceived relative 'newness' of the HPV vaccine and, in turn, the concerns of caregivers and adolescents that its longer-term safety and effectiveness had not yet been established. Indeed, many study participants in our review themselves made a distinction between their uncertainty surrounding the HPV vaccine, which they felt had not been on the market for an adequate period of time, compared to their confidence in what they perceived as the tried-and-tested nature of more established childhood vaccines. Another significant difference between the findings of the two reviews relates to the complex nuclear familial decision-making dynamics between adolescents and their primary caregivers, identified in the case of HPV vaccination and not routine childhood vaccination. This may reflect differences between childhood immunisation and adolescent immunisation where, in the case of the latter, the role of caregivers as decision makers may be more ambiguous and contestable. Ultimately, the differences between the two reviews reveal that vaccine hesitancy - the way it manifests and why it occurs – potentially varies across vaccines, something that is increasingly recognised in the vaccine hesitancy literature (Larson 2022; WHO 2022b).

Qualitative reviews on HPV vaccination

The findings from our review have various commonalities with the findings from other qualitative reviews focused on the demand side of HPV vaccination for adolescents (Deignan 2021; Ferrer 2014; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022; Poirier 2021), although none of these reviews had the same focus or scope as our review. Three of these explored attitudes and practices surrounding HPV vaccination within specific populations or regions, including socio-economically deprived populations (Mishra 2011), global indigenous communities (Poirier 2021), and stakeholders in sub-Saharan Africa (Deignan 2021). Two reviews explored acceptance of, and decision-making around, HPV vaccination for adolescent women only (Ferrer 2014; Marshall 2019a), and one review investigated these issues for adolescent men only (Lacombe-Duncan 2018). The final related review explored adolescents' views about all adolescent vaccines, including, but not limited to, HPV vaccination (Mitchell 2022).

As with our review, five of these reviews found that many caregivers and adolescents have limited biomedical knowledge about HPV and HPV vaccination (Deignan 2021; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022). Taken together, the findings from these reviews similarly suggest that the relationship between biomedical knowledge about HPV vaccination and acceptance of it is complex and may operate in multiple directions. Various of these reviews, like ours, revealed that inadequate biomedical information about HPV vaccination may reduce acceptance of it for certain people (Lacombe-Duncan 2018; Marshall 2019a; Mitchell 2022). However, and like ours, some of these reviews also found that a lack or scarcity of biomedical knowledge about vaccination may actually enhance acceptance of it (Deignan 2021; Mishra 2011; Mitchell 2022). At the same time, all these reviews likewise found that inadequate knowledge about HPV vaccination may have no impact on some people's attitudes or behaviours towards it. That is, they found that some people accepted or received HPV vaccination despite knowing very little about it (Deignan 2021; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022). Therefore, and like ours, these reviews challenge a persistent assumption within the literature that vaccine hesitancy is driven by limited or a lack of biomedical information ('knowledge-deficit' approaches; Cooper 2019a; Dubé 2017; Larson 2020). In other words, these reviews all challenge the assumption that having sufficient medical facts about the benefits and value of HPV vaccination will necessarily lead to greater acceptance of it.

Relatedly, and corresponding with our review, these reviews found that HPV vaccination views and practices are not only influenced by issues related to the individual and the vaccine itself, but also a complex array of more distal and contextual factors (Deignan 2021; Ferrer 2014; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022; Poirier 2021). Many of the contextual factors we

identified as influencing HPV vaccination views and practices also emerged in these reviews.

For example, all seven reviews highlighted how views and practices around HPV vaccination are influenced by the fact that it targets an STI. Like our review, six of these reviews showed how this can produce a plethora of interrelated concerns which may in turn reduce acceptance of the vaccine. These include, for example, fears that obtaining the vaccine would signify parental endorsement of sexual activity for their adolescent (Marshall 2019a; Mishra 2011; Poirier 2021); would encourage earlier sexual debut, multiple sexual partners, sexual disinhibition or complacency regarding safe sexual health practices (Ferrer 2014; Marshall 2019a; Mishra 2011); or would produce social stigma due to associations of the vaccine and its sequelae with promiscuity (Deignan 2021; Ferrer 2014; Mishra 2011; Poirier 2021). Comparable with our review, some of these reviews showed how many caregivers feel discomfort or reluctance to discuss the vaccine with their adolescent due to its inherent link to sexuality, which may in turn lead to them both avoiding such conversations and HPV vaccination (Ferrer 2014; Marshall 2019a; Mishra 2011). Many of these reviews also reported how reduced acceptance of the vaccine was often associated with perceptions of sexual risk (Ferrer 2014; Marshall 2019a; Mishra 2011; Mitchell 2022; Poirier 2021). That is, and analogous to our review, they demonstrated how many people hold the view that they (or their adolescent) personally, or adolescents generally, lack susceptibility to HPV because they are sexually inactive, monogamous or did not (or would not) engage in unsafe sexual activities. These individuals in turn questioned the necessity of HPV vaccination or decided to delay receipt until what they saw as a more appropriate age. In contrast, one review that explored HPV vaccine acceptability and decision-making amongst adolescent men and their caregivers revealed that a vaccine targeting an STI may enhance its acceptance for men (Lacombe-Duncan 2018). Like our review, this review found that the majority of caregivers perceived their son to be (or soon to be) engaging in sexual activity which they would be unable to monitor. This in turn enhanced their acceptance of HPV vaccination as a means to protect their son. Moreover, and in the same way as our review, this review found that these caregivers did not think that HPV vaccination would encourage earlier sexual debut or increased sexual activity amongst their sons and reported that they were more willing to talk about sexual health with their sons compared to their daughters.

Our review reflected all of these findings, but also elaborated on them by demonstrating the ways in which these views reflect interrelated socio-cultural meanings of sexuality, gender and adolescence. That is, our review showed how these views are permeated with socio-cultural discourses regarding appropriate sexual practices and values commonly attached to men and women, masculinity and femininity. Specifically, our review revealed how HPV vaccination may threaten or alternatively support these socio-cultural norms, potentially contributing to reducing or enhancing acceptance of HPV vaccination in gender-differentiated ways.

Another contextual factor similarly identified in our and other related reviews as influencing HPV vaccination views and practices was the role of trust or distrust in the institutions, systems or experts involved with vaccination (Deignan 2021; Ferrer 2014; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022; Poirier 2021). Like our review, these reviews found that distrust in these entities can contribute to reducing acceptance of HPV vaccination. At the same time, trust in these entities can contribute to both enhancing and reducing vaccination acceptance, depending on these entities' stance towards HPV vaccination. These reviews correspondingly highlighted the particularly crucial role trust in healthcare providers plays specifically, with caregivers and adolescents often overtly seeking advice from healthcare providers or following their HPV vaccination recommendations. Like in our review, the reasons for trust or distrust in the entities associated with vaccination emerged in these related reviews as potentially variable and diverse across settings and populations.

The interplay between access/supply and demand-related dimensions of HPV vaccination identified in our review was likewise highlighted in six of the related reviews (Deignan 2021; Ferrer 2014; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Poirier 2021). As in our review, these reviews showed how practical barriers to accessing vaccination services can reduce acceptance of it. These barriers included transportation costs, missed work and school for multiple doses, lost wages, lack of time, a general lack of access to healthcare services and particularly having to pay for the HPV vaccine. Similar to our review, two of these reviews - one focused on studies from sub-Saharan Africa (Deignan 2021), and one exploring acceptance of HPV vaccination for men only (Lacombe-Duncan 2018) - found that the feminisation of HPV vaccination programmes has contributed to reducing acceptance of HPV vaccination for men. As with ours, these reviews found that the common targeting of women within many HPV vaccination programmes has led to a perception of the vaccine as a ‘female vaccine’, and in turn a view that it is unnecessary or emasculating for men to receive. These reviews also highlighted how this feminisation has generated resentment amongst adolescent men and their caregivers, who feel it is unfair for the vaccine to be given to women only, given that the virus can cause illness in men and women. Our review reflected these findings but extended them by showing how the feminisation of HPV vaccination programmes has contributed to reducing acceptance of HPV vaccination not only for men but also for women. That is, we found that it has created distrust of a women-only vaccine and resentment towards what is perceived as the patriarchal norms that it reinforces of sexual and reproductive health being a woman’s responsibility. These sentiments emerged in our review as contributing to reducing HPV vaccination acceptance for women.

Moreover, the complex nuclear familial dynamics between adolescents and their primary caregiver(s) also emerged as an important factor shaping HPV vaccination practices in six related reviews (Deignan 2021; Ferrer 2014; Lacombe-Duncan 2018; Marshall 2019a; Mishra 2011; Mitchell 2022). Like our review, these reviews found multiple HPV vaccination decision-making scenarios, including the locus of decision-making residing primarily with the caregiver(s), the adolescent, or both, as well as varying paternal and maternal caregiver roles. Two of these reviews similarly highlighted how the complex dynamics involved with HPV vaccination decision-making can give rise to various challenges and consequences (Ferrer 2014; Mitchell 2022). As demonstrated in our review, these included, for example, adolescents resenting their caregiver(s) making the decision for them; caregivers delaying vaccination until an age they perceived to be appropriate for their adolescent to make an independent decision; divergent views about the vaccine between adolescents and their caregiver(s)

and amongst caregivers themselves; and the diverse strategies adolescents may employ to go against their caregiver's wishes so as to receive or avert HPV vaccination depending on their own vaccination stance.

Subgroup themes

Our review did not identify any major differences in the occurrence of themes between subgroups. That is, in our review, all eight overarching themes emerged as potentially relevant across geographical regions, settings and population groups. Two other reviews similarly revealed a fair degree of homogeneity in themes identified (Ferrer 2014; Marshall 2019a), although both reviews focused only on HPV vaccination for women and one review included studies only from HICs (Ferrer 2014). In our review, certain subthemes did, however, emerge amongst specific groups or regions and not others, or they appeared to have particular pertinence for specific groups or regions.

For example, a fear or dislike of needles emerged as a potential factor reducing HPV vaccination acceptance only amongst adolescents and not caregivers, whereas the concern that HPV vaccination might encourage reportedly 'inappropriate' sexual practices was expressed only by caregivers and not adolescents. At the same time, the view that cervical cancer is a preventable, detectable and treatable illness and that HPV vaccination is beneficial solely for the individual and not 'the herd' only emerged amongst caregivers in HICs. In contrast, the views that cervical cancer is an illness that causes immense suffering and financial cost, that HPV vaccination protects against various STIs, and that it has general health-promoting and disease-preventing properties all emerged as particularly strong motivators for caregivers and adolescents from socio-economically disadvantaged settings.

Moreover, certain potential gender differences arose around the factors that enhanced or reduced HPV vaccination acceptance. For example, the perceptions of HPV vaccination preventing HPV infection and various cancers emerged as particularly strong motivators of HPV vaccination for men. Similarly, in many cases, socio-cultural beliefs surrounding sexuality in adolescence and sexuality more generally appeared to contribute to decreasing HPV vaccination for women and increasing HPV vaccination for men.

Finally, language barriers in accessing HPV vaccination and information, as well as structural discrimination and exploitation emerged as key contributors to distrust in the entities associated with vaccination, most particularly amongst caregivers and adolescents from minority ethnic groups.

Theoretical models

The findings from our review support and also enhance various existing conceptual and theoretical models of the demand side of vaccination. Specifically, the eight overarching themes that emerged from our review, depicted graphically in Figure 3, align with, and provide empirical support for, various existing socio-ecological conceptual models of vaccination acceptance, including the WHO's 'Vaccine Hesitancy Determinants Matrix' (Callréus 2010; Larson 2014; Sturm 2005; WHO 2013b). These conceptual models were developed to understand acceptance of vaccination generally and not specifically in relation to HPV vaccination. Our review demonstrates that these socio-ecological models that conceive vaccination as being shaped by interrelated factors operating at multiple levels (e.g. intrapersonal, interpersonal, institutional, community) are applicable to HPV vaccination in particular. Our review also identifies several particular factors that may be important at different levels of influence, specifically for HPV vaccination. The findings from our review also complement and potentially extend the various 'C frameworks' that draw on psychological models to understand the psychological factors that underpin vaccination decision-making (Betsch 2015; Betsch 2018; MacDonald 2015; WHO 2013b). Specifically, our review gives empirical support for the role of these psychological factors, but also provides insights into the more distal, contextual factors and processes - social, political, economic, ideological, structural - and how these potentially interact to influence HPV vaccination views and practices.

In terms of the related published Cochrane review of intervention effectiveness (Abdullahi 2020), as revealed in the matrix in Figure 2, interventions to increase the uptake of HPV vaccination appear to be dominated by education or awareness-raising strategies, which seek to provide caregivers or adolescents with biomedical information about HPV vaccination, including associated risks and benefits. Our review found that biomedical knowledge and risk-benefit perceptions are just two of the many complex factors influencing HPV vaccination views and practices. These other, more complex factors were underrepresented in the interventions tested in the studies included in Abdullahi 2020. In particular, relatively few interventions considered or targeted the decision-making dynamics between adolescents and their caregivers, the role of the media in influencing HPV vaccination views and practices, and the social networks or communities with which caregivers or adolescents are affiliated. Similarly, no interventions appeared to consider adolescents' or caregivers' views and experiences of other vaccines and vaccination programmes, nor broader socio-cultural norms and practices. Our review found that various socio-cultural norms and practices, for example around adolescence, sexuality, gender, parenting and health, can play an important role in shaping specific meanings, fears, or reservations about HPV vaccination amongst caregivers and adolescents.

Overall completeness and applicability of the evidence

This review included studies from diverse countries, socioeconomic settings and population groups, as well as studies from all six WHO regions. It also comprised studies that explored HPV vaccination for adolescent women and men. This diversity was facilitated by the sampling approach we used (see 'Sampling of studies' above), which was geared towards ensuring the studies included in the analysis comprised a diverse geographical spread and vaccine gender focus. Other reviews have suggested that adolescents' views around vaccines are underrepresented in the qualitative literature (Ferrer 2014; Maisonneuve 2018; Mitchell 2022). Our review does not necessarily support this perspective, at least in the case of HPV vaccination - we identified 88 studies that included adolescents only or both adolescents and caregivers as study participants. The issue may therefore be less about whether there is evidence on adolescents' vaccination views, and more about whether this evidence is being adequately recognised or incorporated into immunisation programmes.

The updated search in October 2024 identified 36 eligible studies that are yet to be fully incorporated into the review (see Characteristics of studies awaiting classification). Once incorporated, the findings from these studies may change the interpretations and conclusions of the review. However, our review

findings did not suggest much volatility in the field. We identified limited (if any) changes over time in the views and experiences around HPV vaccination amongst the included studies that were published over a 15-year period (2008-2023). We therefore do not anticipate that the findings from the studies currently awaiting classification are likely to have any major impact on the validity of our review findings.

We included studies that were published only in English or French, which may have led to the omission of findings from cultural contexts where these languages are not the norm. Moreover, while numerous studies targeted caregivers, most were conducted with mothers or women caregivers only. When fathers or male caregivers were included, the researchers generally did not distinguish between mothers' and fathers' perspectives, nor did they explore any potential gender differences amongst caregivers in their analysis. We are therefore uncertain whether paternal caregivers have the same perspectives and practices regarding HPV vaccination as maternal caregivers.

At the same time, although our sampling approach sought to include studies that explored views and practices of HPV vaccination for diverse genders, we only identified studies that focused on HPV vaccination for adolescent men or women (or both). This may relate to the fact that many HPV vaccination programmes continue to determine eligibility based on sex and many are only open to one sex. Moreover, the majority of the studies included in our review did not report data on adolescents' sexual orientation, and the views and practices of sexual and gender minorities were notably lacking across studies. The findings from this review revealed that HPV vaccination was deeply entangled with social norms around gender and sexuality, and it is therefore unclear whether the findings can be appropriately applied to populations across sexual orientations and gender identities.

Similarly, many studies did not report data on the HPV vaccine type (e.g. two-dose or three-dose) nor the HPV vaccination setting (e.g. healthcare facilities, schools), nor did they explore these issues in their analysis. It materialised in those studies that did report or investigate such factors that vaccine type and setting may have an influence on views and practices around HPV vaccination. It is therefore unclear whether the findings of this review are equally relevant to all HPV vaccine types and vaccination settings.

Finally, the majority of studies displayed limited reflexivity on the part of the researcher, including how their own views towards vaccination may have influenced participants' responses. Participants may convey more accepting attitudes towards vaccines if they perceive the researchers themselves to hold a pro-vaccine stance. It is therefore possible that some hesitancies towards HPV vaccination, and their drivers, may not have been revealed in the studies and, in turn, this review.

Limitations of the review

All the studies included in our review were published in English, which inevitably resulted in an overrepresentation of studies from anglophone settings. This may have been due, at least in part, to the fact that we did not include regional databases as part of our database searches. We also made the decision to only include studies published in languages spoken by the review authors, which meant that only publications in French and English were eligible for inclusion. This decision was based on the well-known challenges and resources associated with translating qualitative research papers (see 'Language translation' for more details). However, a limitation of our review is that we may have missed important findings of studies from cultural contexts where English is not the norm. Our review also identified fewer studies from South-East Asia (n = 4) and Eastern Mediterranean (n = 1). All of these studies were sampled for inclusion in the analysis, but studies from these regions were still underrepresented in our analysis. Finally, where confidence was low in the findings in certain instances, this was because the evidence only came from specific settings or populations. Analysis by these contexts or groups only would have produced higher confidence assessments for the findings within those specific settings or populations. This may be significant if the findings are to be applied to particular contexts.

AUTHORS' CONCLUSIONS

Implications for practice

Below are a set of questions and prompts that may help policy- and decision-makers when planning, implementing, improving and evaluating strategies to promote acceptance or uptake of human papillomavirus (HPV) vaccination for adolescents. The questions and prompts are based on the findings of this review. They also align with, and draw on, implications identified in three related Cochrane qualitative reviews: one on perceptions and experiences of communication about routine childhood vaccination (Ames 2017); one on healthcare workers' perceptions and experiences of communicating with people over 50 years of age about vaccination (Glenton 2021), and a third on the factors that influence caregivers' views and practices regarding routine childhood vaccination (Cooper 2021).

When applying these questions and prompts, it is important to note that the studies included in our review took place in contexts or amongst population groups that may be different from yours. Not all factors will therefore necessarily be applicable. Successful development and implementation of interventions necessitate identifying, and tailoring to, the target setting. Moreover, there are numerous interventions relevant to increasing HPV vaccination uptake. The questions and prompts below are not geared towards any specific strategy; they can be used to inform all strategies or help inform decisions regarding which types of strategies might be most important.

Finally, it is essential to recognise that these questions and prompts were informed by our particular standpoint towards vaccination. This standpoint views adherence to currently recommended vaccines as an important public health measure, but at the same time appreciates the importance of supporting an individual's right to make their own decision about vaccination. This perspective may not be shared in all settings. It is therefore important to consider what the vaccination values, aims, and policies are in your setting, and how these may potentially diverge from the perspective provided here.

In sum, these questions and prompts should be regarded as guidance to help stakeholders think about how best to design and deliver strategies to promote HPV vaccination acceptance or uptake for adolescents, which are tailored to the specific needs, priorities, and values of their own context.

1. Have you considered whether caregivers and adolescents in your target setting lack biomedical knowledge about HPV and HPV vaccination, and the impact this may have on their HPV vaccination views and practices?

- For instance, might limited biomedical knowledge be creating frustration, resentment or other attitudes, which may be reducing acceptance of HPV vaccination? If so, have you considered how biomedical knowledge about HPV vaccination might be communicated and enhanced amongst caregivers and adolescents in your target setting?
- Alternatively, might limited biomedical knowledge actually be increasing acceptance of HPV vaccination, for example, through beliefs that are incongruent with a biomedical perspective yet serve as motivators for receiving the vaccine? Or might limited biomedical knowledge not be impacting on HPV vaccination with, for example, adolescents or caregivers accepting it in spite of having limited knowledge about it? Here it could be helpful to consider what you are hoping to achieve through the intervention or programme. For instance, are you seeking to raise awareness about, and compliance with, HPV vaccination? Or are you hoping to build science literacy, so people can make informed decisions and consent to HPV vaccination? These different objectives might give rise to different types of interventions and potential outcomes, which are not necessarily aligned with increasing HPV vaccination acceptance.

2. Have you considered caregivers' and adolescents' perceptions of the risks and benefits (or lack thereof) of HPV vaccination, and how these may impact on their HPV vaccination views and practices?

- For instance, might caregivers and adolescents have concerns about the safety and effectiveness of the vaccine, perhaps related to its relative newness? Or might adolescents have a fear or dislike of needles? Might caregivers worry the vaccine will promote sexual practices that they disapprove of? Relatedly, might caregivers and adolescents have certain views about cervical cancer that might increase or decrease acceptance of HPV vaccination? Or might they have certain views about for whom HPV vaccination is necessary or would benefit and therefore be less accepting of it for themselves or their own adolescent? What other risks and benefits do caregivers and adolescents attribute to HPV vaccination that might reduce or enhance their acceptance of it?
- Have you considered how the intervention(s) could be tailored to target the specific risks or benefits of HPV vaccination perceived by caregivers and adolescents in your target setting? For instance, by providing vaccination communication that attempts to address the particular concerns, questions, or perceptions of personal susceptibility they may give rise to.

3. Have you considered whether caregivers and adolescents have views and experiences of other vaccines and vaccination programmes that might impact on their views and experiences of HPV vaccination?

- For instance, might some caregivers and adolescents have a routine response towards vaccination generally, and therefore be accepting (or not) of HPV vaccination by default? Or might they have positive or negative views and experiences of other vaccines that might increase or decrease acceptance of HPV vaccination?
- Have you considered whether the intervention(s) could draw upon and promote the positive views and experiences caregivers and adolescents may have about other vaccines or vaccination? At the same time, could the intervention(s) address the negative views and experiences caregivers and adolescents may have about other vaccines or vaccinations, for instance, by responding to the concerns or questions these views and experiences have given rise to, or by providing HPV vaccination in ways that take into account previous negative experiences?

4. Have you taken into account the decision-making dynamics between adolescents and caregivers and the impact this may have on who is involved and makes the final decision regarding HPV vaccination?

- For instance, might the caregiver(s), or the adolescent, or both, be involved in the decision-making around HPV vaccination in your target setting? If multiple nuclear family members are involved and disagreements occur, who makes the final decision? If caregiver(s) are involved, what role do paternal and maternal caregivers play? What other potential nuclear family structures exist (e.g. single-parent-headed families) in your target setting that might influence HPV vaccination decision-making?
- Have you considered whether the intervention(s) could incorporate all nuclear family members involved in HPV vaccination in your target setting, and take into account the dynamics between them? At the same time, have you considered intervention(s) that specifically target the primary HPV vaccination decision-maker in your setting, for instance, by being tailored specially to adolescents, or to paternal or maternal caregivers?

5. Have you taken into account the social relations and networks with which caregivers and adolescents in your target setting are affiliated?

- What are the different groups (for example, extended family relations, peers, traditional or religious communities or leaders) that caregivers in your target setting belong to or feel part of? What are the common HPV vaccination views and practices of these groups? For instance, is vaccination generally supported? Alternatively, might non-vaccination be a social norm within these groups?
- Have you considered whether the intervention(s) could incorporate the social groups or relations with which caregivers and adolescents in your target setting are affiliated? For example, could influential individuals within these groups be involved in the design, planning, or delivery of the intervention(s)?

6. Have you taken into account the potential influence of the media (e.g. social media, the internet, television, online and print newspapers, radio) on caregivers' and adolescents' HPV vaccination views and practices in your target setting?

- For instance, have you considered whether media platforms considered influential by caregivers and adolescents in your target setting could be utilised to deliver positive HPV vaccination messages and engage communities to build

confidence in HPV vaccination, for instance, through mass media awareness-raising campaigns? At the same time, have you considered adjusting vaccination communication strategies to respond to negative media stories, rumours, or publicity about HPV vaccination that caregivers and adolescents in your target setting may have received?

7. Have you considered the broader socio-cultural beliefs and practices in your target setting that may influence caregivers' and adolescents' HPV vaccination views and practices?

- For instance, might caregivers hold certain views about adolescence, for example, that it is a time of innocence or, alternatively, sexual curiosity that might increase or decrease acceptance of HPV vaccination? Or might caregivers and adolescents hold various beliefs about what are deemed moral and appropriate forms of sexuality that could decrease HPV vaccination? Might these beliefs about adolescence and sexuality include a gendered dimension, which may give rise to gender differences in HPV vaccination acceptance? Might caregivers have particular views and practices around what they see as responsible parenting to promote and protect adolescent sexual health, which HPV vaccination might be perceived as promoting or sabotaging? Might caregivers and adolescents hold various religious beliefs about health and illness that may reduce acceptance of vaccination? What other socio-cultural beliefs and practices might caregivers and adolescents have - for instance, about adolescence, sexuality, gender, parenting and health, and what specific meanings, fears, or reservations about HPV vaccination might these give rise to?
- Have you considered how the intervention(s) could be tailored to the specific socio-cultural beliefs and practices of caregivers and adolescents in your target setting – for instance, by providing vaccination communication that acknowledges these beliefs and practices, and attempts to address the concerns, questions, and tensions they may give rise to?

8. Have you considered how caregivers and adolescents in your target setting perceive authorities, and their policy decisions, associated with vaccination programmes?

- Might caregivers and adolescents feel distrustful of any of the authorities associated with HPV vaccination programmes, for instance, teachers and schools, the pharmaceutical industry, government, science and biomedicine, healthcare professionals, religious and traditional authorities, or other relevant stakeholders? If so, have you considered the specific reasons for this distrust? For instance, might these entities be perceived to be driven by motives other than the public's best interest, such as financial gain? Might distrust be part of a contemporary trend of increased scepticism of science and biomedicine? Might it be related to the type of vaccine information they provide, for example, information that is perceived to be simplistic or unbalanced? Might the distrust be due to experiences of structural discrimination or exploitation, currently or in the past? What other reasons might caregivers and adolescents have for distrusting the authorities associated with HPV vaccination programmes?
- Might caregivers and adolescents feel trustful of any of the authorities associated with HPV vaccination programmes, which may in turn enhance or reduce HPV vaccination acceptance? For instance, might trust in teachers and the school, or government, or healthcare workers mean that when they recommend or promote HPV vaccination this could increase acceptance. Alternatively, if trusted individuals communicate concerns or fail to recommend HPV vaccination, might this decrease caregivers' and adolescents' acceptance of HPV vaccination?
- Have you considered whether the intervention(s) could be tailored to address the specific reasons for caregivers' and adolescents' distrust, for instance, dialogue-based approaches inviting open discussion about the reasons for distrust, which focus on relationships, transparency and community involvement and participation? Alternatively, have you considered collaborating with the groups or institutions that caregivers and adolescents in your target setting trust (e.g. teachers and the school, government, healthcare professionals, non-governmental organisations, religious or traditional leaders, etc.), potentially involving them in the design, planning, or delivery of the intervention(s)? Or have you considered intervention(s) that specifically target these trusted entities, for instance, by making them aware of the influence their interactions with caregivers and adolescents may have, providing them with training in communication skills or adapting the types of vaccination information they have access to and provide to caregivers and adolescents? (See Ames 2017 and Glenton 2021 for further guidance on tailoring vaccination information).

9. Have you attempted to address the supply-side barriers that caregivers and adolescents may face in receiving HPV vaccination?

- For instance, do caregivers and adolescents face challenges accessing HPV vaccination, such as having to travel long distances to get to HPV vaccination services, a lack of time, competing priorities or having to miss work with associated lost wages? Are regular HPV vaccine stock-outs an issue in your target setting? Do caregivers and adolescents have to pay out-of-pocket costs to receive the HPV vaccine? Or might they experience language barriers in accessing healthcare services and health information, for example, making it difficult to understand the information they receive? Does HPV vaccination in your setting currently target only adolescent women, or did it in the past? What other struggles or inconveniences might caregivers and adolescents face in negotiating HPV vaccination services?
- Have you considered whether the intervention(s) could target the specific barriers that caregivers and adolescents face in accessing vaccination in your target setting? For instance, could HPV vaccination be provided at more convenient locations, such as through vaccination outreach or mobile vaccination teams? If vaccine stock-outs are a regular feature in your target setting, can you identify what the underlying reasons for stock-outs are and how these problems could be addressed? Could you consider providing the HPV vaccine free or at a lower cost, or implementing reduced vaccine-dose schedules, or both? Could HPV vaccination sites employ (more) interpreters or healthcare professionals from ethnic minority groups, or alternatively could HPV vaccination educational materials be provided in the multiple languages spoken in your target setting? Could you consider whether gender-neutral vaccination programmes might be a feasible and affordable option in your target setting?

Implications for future research

We have developed these implications for research based on the overview of studies included in this review and our GRADE-CERQual assessments of the review findings. In future, qualitative studies should provide more detailed and transparent reporting of the settings and contexts in which the research took place. These studies should also pay more attention to, and provide evidence for, the researchers' roles in the study and their prior assumptions and standpoints, and how these may have impacted on the process and findings of the study (i.e. researcher reflexivity). This is particularly important for the topic of vaccination, which can be a contentious issue with opposing perspectives (Cooper 2023; Glenton 2021). Researchers therefore need to be more reflexive about how their vaccine attitudes and practices may have influenced participants' responses and subsequent data analysis.

Qualitative research about the views and practices regarding HPV vaccination for adolescents needs to include a broader spectrum of contexts and population groups, and focus on vaccination for a broader range of genders. In particular, more studies are needed in the World Health Organization regions of South-East Asia and the Eastern Mediterranean. More studies are also needed that focus on views and practices of HPV vaccination for adolescents with genders other than women and men, and include adolescents (and their caregivers) with more diverse sexual orientations and gender identities. For example, the findings from one study included in this review revealed certain potentially unique vaccine decision-making dynamics between adolescent men who have sex with men (MSM) and their caregivers, which the study found may be related to the prior autonomy these adolescents had regarding decisions about their sexuality and sexual healthcare. It would be useful for studies to explore this issue further amongst other MSM and adolescents from other sexual and gender minorities (including, for example, lesbian, gay, bisexual, transgender and gender-diverse and non-conforming adolescents). These studies could provide important insights for equitable access to vaccination, in a context whereby many HPV vaccination programmes continue to determine eligibility based on sex and are only open to one sex. Finally, future qualitative studies should also consider the attitudes of fathers and other male caregivers, to help give us a better understanding of their viewpoints and how gender identities, roles, and paternal-maternal relations might influence ideas and practices regarding HPV vaccination. This is essential, as the findings from this review suggested that, in various contexts, fathers may constitute the primary decision-makers around HPV vaccination for adolescents.

Relatedly, qualitative research about views and practices regarding HPV vaccination for adolescents should also consider extending the types of data that are collected, reported and included in the analysis. Specifically, obtaining and describing data on adolescents' sexual orientation and gender identity is important. Here it could be useful to draw on the 2016 Sex and Gender Equity in Research (SAGER) guidelines, which provide guidance around incorporating sex and gender-related information within research, including in the study design, data analysis and interpretation of findings (Heidari 2016). Studies should also consider collecting and reporting data on the type of HPV vaccine being explored (e.g. a two- versus three-dose vaccine) as well as the HPV vaccination setting, and potentially incorporate these issues in the analysis, so we can gain a better understanding of their potential influence on HPV vaccination views and practices.

It would also be worthwhile for future trials to consider incorporating interventions that target a broader array of factors that influence HPV vaccination views and practices, with consideration of the factors identified in this review. Specifically, there is a need for more interventions that target the decision-making dynamics between adolescents and their caregivers, their views and experiences of other vaccines and vaccination programmes, the media, affiliated social networks or communities, and broader socio-cultural beliefs and practices.

In future updates of this review, we will explore how studies from non-anglophone countries might be better represented; for example, by broadening the scope of regional databases searched (including, for example, the Latin American and Caribbean Health Science Information database, LILACS; Biblioteca Regional de Medicina, BIREME; African Index Medicus) or adding review authors who speak additional languages so that studies published in a wider range of languages can potentially be included. Moreover, for findings that we downgraded in the GRADE-CERQual assessments, in future updates of this review we will consider whether any studies that were included but not sampled could contribute data to enhance confidence.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Adeyanju 2022

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	The study explored factors from multiple perspectives that influence hesitancy among caregivers of children and adolescent girls eligible for childhood routine immunisation and HPV.
Study setting	Malawi. The study was conducted in four districts, one with low vaccine coverage, one with high vaccine coverage, one rural and one urban. Caregivers with daughters eligible for HPV vaccination and caregivers with children eligible for routine immunisation were included.
Notes	

Albert 2019

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To investigate how parents imagine and attempt to enact their responsibility to their children's health and sexual health both in regard to vaccination and beyond.
Study setting	28 vaccine-consenting Ontario mothers from Greater Toronto Area, Canada, with at least one daughter between sixth and twelfth grade (ages 11 through 17). 15 mothers had daughters who received the HPV vaccine, 12 had daughters who did not receive it.
Notes	

Alexander 2012

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	Examining the decision-making process of parent-son dyads when deciding whether or not to get vaccinated against HPV.

Alexander 2012 *(Continued)*

Study setting	Twenty-one adolescent males (ages 13–17) and their parents/guardians recruited from adolescent primary care clinics serving low- to middle-income families in Indianapolis, Indiana, a large Midwestern city in the USA.
Notes	Data describing this study were also collected from Alexander 2012, Alexander 2013 (see secondary references).

Ali 2022

Study characteristics	
WHO region	Eastern Mediterranean
Country classification by income level	LMIC
Study aim	To explore adolescent girls' knowledge and perspectives on HPV and cervical cancer and collect their recommendations for implementing an HPV vaccination programme in their community.
Study setting	Pakistan, Karachi. A total of 48 girls from schools and community settings were included. The average age of the girls was 17.1 years. None of the girls was married.
Notes	Data describing this study were also collected from Ali 2021 (see secondary reference).

Ambali 2022

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	A qualitative study that assessed mothers' acceptability and concerns regarding uptake of HPV vaccine by their adolescent daughters.
Study setting	Adolescent girls from age 9 to 15 years and 20 mothers in Ibadan, Nigeria. About 8 of the mothers were between the age range of 30–39 years, 11 were between the age range of 40–49 years while 1 was between the age range of 50–59 years. Christianity was the dominant religion among the mothers with 85% (17) while the remaining 15% (3) of the mothers were Muslims. The level of education of the mothers varied from primary education 5% (1), secondary education 35% (7), diploma/OND/NCE 35% (7), B.Sc. 20% (4) and master degree 5% (1). About 65% (13) of the mothers were traders, 20% (4) were artisans while 15% (3) were civil servants. Four of the daughters were between the age range of 9–10 years while the remaining 16 were between the age range of 11–15 years.
Notes	

Balogun 2018

Study characteristics

Balogun 2018 *(Continued)*

WHO region	Africa
Country classification by income level	LMIC
Study aim	This study explored contextual interpretations of stakeholders regarding cervical cancer and HPV vaccines for adolescents in five selected communities in Ibadan, Nigeria.
Study setting	Nigeria, Ibadan; this study was carried out in the five communities with the traditional system of government still very operational and the traditional chiefs were the custodian of the people's culture. Parents (22 mothers; 16 fathers), and 76 adolescent school-going girls and boys (n = 38 each). The study also included 16 out-of-school adolescents (10 girls; 6 boys).
Notes	

Bartolini 2012

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	To explore decision-making process among parents of girls, and develop a conceptual model describing the process of HPV vaccine acceptance.
Study setting	Peru urban (n = 12) and rural areas schools (n = 6) where HPV vaccination had been carried out. Parents (n = 48) of two girls who received all three doses of HPV vaccinations and parents of two girls who were not vaccinated with HPV vaccine. The girls were in grade 5 and were 9 years and older.
Notes	

Beyen 2022

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To assess the uptake of HPV vaccination and its associated factors among adolescent schoolgirls in Ambo town, Oromia, Ethiopia, 2020.
Study setting	Ethiopia. 414 girls between the ages of 14-18 from six primary schools and two secondary schools in Ambo town, where the first cycle of HPV vaccination has been initiated.
Notes	

Bowen 2014

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	This qualitative study assessed HPV knowledge and acceptance of the HPV test and HPV vaccine for daughters among Native American women who reside on and off Native reservations in the Northeastern USA.
Study setting	USA, Northeastern region tribes from six states; women caregivers (n = 102) of adolescent Native American girls aged 9 to 18 years old.
Notes	

Bunton 2013

Study characteristics	
WHO region	Western Pacific
Country classification by income level	HIC
Study aim	To describe a detailed account of how young women in Australia understand the HPV vaccine, its benefits and risks.
Study setting	Australia; women (n = 15) aged 18 who had completed the final year of their secondary education in 2008 and have been offered the HPV vaccine as part of the school programme (14 of 15 participants were fully vaccinated).
Notes	

Burke 2015

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To explore narratives from interviews with Cambodian mothers of HPV vaccine-age eligible daughters who experienced genocide and came to the USA as refugees.
Study setting	USA; Seattle, Tacoma Metropolitan Area; 25 Khmer mothers with at least one girl aged 9–17 (n = 9 mothers of girls who had not recieved the HPV vaccine); (n = 16 mothers of girls who received the HPV vaccine).
Notes	

Chau 2021

Study characteristics	
WHO region	Western Pacific
Country classification by income level	LMIC
Study aim	This qualitative study was an integral part in the development of a multidisciplinary team-led school-based HPV vaccination health promotion programme aiming to increase HPV vaccine uptake in Hong Kong.
Study setting	China. Eight mother–daughter dyads. Adolescent girls aged 14-17, enrolled in a local secondary school and can communicate in Cantonese.
Notes	

Chiang 2015

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	To describe determinants of parental decisions to vaccinate their daughters against HPV.
Study setting	This study was part of a larger research project, HPV vaccination in São Paulo, Brazil. Thirty parents (87% mainly female) with at least one female child between the ages of 9-13.
Notes	

Cooper 2010

Study characteristics	
WHO region	Western Pacific
Country classification by income level	HIC
Study aim	To explore factors related to the vaccination process.
Study setting	Australian schools (n = 9) with low and high HPV vaccine uptake, and schools from public, Catholic, and independent sectors were selected. The ongoing HPV vaccination programme in Australia involved Year 7 students, therefore parents of Year 7 students were selected. 20 focus groups included Year 7, and older students in the 'catch-up' programme; and 38 parents (97% female). Some parents performed home duties only (6/38) and some engaged in work outside the home as well. Approximately 15% of the parents interviewed did not consent for their daughters to be vaccinated.

Cooper 2010 *(Continued)*

Notes	Data describing this study were also collected from Bernard 2011; Cooper 2015; Robbins 2010; Robbins 2010 (see secondary references).

Cordoba-Sanchez 2019

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	The study aimed to identify barriers and facilitators of HPV vaccine uptake among girls eligible for vaccination in the initial years of vaccine implementation from 2012 to 2014, and their parents.
Study setting	Manizales, central region of Colombia; girls (n = 49) aged at least 9 years old who resided in Manizales from 2012 to 2014 and were registered in sixth, seventh or eighth grade of high school at the time of the study. Eleven were unvaccinated and 38 were vaccinated. The majority of the girls were 13–15 years old (81.6%), in sixth or seventh grade (70%), of low and middle SES level schools (75%), and from secular urban background. Parents (n = 58) participated in the study, of whom 45 (77%) had vaccinated daughters. The majority of parents were female (89.7%) with an average age of 44.1 years (range 29–70), of low or middle SES levels (59.2%), and approximately 20% had a university degree.
Notes	Data describing this study were also collected from Cordoba-Sanchez 2018 (see secondary ref).

Cordoba-Sanchez 2022

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	To explore the factors influencing HPV-vaccine hesitancy alongside the COVID vaccine within an integrative model of behaviour change, the COM-B model.
Study setting	Colombia, Medellín is in the Metropolitan Area of the Aburra Valley. Fifty female students between the ages of 9-15. All students had an incomplete vaccination schedule. Twenty-nine of the students had 1 dose of the HPV vaccine and 21 did not vaccinate. Thirteen parents also participated.
Notes	

Cover 2012

Study characteristics	
WHO region	Western Pacific

Cover 2012 *(Continued)*

Country classification by income level	LMIC
Study aim	To present findings from qualitative research on parental reasons for HPV vaccine acceptance/non-acceptance and their decision- making process after both the first and second year of HPV vaccine implementation in Vietnam.
Study setting	Vietnam; 133 parents of HPV fully, partial and non-vaccinated girls from 19 rural and urban communities.
Notes	

Craciun 2012

Study characteristics	
WHO region	Europe
Country classification by income level	LMIC
Study aim	To explore the experience of Romanian mothers with the HPV vaccine. In addition to identifying their perceptions and attitudes towards the HPV vaccine. To understand their reasons for accepting or rejecting HPV vaccination for their daughters.
Study setting	Romania, Cluj Napoca; around 25 mothers of girls in the vaccine target group.
Notes	

Creed 2021

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	This study aimed to explore parental views of the HPV vaccine; elucidate specific concerns relating to this vaccine and to identify relevant influences on the decision to vaccinate against HPV to inform strategies to optimise uptake.
Study setting	Ireland; parents of female patients from a large GP practice. The female patients were aged 11–13 years, registered to the practice, had not yet been offered the HPV vaccine.
Notes	

Dalmau 2020

Study characteristics

Dalmau 2020 *(Continued)*

WHO region	Western Pacific
Country classification by income level	LMIC
Study aim	To identify information and communication needs among key population groups in Mongolia ahead of vaccine re-introduction.
Study setting	Five provinces of Mongolia; Arkhangai, Selenge, Uvs, Umnugovi and Bulgan and two districts of Ulaanbaatar city. Parents/guardians of girls 10–13 years, including those previously vaccinated in the 2012 pilot campaign and those not vaccinated.
Notes	

De Fouw 2023

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To understand the perspectives of men on cervical cancer screening and HPV vaccination in Western-Uganda.
Study setting	Uganda. Sixty-seven men aged 25 to 60 years, who were married and/or had daughters. All participants were literate, and in six of the focus groups the majority had completed secondary or higher education. All participants were married, three participants (4%) stated that they had a relative with cancer.
Notes	

de Oliveira 2019

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	To understand the experience of those responsible for adolescents in relation to vaccination against HPV.
Study setting	Brazil; 14 guardians aged 33-60 years, of adolescents participated, among them, nine (n = 9) mothers, three (n = 3) fathers and two grandmothers (n = 2). Eleven (n = 11) accepted the vaccination for their teenager and three (n = 3) guardians refused the vaccination.
Notes	

Elit 2022

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To assess the knowledge, beliefs and attitudes of parents of young girls aged 9–14 years about HPV vaccines within rural communities in the Northwest Region of Cameroon.
Study setting	Cameroon. Forty-five parents (fathers = 10; mothers = 35) with a daughter aged 9–14 years living in Mbingo, Njinikom and Fundong. The parents' ages ranged from 27 to 72 years old. Mothers were younger (mean 39.5 years) than the fathers (mean 50.4 years). Parents had primary to secondary school education level. Ten parents had a relative or close friend with cancer.
Notes	

Evans 2021

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To investigate why the rates pf HPV vaccinations are low amongst Black male adolescents.
Study setting	USA; mothers of Black male adolescents
Notes	

Fielding 2018

Study characteristics	
WHO region	Western Pacific
Country classification by income level	LMIC
Study aim	To identify the underlying barriers and facilitators about HPV vaccination of adolescent daughters in Chinese families.
Study setting	China; Hong Kong Chinese women with at least one adolescent daughter aged 10 to 18 years who were aware of HPV vaccination, together with the daughter and her father.
Notes	

Fisher 2020

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	The aim of this study was to explore the extent to which young women were able to exercise autonomy within the HPV vaccination programme.
Study setting	South west of England; 19 young women (12-17 years old) and 22 parents (21 mothers and one father) participated. Of the 19 young women interviewed: all attended mainstream schools and had received the HPV vaccine, eight were from minority ethnic groups. Five of 22 parents had daughters who took part in the study.
Notes	

Francis 2011

Study characteristics	
WHO region	Africa; Americas
Country classification by income level	LMIC; HIC
Study aim	The purpose of this report was to compare findings about cervical cancer prevention, HPV, and the acceptance of the HPV vaccine among residents of two distinct geographical locations that face many similar yet different socio-environmental issues.
Study setting	USA Ohio Appalachia; 18 years or older parents or women who have a daughter who was 9–17 years of age. Participants had a mean age of 36 years, were white, and all participants had at least one female child. South Africa Johannesburg; 24 female participants between 18 and 44 years old who had at least some education, and could read and speak English. All participants had at least one child, with 53 % having a daughter. Most (87%) participants lacked medical aid.
Notes	Data describing this study were also collected from Francis 2011 (see secondary ref)

Friedman 2013

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	This research sought to understand HPV vaccine-related perceptions and concerns of male and female caregivers and community leaders in four rural communities of western Kenya.

Friedman 2013 *(Continued)*

Study setting	Kenya; three rural communities and one urban location of Siaya County. The study sites were located within a Health and Demographic Surveillance System (HDSS). Caregivers (n = 56) who had an average of five children; most (79%) were married and one-quarter had not completed primary education.
Notes	Data describing this study were also collected from Friedman 2013 (see secondary ref).

Galbraith-Gyan 2019

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To explore the influence of culture on African-American mothers' and daughters' HPV vaccine acceptance using the PEN-3, a culturally-centered conceptual framework.
Study setting	USA; African-American parent or guardian of an adolescent daughter, and, daughters between the ages of 12–17 years. A majority of daughters had not initiated the HPV vaccine series (n = 22, 64.7%), however among those who had, the majority had completed the 3-dose series.
Notes	Data describing this study were also collected from Galbraith-Gyan 2019 (see secondary ref).

Getrich 2014

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To examine actual vaccination decision-making processes among clinicians, parents, and adolescents to identify strategies to enhance uptake.
Study setting	USA New Mexico; Hispanic mothers (n = 10), and 12 girls between the ages of 12 and 17.
Notes	Data describing this study were also collected from Getrich 2011 (see secondary ref).

Gordon 2011

Study characteristics	
WHO region	Europe
Country classification by income level	HIC

Gordon 2011 *(Continued)*

Study aim	This study aimed to explore attitudes to HPV vaccination and reasons for accepting or declining the vaccine in the British Jewish community.
Study setting	England; vaccine-accepting (n = 10) and vaccine-declining (n = 10) mothers.
Notes	

Gottvall 2017

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	To explore parents' views of extending the HPV vaccination programme to also include boys.
Study setting	Sweden; a total of 42 parents (38 women; 4 men) from 11 municipalities in the central region of Sweden. In the chosen municipalities, the vaccination programme had started in all schools, in some other areas the vaccination programme started later. Parents who were offered HPV vaccination for their young daughter were eligible and invited to participate.
Notes	

Grandahl 2019

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	This study investigates boys' awareness and thoughts about HPV and HPV vaccination, perceived benefits of vaccinating men, information sources and intention to be vaccinated against HPV.
Study setting	Central Sweden; a total of 31 non-HPV vaccinated male students in upper secondary school (median age = 18 years). Seven out of 31 had not had their sexual debut, while 24/31 had experienced sexual intercourse.
Notes	

Gutierrez 2013

Study characteristics	
WHO region	Americas

Gutierrez 2013 *(Continued)*

Country classification by income level	HIC
Study aim	The purpose of the study was to understand perceptions of HPV and the vaccine among adolescent and young adult males, both heterosexual and MSM.
Study setting	USA, Philadelphia; 76 men and boys (45 heterosexual, 31 MSM) who were 13-21 years old.
Notes	

Harries 2009

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To explore key challenges and opinions towards HPV vaccination introduction in South Africa.
Study setting	South Africa, Western Cape; female community members (n = 43) with children elligible for HPV vaccination. The median age was 32.7 years, 33 (77%) had completed secondary school education, 26 (60.5%) were unemployed.
Notes	

Holroyd 2022

Study characteristics	
WHO region	South-East Asia
Country classification by income level	LMIC
Study aim	Assessed facilitators and barriers among out-of-school girls and proposed programme characteristics to inform the design of pro-equity HPV vaccine delivery programmes for out-of-school girls.
Study setting	India; girls aged 9 to 14 (n = 33); girls aged 15 to 17 (n = 19) who were out of school. Most had less than a middle school certificate, seven had a middle school certificate, and 17 reported that they were illiterate. The majority of adolescent girl participants were not working outside the home. The study also included mothers (n = 24); fathers (n = 19).
Notes	

Islam 2018

Study characteristics

Islam 2018 *(Continued)*

WHO region	Americas, Western Pacific, Africa, Europe
Country classification by income level	HIC, LMIC
Study aim	Primary aim was to solicit provider and mother opinions of the acceptance of a 2-dose HPV vaccination schedule in five countries, including Argentina, Malaysia, South Africa, South Korea, and Spain.
Study setting	Argentina, Malaysia, South Africa, South Korea, and Spain; a total of 124 mothers of adolescent girls aged 9–14 years (70 with vaccinated daughters, 54 with unvaccinated daughters) were enrolled across the five countries (Argentina [n = 23]; Malaysia [n = 26]; South Africa [n = 21]; South Korea [n =31]; and Spain [n = 23]).
Notes	

Jackson 2016

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	(1) To investigate the barriers to and facilitators of acceptability and uptake of immunisations among six Traveller communities across four UK cities; and (2) identify possible interventions to increase uptake of immunisations in these Traveller communities that could be tested in a subsequent feasibility study.
Study setting	England and Scotland; 174 men and women travelers living in extended families across generations. We included young women planning families, parents and grandparents to capture a lifespan cross-generational perspective, as well as adolescents eligible for their three-in-one booster (diphtheria, tetanus, poliomyelitis, given at age 13–18 years), girls eligible for HPV vaccine (given at age 12 or 13 years in school).
Notes	

Joseph 2015

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To assess knowledge, attitudes, beliefs and practices related to HPV vaccination among African-Americans and Haitan immigrant parents, and to compare vaccination rates of their sons.
Study setting	USA; a total of 25 USA-born African-American and 30 Haitian immigrant parents or legal guardians of boys aged 11-17 years. Of 55 total participants: n = 41 were mothers, n = 9 were fathers, and n = 3 were grandparents. The average age of American sons was 13.2 years, and the average age of Haitian immigrant sons was 14.3 years.

Joseph 2015 *(Continued)*

Notes

Katahoire 2008

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To generate evidence for government decision-making and operational planning for HPV vaccine introduction.
Study setting	Uganda; children aged 10-12 years and, parents/primary caregivers.
Notes	

Katz 2013

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To elucidate factors influencing HPV vaccination among a sample of low-income South African adolescents receiving the vaccine for the first time in Soweto.
Study setting	South Africa, Soweto; 201 adolescent boys ages 12-19 who were part of a clinical trial to receive HPV vaccine. All (n = 201) received the first dose of the vaccine. Of the 201, 192 (95.5%) returned for a second dose and, 164 participants (81.6%) completed the full three doses of the vaccine. Participants also included 39 adolecent-caregiver dyads.
Notes	

Kisaakye 2018

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	This study assessed the level and the factors associated with uptake of HPV vaccine by female adolescents in Lira district, Uganda.
Study setting	Northern Uganda, Lira district; 460 girls between the ages of 12-17 (mean age = 14). Of the 460 girls, 49.6%, (228/460) had not received any dose of HPV vaccine, 18.0% (83/460) had received one dose,

Kisaakye 2018 *(Continued)*

	14.8% (68/460) had received two doses, and 17.6% (81/460) had completed all the three doses. Out of the 232 respondents who had initiated on the vaccine, 180 (77.6%) had received it from school.
Notes	

Kucheba 2021

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	This paper explores the acceptability of the HPV vaccine administered in girls (9-13 years) in Zambia.
Study setting	Zambia, Lusaka; about 30 vaccinated and non vaccinated girls and 6 parents. Participants were recruited from two schools (one public and one private) that were part of the HPV vaccine pilot.
Notes	

Liebermann 2020a

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	The purpose of the study was to explore multi-level barriers and facilitators to implementation of a national HPV vaccine programme in the Dominican Republic; this article focuses on parent-level barriers and facilitators.
Study setting	Santo Domingo area of the Dominican Republic; a total of 64 parents and caregivers of school-age children.
Notes	

Lismidiati 2019

Study characteristics	
WHO region	South East Asia
Country classification by income level	LMIC
Study aim	To explore adolescents', parents' and teachers' needs, obstacles, and expectations around the HPV vaccination.

Lismidiati 2019 *(Continued)*

Study setting	Indonesia; 38 participants (21 female students; 17 parents).
Notes	Data describing this study were also collected from Lismidiati 2020 (see secondary ref).

Madhivanan 2009

Study characteristics	
WHO region	South East Asia
Country classification by income level	LMIC
Study aim	This study investigates attitudes toward HPV vaccination among parents of adolescent girls in Mysore, India.
Study setting	India; a total of 44 parents (23 mothers; 21 fathers) of girls aged 9-15 years.
Notes	

Marlow 2009

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	The objective of this study was to explore attitudes to HPV vaccination among black and Asian mothers living in Britain.
Study setting	England; British black mothers (n = 10) and Asian mothers (n = 10).
Notes	

Mitchell 2021

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	Investigated acceptability of dose-reduction among girls, and parents/guardians of girls, randomised to receive one, two or three doses in an HPV vaccine dose-reduction and immunobridging study in Tanzania.
Study setting	Tanzania. All participants lived in the trial study location of Mwanza, a large city on the south-east edge of Lake Victoria. The sample was predominantly urban, girls aged 9 to 14 (n = 13), 18 parents of (differ-

Mitchell 2021 *(Continued)*

	ent) girls (n = 12) and girls and their parent/guardian in paired interviews (6 interviews). Parent participants were Christian and most (14 of 18) were educated to primary level. Girls who had completed their allocated vaccination course and attended their clinic visit scheduled for six months after the first vaccine dose, were selected. Five girls reported to have received 3 doses of the HPV vaccine. Seven girls received 2 doses and 7 girls received 1 dose. Parents reported that their girls (n = 7) had 3 doses of the HPV vaccine, some parents stated that the girls (n = 5) received 2 doses of the vaccine and, 6 girls received 1 dose of the vaccine.
Notes	

Muresianu 2022

Study characteristics	
WHO region	Americas
Country classification by income level	LMIC
Study aim	Explore fathers' attitudes towards the HPV vaccine and adolescent sexual health and education.
Study setting	Chile. Thirty fathers of 9–19 year old children. Fathers were between the ages 31 to 70. Five fathers had girls, 8 had boys and 17 had both. The level of education included those who had primary education (n = 14), high school education (n = 13), and those with university education (n = 3).
Notes	

Njuguna 2021

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	Assess the knowledge, attitudes, and practice of affected groups towards HPV infection and vaccination in two counties of Kenya.
Study setting	Kenya. School boys (n = 7) and girls (n = 19) aged between 10–13 years all from different schools. Ten parents (9 = female; 1 = male). The age of parents ranged from 30–45 years.
Notes	

Nordtug 2021

Study characteristics	
WHO region	Europe

Nordtug 2021 *(Continued)*

Country classification by income level	HIC
Study aim	To analyse how Danish parents engage with digital media when making this decision.
Study setting	Denmark: 18 Danish parents of girls aged 10–13 years old. Included parents were either currently deciding on the vaccine or had recently made a decision about it. Parents' educational backgrounds included short-cycle, further and higher education, vocational training and parents with basic school education. The majority of parents interviewed (n = 16/18) were mothers.
Notes	Data describing this study were also collected from Nordtug 2022 (see secondary ref).

Patrick 2022

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To determine the HPV vaccine dose 2 completion and describe the possible factors associated with timely HPV vaccine completion and non-completion among girls of age 9–14 years attending the adolescent clinic at Mulago hospital.
Study setting	Uganda, Kampala. Girls aged 9–14 years attending the adolescent clinic and girls who received the first dose in at least the last 6 months in the clinic. Of the 288 girls, 201 (69.8%) girls completed 2 doses of HPV vaccine, while 87 (30.2%) girls received only one dose of HPV vaccine.
Notes	

Paul 2014

Study characteristics	
WHO region	South East Asia
Country classification by income level	LMIC
Study aim	The purpose of this study was to use qualitative research methods to examine parental, particularly mothers', attitudes about HPV vaccine prior to its availability in peri-rural areas outside of Hyderabad, India.
Study setting	India; 30 mothers and 6 fathers. Majority were Hindu (81%). Education ranged from none to postgraduate degrees, and most (67%) were employed.
Notes	

Perez 2015

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	The study's objective was to examine parents' reasons for their decision to vaccinate their 9-16-year-old sons with the HPV vaccine.
Study setting	Canada; 3784 parents (68% mothers) completed the survey. The majority was white (88.0%) and had completed a post high-school degree (77.8%). Nearly half (48.8%) reported earning more than Canadian Dollars (CAD) 80,000 per year. The mean age of the sons was 12.6 years. Fewer parents had decided not to vaccinate their sons (6.8%) and decided to vaccinate their sons (5.0%). Only 1.1% of our sample reported that their sons have been vaccinated.
Notes	

Perkins 2013

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To characterise the attitudes of low-income and minority parents/guardians toward vaccinating sons against HPV.
Study setting	USA, Boston; a total of 120 parents and legal guardians of boys aged 11 to 17 from low income urban area. The average age of parents/guardians and sons were 43.5 and 14.0, respectively. Most respondents were mothers, had completed high school or some college, and practiced a religion.
Notes	

Pop 2015

Study characteristics	
WHO region	Europe
Country classification by income level	LMIC
Study aim	Explore the reasons behind women's decisions to refuse enrolment in free reproductive health delivery programmes.
Study setting	Southern Romania; 43 women aged 20-78 years.
Notes	Data describing this study were also collected from Pop 2016 (see secondary ref).

Rail 2018

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	The objective of this study was to investigate the deployment of HPV vaccination discourses and their impact on Canadian girls, parents, nurses and physicians.
Study setting	Canada; the study had 91 participants. Parents (n = 44); girls (n = 38) and boys (n = 9) from four provinces. Most participants came from urban centres and a smaller number from suburban and rural areas. The ages of girls and boys were 12-16, however, eight were between the ages of 17-21. The 8 participants identified as bisexual, questioning, gay, trans*, pansexual or polysexual.
Notes	

Reich 2010

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To explore parent's resistance to the HPV vaccine.
Study setting	USA, Colorado; 21 parents (n = 23 mothers; n = 1 father) between the ages of 30-55 years old. All parents were white, seven parents had bachelor-level degrees, 7 have graduate degrees, and the remaining 7 have either not attended college or have attended but without earning bachelor's degree. All but four parents (all women) in this study have at least one daughter. Many of the mothers have strong opinions about the HPV vaccine because they themselves have experienced cervical cancer screenings and issues of women's health.
Notes	Data describing this study were also collected from Reich 2016 (see secondary ref).

Reiter 2014

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	Collected data from four key stakeholder groups from Appalachian communities to examine their acceptability of HPV vaccine for men and boys and potential barriers to vaccinating them against HPV in their communities.

Reiter 2014 *(Continued)*

Study setting	USA, Appalachia; parents (n = 28) with adolescent sons ages 9 to 17 years, and 18 young men aged between 18-26.
Notes	

Remes 2012

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	To assess attitudes and knowledge about cervical cancer and HPV, and acceptability of and potential barriers to HPV vaccination of Tanzanian schoolgirls.
Study setting	Northwest Tanzania; student (n = 54) respondents with a median age of 12 years and were aged between 11 and 17, and parents between 18 and 59 years. The majority of parents worked as farmers, fishermen or operated small businesses (e.g. food or vegetable sellers). Most had completed primary school; a minority (12/60) had completed secondary school.
Notes	

Rendle 2017

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	To examine parental decision making regarding HPV vaccination for their adolescent sons and daughters.
Study setting	USA, San Francisco Bay; 27 parents who had not yet vaccinated their child or children who was/were at or above the recommended age for vaccination.
Notes	

Roncancio 2019

Study characteristics	
WHO region	Americas
Country classification by income level	HIC

Roncancio 2019 *(Continued)*

Study aim	To identify the salient behavioural, normative and control beliefs associated with Hispanic mothers having their adolescent sons initiate the HPV vaccine series.
Study setting	USA, Texas; Hispanic mothers (n = 27) with sons between 11 and 17 years old.
Notes	Data describing this study were also collected from Roncancio 2019 (see secondary ref).

Rujumba 2021

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	Explore barriers that prevent eligible girls from initiating or completing the recommended 2-dose HPV vaccine series in Oyam District, Northern Uganda.
Study setting	Northern Uganda, Oyam District. Eight adolescent girls (10-15 years) and 8 caregivers (25-56 years) were part of the study. Included girls were fully vaccinated (n = 3), incomplete vaccinated (1 dose) (n = 3) and some unvaccinated (n = 2).
Notes	

Siu 2014

Study characteristics	
WHO region	Western Pacific
Country classification by income level	HIC
Study aim	Investigate the perceptions of Hong Kong mothers with regards to vaccinating their daughters against HPV in Hong Kong.
Study setting	Hong Kong; 35 mothers between the ages of 30-60 with at least one daughter between 9 and 16 years old. Neither they nor their daughters had ever received the HPV vaccine. 21 mothers were employed full time and 5 were employed part time. All the participants had received some level of formal education: 11 participants had completed university, two had attained post-secondary school education, 20 had reached form 5 in secondary school and two had reached form 3.
Notes	

Stephens 2013

Study characteristics	
WHO region	Americas

Stephens 2013 *(Continued)*

Country classification by income level	HIC
Study aim	Explore cultural beliefs influencing 31 immigrant Haitian mothers' willingness to vaccinate their daughters against HPV using semi structured interviews.
Study setting	USA; 31 Haitian mothers with daughters aged 11-18 years. A total of 13 daughters were between 11 and 15 years old, and the remaining 18 were between 16 and 18 years old. None of the daughters had received the HPV vaccine.
Notes	

Turiho 2017

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	Explore community member's perceptions about HPV vaccination in Ibanda district and the implications of the perceptions for acceptability of HPV vaccination.
Study setting	Uganda; 43 schoolgirls and 52 parents. The girls, aged 13–16 years had received at least one dose of the HPV vaccination and were registered in their respective schools' vaccination registers. The parents had daughters that were fully or partially vaccinated against HPV.
Notes	

Venderbos 2022

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	Explore parental associations and beliefs regarding the HPV vaccination for boys.
Study setting	Netherlands; 16 (13 = mothers; 3 = fathers) Dutch-speaking parents and/or guardians with a son born in 2010 were included in the study. Fifteen parents had their children vaccinated in accordance with recommendations of the national immunisation programme. The average age of the parents/caregivers was 38 years old. Most parents were born in the Netherlands and were highly educated.
Notes	

Vermandere 2015

Study characteristics	
WHO region	Africa
Country classification by income level	LMIC
Study aim	The aim of this study was to evaluate the implementation of the HPV vaccination demonstration program in Eldoret.
Study setting	Kenya, Eldoret; 67 fathers of school-going girls in seven schools. The schools were in Eldoret where an HPV vaccination programme had been enrolled. The vaccines were administered for free in the hospital two days a week.
Notes	

Wakimizu 2015

Study characteristics	
WHO region	Western Pacific
Country classification by income level	HIC
Study aim	Examine the process of Japanese adolescent girls receiving HPV vaccine and factors influencing these decisions and implementations.
Study setting	Japan, Toyko; 20 school-going girls between 12 and 17 years who had received at least one HPV vaccination since start-up in December 2009; girls in the same age who knew about the HPV vaccine, but decided not to undergo vaccination. Eight girls completed all three HPV vaccinations. Another eight girls completed the first or second vaccination with at least one injection not being carried out. Four girls had no vaccination including pendency. Mothers of the girls were also included, and the mean age of the mothers was 45.1 years.
Notes	

Ward 2017

Study characteristics	
WHO region	Europe
Country classification by income level	HIC
Study aim	To examine how and why mothers agree or do not agree to HPV vaccination for their daughters.
Study setting	France; 19 mothers of girls around the recommended age for HPV vaccination (11–14 years). Mothers were aged 41 to 51 years, and their daughters were 12 to 16 years. Most mothers had at least one other child and only three had another daughter. All mothers were covered by some form of health insurance.

Ward 2017 *(Continued)*

Notes	

Warner 2015

Study characteristics	
WHO region	Americas
Country classification by income level	HIC
Study aim	Assess Latino parents' perceptions of the HPV vaccine.
Study setting	USA, Salt Lake City, Utah; parents/guardians (n = 52) of Latino male and female adolescents who were ages 11–17. 86.5% of parents were female. The majority of participants were married (86.3%). Half of parents had a high school education or less, and 79.2% reported an annual household income of greater than USD 35,000.
Notes	

COM-B: capability-opportunity-motivation-behaviour; GP: general practitioner; **HICs**: high-income countries; HPV: human papillomavirus; **LMICs:** low- and middle-income countries; **MSM:** men who have sex with men; **SES:** socioeconomic status; **WHO:** World Health Organization.

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Adegboyega 2023	Not possible to separate out the data of parents or adolescents from other stakeholders
Alexander 2014	Did not investigate the phenomenon of interest of the review
Allen 2009	Not possible to separate out the data of parents or adolescents from other stakeholders
Arroyo-Morales 2020	Did not use qualitative methods for data collection and analysis
Audrey 2021	Not possible to separate out the data for HPV vaccine
Avni-Singer 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
Baezconde-Garbanati 2017	Not possible to separate out the qualitative data
Bair 2007	Did not use qualitative methods for data collection and analysis
Baloch 2017	Did not use qualitative methods for data collection and analysis
Bartolini 2010	Not possible to separate out the data of parents or adolescents from other stakeholders
Bauquier 2021	Did not investigate the phenomenon of interest of the review
Bellinger 2015	Not possible to separate out the data of parents or adolescents from other stakeholders
Brand 2020	Conference proceedings

Study	Reason for exclusion
Brohman 2024	Did not investigate the phenomenon of interest of the review
Brooks 2024	Did not investigate the phenomenon of interest of the review
Bruel 2020	Did not explore the perspective of parents or adolescents
Bynum 2009	Not possible to separate out the data of parents or adolescents from other stakeholders
Carnegie 2017	Not possible to separate out the data of parents or adolescents from other stakeholders
Celentano 2021	Did not investigate the phenomenon of interest of the review
Cernasev 2023	Did not explore the perspective of parents or adolescents
Chen 2020	Not possible to separate out the data of parents or adolescents from other stakeholders
Cohen 2013	Not possible to separate out the data of parents or adolescents from other stakeholders
Coleman 2017	Conference proceedings
Cunningham-Erves 2021	Did not explore the perspective of parents or adolescents
Dai 2020	Did not explore the perspective of parents or adolescents
Dang 2024	Not possible to separate out the data of parents or adolescents from other stakeholders
Do 2009	Not possible to separate out the data of parents or adolescents from other stakeholders
Ejaz 2022	Not possible to separate out the data of parents or adolescents from other stakeholders
Emerson 2020	Did not explore the perspective of parents or adolescents
Essoh 2023	Not possible to separate out the data for HPV vaccine
Fernandez 2014	Not possible to separate out the data of parents or adolescents from other stakeholders
Finneran 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
FitzGerald 2014	Not possible to separate out the data of parents or adolescents from other stakeholders
Fok 2023	Not possible to separate out the data of parents or adolescents from other stakeholders
Galea 2017	Not possible to separate out the data of parents or adolescents from other stakeholders
Ganczak 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
Ganczak 2023	Not possible to separate out the data of parents or adolescents from other stakeholders
Garcia 2023	Did not explore the perspective of parents or adolescents
Gerend 2019	Not possible to separate out the data of parents or adolescents from other stakeholders
Geshnizjani 2013	Not possible to separate out the data of parents or adolescents from other stakeholders
Ginjupalli 2022	Not possible to separate out the data of parents or adolescents from other stakeholders

Study	Reason for exclusion
Gochenaur 2020	Did not use qualitative methods for data collection and analysis
Gorman 2019	Not possible to separate out the data for HPV vaccine
Gray 2014	Did not explore the perspective of parents or adolescents
Grigore 2023	Conference proceedings
Guay 2010	Did not use qualitative methods for data collection and analysis
Head 2012	Did not explore the perspective of parents or adolescents
Hecht 2021	Did not use qualitative methods for data collection and analysis
Henderson 2018	Not possible to separate out the data of parents or adolescents from other stakeholders
Hodge 2014	Not possible to separate out the data of parents or adolescents from other stakeholders
Jacob 2010	Not possible to separate out the data of parents or adolescents from other stakeholders
Jaiswal 2020	Not possible to separate out the data of parents or adolescents from other stakeholders
Jones 2022	Not possible to separate out the data for HPV vaccine
Joseph 2017	Conference proceedings
Katagwa 2014	Did not use qualitative methods for data collection and analysis
Kim 2014	Did not use qualitative methods for data collection and analysis
Kim 2015a	Conference proceedings
Kim 2015b	Not possible to separate out the data of parents or adolescents from other stakeholders
Kim 2020	Did not use qualitative methods for data collection and analysis
Kobetz 2011	Not possible to separate out the data of parents or adolescents from other stakeholders
Kraaijeveld 2022	Not possible to separate out the qualitative data
Kwan 2008	Not possible to separate out the data of parents or adolescents from other stakeholders
Lee 2020	Did not use qualitative methods for data collection and analysis
Lees 2011	Conference proceedings
Liebermann 2020b	Did not investigate the phenomenon of interest of the review
Ling 2014	Conference proceedings
Loft 2020	Not possible to separate out the data for HPV vaccine
Louis-Nance 2012	Did not investigate the phenomenon of interest of the review
Maatouk 2020	Not possible to separate out the data of parents or adolescents from other stakeholders

Study	Reason for exclusion
MacPhail 2013	Not possible to separate out the data of parents or adolescents from other stakeholders
Maggio 2020	Did not investigate phenomenon of interest of the review
Malone 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
McRae 2014	Not possible to separate out the data of parents or adolescents from other stakeholders
Miller-Day 2023	Did not explore the perspective of parents or adolescents
Milondzo 2022	Did not use qualitative methods for data collection and analysis
Mortensen 2010a	Did not use qualitative methods for data collection and analysis
Mortensen 2010b	Did not use qualitative methods of data collection and analyis
Nabirye 2020	Did not use qualitative methods of data collection and analysis
Nagendiram 2020	Did not explore the perspective of parents or adolescents
NCT02897232	Did not use qualitative methods for data collection and analysis
Newcomer 2020	Did not use qualitative methods for data collection and analysis
Nghi 2010	Not possible to separate out the data of parents or adolescents from other stakeholders
Niccolai 2014	Did not explore the perspective of parents or adolescents
Nkwonta 2022a	Not possible to separate out the data of parents or adolescents from other stakeholders
Nkwonta 2022b	Not possible to separate out the data of parents or adolescents from other stakeholders
Onyeabor 2015	Did not use qualitative methods for data collection and analysis
Oscarsson 2012	Not possible to separate out the data of parents or adolescents from other stakeholders
Osei 2021a	Not possible to separate out the data of parents or adolescents from other stakeholders
Osei 2021b	Did not explore the perspective of parents or adolescents
Perkins 2012	Did not use qualitative methods for data collection and analysis
Pierre-Victor 2017a	Not possible to separate out the data of parents or adolescents from other stakeholders
Pierre-Victor 2017b	Not possible to separate out the data of parents or adolescents from other stakeholders
Pierre-Victor 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
Pinariya 2020	Did not explore the perspectives of parents or adolescents
Pineros 2010	Did not explore the perspective of parents or adolescents
Rand 2020	Not possible to separate out the data of parents or adolescents from other stakeholders
Rockliffe 2020	Did not explore the perspectives of parents or adolescents

Study	Reason for exclusion
Roncancio 2018	Did not investigate the phenomenon of interest of the review
Salwa 2018	Did not use qualitative methods for data collection and analysis
Shah 2021	Not possible to separate out the data of parents or adolescents from other stakeholders
Sheth 2020	Not possible to separate out the data of parents or adolescents from other stakeholders
Sidiropoulou 2022	Did not use qualitative methods for data collection and analysis
Soltanizadeh 2020	Not possible to separate out the data of parents or adolescents from other stakeholders
Susanto 2020	Not possible to separate the qualitative data
Thomas 2014	Conference proceedings
Towghi 2013	Did not explore the perspective of parents or adolescents
Vu 2022	Did not use qualitative methods for data collection and analysis
Wheldon 2017	Did not explore the perspectives of parents or adolescents
Williamson 2020	Conference proceedings
Wilson 2013	Not possible to separate out the data of parents or adolescents from other stakeholders
Wong 2008	Not possible to separate out the data of parents or adolescents from other stakeholders
Wong 2009	Not possible to separate out the data of parents or adolescents from other stakeholders

HPV: human papillomavirus

Characteristics of studies awaiting classification *[ordered by study ID]*

Agana-Norman 2024

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: understand parental beliefs regarding receipt of the HPV vaccine among their children at ages 9–10 Participants: caregivers

Ailloud 2023

Notes	**Study identified in final search update** Country: France

Ailloud 2023 *(Continued)*

	Country classification by income level: HIC
	WHO region: Europe
	Study aim: identify knowledge and perceptions of HPV amongst mothers and school staff, as well as factors influencing HPV vaccination
	Participants: caregivers

Appiah 2023

Notes	**Study identified in final search update**
	Country: Ghana
	Country classification by income level: LMIC
	WHO region: Africa
	Study aim: explore the acceptance of HPV vaccination in boys among mothers from selected churches in Accra
	Participants: caregivers

Arams 2021

Notes	**Study identified in final search update**
	Country: Chile
	Country classification by income level: LMIC
	WHO region: Americas
	Study aim: identify maternal factors and family dynamics that affect HPV vaccination behaviour
	Participants: caregivers

Bitariho 2023

Notes	**Study identified in final search update**
	Country: Uganda
	Country classification by income level: LMIC
	WHO region: Africa
	Study aim: assess the knowledge, perceptions, and practices of adolescent girls aged 10-14 years towards HPV vaccination program in Kampala
	Participants: adolescents

Bwanali 2024

Notes	**Study identified in final search update** Country: Malawi Country classification by income level: LMIC WHO region: Africa Study aim: identify barriers to caregiver acceptance of the HPV vaccine for their female children in Chileka, Blantyre and to establish the consequential willingness to vaccinate their children Participants: caregivers

Camano-Puig 2014

Notes	**Study in Spanish**

Carneiro 2018

Notes	**Study in Portuguese**

Carter 2024

Notes	**Study identified in final search update** Country: Australia Country classification by income level: HIC WHO region: Western Pacific Study aim: explore the factors believed to influence parental decision-making regarding vaccine uptake for students with intellectual disability and/or on the autism spectrum attending special schools in New South Wales Participants: caregivers

Chan 2024

Notes	**Study identified in final search update** Country: Hong Kong Country classification by income level: HIC WHO region: Western Pacific Study aim: explore the barriers and facilitators influencing South Asian minority and Chinese mothers' decisions to vaccinate their daughters against HPV Participants: caregivers

Choi 2023

Notes	**Study identified in final search update** Country: South Korea Country classification by income level: HIC WHO region: Western Pacific Study aim: explore perceptions of male HPV vaccination and underlying factors for vaccine hesitancy among mothers of unvaccinated boys in Seoul Participants: caregivers

Cooper 2024

Notes	**Study identified in final search update** Country: Australia Country classification by income level: HIC WHO region: Western Pacific Study aim: explore how parents and their adolescent children make decisions about the HPV vaccine, and to inform future interventions that aim to facilitate inclusive decision-making processes Participants: caregivers and adolescents

Dionne 2023

Notes	**Study identified in final search update** Country: Canada Country classification by income level: HIC WHO region: Americas Study aim: describe barriers and enabling conditions of HPV vaccination as perceived by parents and school nurses and identify potential solutions to improve HPV vaccine uptake rates and acceptance in school-based programmes Participants: caregivers

Enskär 2024

Notes	**Study identified in final search update** Country: Sweden Country classification by income level: HIC WHO region: Europe Study aim: explore middle-school children's perceptions of HPV vaccination

Enskär 2024 *(Continued)*

	Participants: adolescents

Fidalgo 2013

Notes	**Study in French**

Fisher 2024

Notes	**Study identified in final search update** Country: England Country classification by income level: HIC WHO region: Europe Study aim: understand the information needs of vaccine-hesitant, ethnically diverse parents during decision-making about the HPV vaccine for their adolescent child, to inform the future development of tailored communication materials Participants: caregivers

Khan 2023

Notes	**Study identified in final search update** Country: Canada Country classification by income level: HIC WHO region: Americas Study aim: determine barriers to and facilitators of HPV vaccination among these subgroups to uncover high-resolution quality improvement targets of investment for under-immunised pockets of the population Participants: caregivers

Klotzler 2012

Notes	**Study in German**

Kohler 2023

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas

Kohler 2023 *(Continued)*

	Study aim: explore perceptions about starting HPV vaccination at a younger age to inform future interventions that promote initiation at ages 9 and 10 years Participants: caregivers

Lubeya 2023

Notes	**Study identified in final search update** Country: Zambia Country classification by income level: LMIC WHO region: Africa Study aim: understand adolescent girls' knowledge and perceptions regarding the HPV vaccine and discuss its acceptability and uptake implications Participants: adolescents

Martinez 2024

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: understand the perceptions of HPV vaccination barriers and factors among parents or guardians of American Indian adolescents in the Cherokee Nation Participants: caregivers

Martínez-Figueroa 2023

Notes	**Study identified in final search update** Country: Mexico Country classification by income level: LMIC WHO region: Americas Study aim: identify the knowledge and attitudes of Mexican mothers in the non-acceptance of the HPV vaccine for their daughters Participants: caregivers

Moucheraud 2023

Notes	**Study identified in final search update**

Moucheraud 2023 *(Continued)*

	Country: Malawi Country classification by income level: LMIC WHO region: Africa Study aim: understand attitudes about, and experiences with, the HPV vaccine among caregivers of eligible girls Participants: caregivers

Nakibuuka 2024

Notes	**Study identified in final search update** Country: Uganda Country classification by income level: LMIC WHO region: Africa Study aim: determine the uptake of, and factors associated with HPV vaccination among adolescent girls living with HIV in Uganda Participants: adolescents

Netfa 2023

Notes	**Study identified in final search update** Country: Australia Country classification by income level: HIC WHO region: Western Pacific Study aim: identify facilitators and barriers to HPV vaccination of adolescents as perceived by Arabic-speaking mothers in Western Sydney Participants: caregivers

Ochomo 2024

Notes	**Study identified in final search update** Country: Kenya Country classification by income level: LMIC WHO region: Africa Study aim: explore the concerns, myths and barriers to HPV vaccine uptake among adolescent girls enrolled at HIV comprehensive care clinics and their parents in Kisumu County Participants: caregivers and adolescents

Petagna 2024

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: assess the attitudes, vaccine practices, facilitators, and barriers to receiving the HPV vaccine in southwest Georgia Participants: caregivers and adolescents

Purvis 2024

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: explore hesitancy and facilitators for overcoming hesitancy among hesitant adopter parents Participants: caregivers

Schwartz 2023

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: explore parental knowledge, perceptions, and decision-making processes about HPV and HPV vaccination for both anogenital and head and neck cancers (HNC) Participants: caregivers

Shin 2023a

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: assess potential opportunities within and outside schools to increase HPV vaccination

Shin 2023a *(Continued)*

	Participants: caregivers

Shin 2023b

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: understand parental HPV vaccine hesitancy and inform community-specific, multilevel approaches to improve HPV vaccination among diverse populations in Los Angeles Participants: caregivers

Tran 2023

Notes	**Study identified in final search update** Country: Reunion Island Country classification by income level: N/A WHO region: N/A Study aim: understand barriers and motivations to HPV vaccination in populations sensitised to its benefits Participants: caregivers and adolescents

Tuckerman 2024

Notes	**Study identified in final search update** Country: Australia Country classification by income level: HIC WHO region: Western Pacific Study aim: identify and improve understanding of the facilitators and barriers of HPV vaccination among adolescents with intellectual disabilities or autism in Victorian specialist schools to inform strategies to increase vaccination acceptance and uptake Participants: caregivers and adolescents

Warsi 2023

Notes	**Study identified in final search update** Country: Uzbekistan

Warsi 2023 *(Continued)*

	Country classification by income level: LMIC WHO region: Europe Study aim: identify barriers and drivers for HPV vaccine-related behaviour to develop an HPV vaccine introduction communication plan in Uzbekistan Participants: caregivers

Washington 2023

Notes	**Study identified in final search update** Country: USA Country classification by income level: HIC WHO region: Americas Study aim: describe the perspectives of parents who had delayed and refused HPV vaccination for their children, even when it was discussed or recommended by a healthcare provider, and to identify the factors related to vaccine hesitancy Participants: caregivers

Wiesner 2010

Notes	**Study in Spanish**

Wijayanti 2023

Notes	**Study identified in final search update** Country: Indonesia Country classification by income level: LMIC WHO region: South-East Asia Study aim: understand parents' decision-making regarding whether they will allow their daughters to receive the HPV vaccine Participants: caregivers

Wilson 2023

Notes	**Study identified in final search update** Country: Gambia Country classification by income level: LMIC WHO region: Africa

Wilson 2023 *(Continued)*

	Study aim: explore experiences with and perceptions of HPV vaccination amongst diverse stakeholders
	Participants: caregivers and adolescents

Wubu 2023

Notes	**Study identified in final search update**
	Country: Ethiopia
	Country classification by income level: LMIC
	WHO region: Africa
	Study aim: explore the perception of secondary school girls towards HPV vaccine in Addis Ababa
	Participants: adolescents

Yangchen 2024

Notes	**Study identified in final search update**
	Country: Bhutan
	Country classification by income level: LMIC
	WHO region: South-East Asia
	Study aim: document the process through which Bhutan expanded their school-based HPV programme to boys, including identifying successes, challenges, and lessons learned
	Participants: caregivers and adolescents

Yim 2024

Notes	**Study identified in final search update**
	Country: China
	Country classification by income level: LMIC
	WHO region: Western Pacific
	Study aim: identify potential factors of delayed HPV vaccination for adolescent girls
	Participants: caregivers

Ρούσσου 2019

Notes	**Study in Greek**

Τσιγαρίδα 2019	
Notes	**Study in Greek**

HIC: high-income country; **HPV:** human papillomavirus; **LMIC:** low- and middle-income country; **N/A:** not applicable; **WHO:** World Health Organization

ADDITIONAL TABLES

Table 1. Summary of related systematic reviews

Summary of related systematic reviews focused on the demand side of HPV vaccination (beliefs, attitudes, perceptions, decision-making, acceptance, hesitancy, confidence/trust etc.)

Review ID	Title	Focus	Methodology
Brewer 2007	Predictors of HPV vaccine acceptability: a theory-informed, systematic review	Focuses on HPV-related beliefs, awareness, and knowledge, and the predictors of HPV vaccine acceptability. Only includes studies from the USA	Mixed methods, including both quantitative and qualitative studies
Black 2009	Literature review of human papillomavirus vaccine acceptability among women over 26 years	Focuses on adult opinions and acceptability, and factors influencing these, of vaccinating women against HPV. Focuses only on women and those over 26 years	Mixed methods, including both quantitative and qualitative studies
Liddon 2010	Acceptability of human papillomavirus vaccine for males: a review of the literature	Focuses on intentions and acceptability regarding HPV vaccination for men. Only includes studies with men	Mixed methods, including both quantitative and qualitative studies
Young 2010	HPV vaccine acceptance among women in the Asian Pacific: a systematic review of the literature	Focuses on factors associated with women's intent to receive HPV vaccination. Only includes studies from the Asian Pacific region	Mixed methods, including both quantitative and qualitative studies
Mishra 2011	Implementing HPV vaccines: public knowledge, attitudes, and the need for education	Reviews qualitative research on public knowledge and attitudes to HPV vaccines, focusing on socio-economically challenged populations	Qualitative
Chan 2012	A systematic review of literature about women's knowledge and attitudes toward Human Papillomavirus (HPV) vaccination	Focuses on women's knowledge and attitudes toward HPV vaccination. Only includes studies with adult women	Mixed methods, including both quantitative and qualitative studies
Kessels 2012	Factors associated with HPV vaccine uptake in teenage girls: a systematic review	Focuses on the factors associated with HPV vaccination initiation and/or completion amongst (pre-)adolescent girls	Quantitative
Trim 2012	Parental knowledge, attitudes and behaviours towards human papillomavirus vaccination for their children: a systematic review from 2001 to 2011	Focuses on parental knowledge, attitudes, and behaviour before and after approval of the quadrivalent and bivalent HPV vaccines. Only includes studies with parents	Quantitative
Hendry 2013	"HPV? Never heard of it!": A systematic review of girls' and parents' in-	Focuses on girls' and parents' information needs, views, and preferences regarding HPV	Mixed methods, including both quan-

Table 1. Summary of related systematic reviews *(Continued)*

	formation needs, views and preferences about human papillomavirus vaccination	vaccination. Only includes studies with adolescent girls and parents of girls	titative and qualitative studies
Newman 2013	HPV vaccine acceptability among men: a systematic review and meta-analysis	Focuses on rates of, and factors associated with, HPV acceptance amongst men. Only includes studies with adults and adolescent men	Quantitative
Cunningham 2014	HPV vaccine acceptability in Africa: a systematic review	Focuses on the factors associated with HPV vaccine acceptability among adults. Only includes studies from Africa and with adults	Mixed methods, including both quantitative and qualitative studies
Ferrer 2014	Barriers and facilitators to HPV vaccination of young women in high-income countries: a qualitative systematic review and evidence synthesis	Focuses on the factors affecting decision-making of HPV vaccination of young women. Only included studies from HICs	Qualitative
Perlman 2014	Knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-Saharan Africa: a systematic review	Focuses on knowledge and awareness of cervical cancer, HPV, and HPV vaccine, as well as willingness and acceptability to vaccinate. Only includes studies from SSA	Mixed methods, including both quantitative and qualitative studies
Fernández de Casadevante 2015	Determinants in the uptake of the human papillomavirus vaccine: a systematic review based on European studies	Focuses on the determinants of HPV uptake. Only includes studies from Europe and with women	Quantitative
Patel 2016	Knowledge of human papillomavirus and the human papillomavirus vaccine in European adolescents: a systematic review	Focuses on the levels of knowledge regarding HPV and the HPV vaccine amongst European adolescents. Only includes studies from Europe and with adolescents	Mixed methods, including both quantitative and qualitative studies
Abdullahi 2016	Knowledge, attitudes and practices on adolescent vaccination among adolescents, parents and teachers in Africa: a systematic review	Focuses on knowledge, attitudes, practices towards adolescents' vaccines. Only includes studies from Africa and considers all adolescent vaccines	Mixed methods, including both quantitative and qualitative studies
Loke 2017	The uptake of human papillomavirus vaccination and its associated factors among adolescents: a systematic review	Focuses on facilitators and barriers to HPV vaccination among adolescents. Only includes studies with adolescents	Quantitative
Radisic 2017	Factors associated with parents' attitudes to the HPV vaccination of their adolescent sons: a systematic review	Focuses on factors influencing attitudes towards HPV vaccination amongst parents of adolescent boys. Only includes studies with parents of adolescent boys	Mixed methods, including both quantitative and qualitative studies
Lacombe-Duncan 2018	Human papillomavirus vaccine acceptability and decision-making among adolescent boys and parents: a meta-ethnography of qualitative studies	Focuses on HPV vaccine acceptability and decision-making among adolescent boys or their parents, or both. Only includes studies with adolescent men or parents of adolescent men, or both	Qualitative
Marshall 2019a	Views of parents regarding human papillomavirus vaccination: a systematic review and meta-ethno-	Focuses on parents' views of HPV vaccination for adolescent women. Considers only women's HPV vaccination and only includes studies with parents and guardians	Qualitative

Table 1. Summary of related systematic reviews *(Continued)*

	graphic synthesis of qualitative literature		
Newman 2018	Parents' uptake of human papillomavirus vaccines for their children: a systematic review and meta-analysis of observational studies	Focuses on factors associated with parents' uptake of HPV vaccines for their children. Only includes studies with parents and guardians	Quantitative
Santhanes 2018	Factors influencing intention to obtain the HPV vaccine in South East Asian and Western Pacific regions: a systematic review and meta-analysis	Focuses on factors influencing intentions for HPV vaccination among women. Only includes studies from the WHO SEAR and WPR, and with women	Mixed methods, including both quantitative and qualitative studies
Karafillakis 2019	HPV vaccination in a context of public mistrust and uncertainty: a systematic literature review of determinants of HPV vaccine hesitancy in Europe	Focuses on the determinants of HPV vaccine hesitancy in Europe. Only includes studies from Europe	Mixed methods, including both quantitative and qualitative studies
López 2020	HPV knowledge and vaccine acceptance among European adolescents and their parents: a systematic literature review	Identify factors associated with HPV knowledge and vaccine acceptance in European adolescents and their parents. Only includes studies from Europe	Quantitative
Netfa 2020	Knowledge, attitudes and perceptions of immigrant parents towards human papillomavirus (HPV) vaccination: a systematic review	Focuses on immigrant parents' knowledge, attitudes and perceptions (KAP) towards HPV disease and vaccination offered to their children. Focuses only on immigrant parents	Mixed methods, including both quantitative and qualitative studies
Cadeddu 2021	Understanding the determinants of vaccine hesitancy and vaccine confidence among adolescents: a systematic review	Investigate the determinants of vaccine hesitancy among adolescents aged 10–19. Focuses only adolescents	Mixed methods, including both quantitative and qualitative studies
Deignan 2021	Stakeholders' understandings of human papillomavirus (HPV) vaccination in sub-Saharan Africa: a rapid qualitative systematic review	Focuses on stakeholders' (e.g. adolescents, parents, teachers, healthcare providers, and political, religious, and community leaders') understandings of HPV vaccination. Only includes studies from SSA	Qualitative
Poirier 2021	HPV vaccine: uptake and understanding among global Indigenous communities – a qualitative systematic review	Explores the knowledge, beliefs and experiences of Indigenous populations globally regarding HPV vaccines. Focuses on women of all ages and healthcare workers	Qualitative
Wijayanti 2021	Parents' knowledge, beliefs, acceptance and uptake of the HPV vaccine in members of The Association of Southeast Asian Nations (ASEAN): a systematic review of quantitative and qualitative studies	Focuses on the factors influencing parents' acceptance of the HPV vaccine. Only includes studies from ASEAN region. Only includes studies from ASEAN region	Mixed methods, including both quantitative and qualitative studies
Wilson 2021b	HPV vaccine acceptance in West Africa: a systematic literature review	Identify and analyse factors contributing to the acceptance of HPV vaccination in West African countries, identifying the spectrum of perceptions, concerns, trust and access issues relating to the vaccine. Only includes studies from West Africa	Mixed methods, including both quantitative and qualitative studies

Table 1. Summary of related systematic reviews *(Continued)*

Mitchell 2022	What do adolescents think about vaccines? Systematic review of qualitative studies	Identified and summarised existing evidence on adolescents' own understanding of vaccines and experiences with vaccine decision-making, including self-consent. Includes studies focused on all adolescent vaccines, including HPV, COVID-19, meningococcal, hepatitis B and influenza vaccines or adolescent experiences with vaccines in general	Qualitative
Kutz 2023	Barriers and facilitators of HPV vaccination in sub-Saharan Africa: a systematic review	Identify barriers and facilitators of HPV-vaccination in SSA to inform national implementation strategies in the region. Only includes studies from SSA	Mixed methods, including both quantitative and qualitative studies
MacDonald 2023	Barriers and supports for uptake of human papillomavirus vaccination in Indigenous people globally: a systematic review	Identify, appraise, and summarise the literature on documented barriers and supports to HPV vaccination in Indigenous populations internationally. Focuses on Indigenous populations	Mixed methods, including both quantitative and qualitative studies
Urrutia 2023	Acceptability of HPV vaccines: a qualitative systematic review and meta-summary	Understand the reasons that favour or do not favour the acceptability of HPV vaccines. Only includes studies from HICs	Mixed methods, including both quantitative and qualitative studies
Tobaiqy 2024	A systematic review of human papillomavirus vaccination challenges and strategies to enhance uptake	Identify the primary challenges associated with HPV vaccination and propose effective strategies to improve vaccination uptake	Quantitative

ASEAN: The Association of Southeast Asian Nations; **HIC:** high-income countries; **HPV:** human papillomavirus; **SEAR:** South East Asia Region; **SSA:** sub-Saharan Africa; **WPR:** Western Pacific Region; **WHO:** World Health Organization

APPENDICES

Appendix 1. Search strategies

Epistemonikos, Epistemonikos Foundation (searched 26 November 2019)

Search terms	Results
Advanced search in Title/Abstract: papilloma* AND (vaccin* OR immuni*) AND qualitative	33

Epistemonikos, Epistemonikos Foundation (searched 23 April 2021)

Search terms	Results
Advanced search in Title/Abstract: (hpv OR papilloma*) AND (vaccin* OR immuni*) AND qualitative	62

Epistemonikos, Epistemonikos Foundation (searched 10 February 2023)

Search terms	Results
Advanced search in Title/Abstract: (hpv OR papilloma*) AND (vaccin* OR immuni*) AND qualitative	34

MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to 22 November 2019, Ovid (searched 26 November 2019)

#	Searches	Results
1	Papillomavirus Vaccines/	7304
2	Human Papillomavirus Recombinant Vaccine Quadrivalent, Types 6, 11, 16, 18/	714
3	Papillomavirus Infections/	24481
4	((hpv or papillomavirus* or papilloma* virus) and (vaccin* or immuni* or infect*)).ti,kf.	13453
5	((hpv or papillomavirus* or papilloma virus*) adj3 (vaccin* or immuni* or infect*)).ab.	21560
6	or/1-5	36053
7	limit 6 to "qualitative (best balance of sensitivity and specificity)"	2261
8	6 and (Qualitative Research/ or Interviews as Topic/)	319
9	6 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,kf.	663
10	or/7-9	2393
11	limit 10 to yr=2006-current	1988

MEDLINE ALL 1946 to 22 April 2021, Ovid (searched 23 April 2021)

1	Papillomavirus Vaccines/	8222
2	Human Papillomavirus Recombinant Vaccine Quadrivalent, Types 6, 11, 16, 18/	755
3	Papillomavirus Infections/	27357
4	((hpv or papillomavirus* or papilloma* virus*) and (vaccin* or immuni* or infect*)).ti,kf.	14979

(Continued)

5	((hpv or papillomavirus* or papilloma virus*) adj3 (vaccin* or immuni* or infect*)).ab.	23867
6	or/1-5	39948
7	limit 6 to "qualitative (best balance of sensitivity and specificity)"	2574
8	6 and (Qualitative Research/ or Interviews as Topic/)	377
9	6 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,kf.	795
10	or/7-9	2728

PubMed 22 April 2021 - 7 February 2023 (searched 7 February 2023)

1	Papillomavirus Vaccines[mh]	9908
2	Human Papillomavirus Recombinant Vaccine Quadrivalent, Types 6, 11, 16, 18[mh]	792
3	Papillomavirus Infections[mh]	41467
4	(hpv[tiab] OR papillomavirus*[tiab] OR papilloma* virus*[tiab]) AND (vaccin*[tiab] OR immuni*[tiab] OR infect*[tiab])	38502
5	#1 OR #2 OR #3 OR #4	58108
6	qualitative research[mh]	79459
7	interviews as topic[mh]	66807
8	qualitative[tiab] OR group discussion*[tiab] OR focus group*[tiab] OR themes[tiab] OR mixed method*[tiab]	402183
9	#6 OR #7 OR #8	451720
10	#5 AND #9	1247
11	#5 AND #9 Filters: from 2021/4/22- 2023/2/7	251

Embase 1974 to 2019 November 22, Ovid (searched 26 November 2019)

#	Searches	Results
1	Wart virus vaccine/	13030
2	((hpv or papillomavirus* or papilloma virus*) and (vaccin* or immuni*)).ti,kw,od.	12510

(Continued)

3	((hpv or papillomavirus* or papilloma virus*) adj3 (vaccin* or immuni*)).ab.	11140
4	or/1-3	19224
5	limit 4 to "qualitative (maximizes specificity)"	388
6	4 and (qualitative research/ or interview/)	493
7	4 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,kw,od.	598
8	or/5-7	841
9	limit 8 to (conference abstracts or embase)	596
10	limit 9 to yr=2006-current	586

Embase 1974 to 2021 April 22, Ovid (searched 23 April 2021)

No.	Search terms	Results
1	Wart virus vaccine/	14513
2	((hpv or papillomavirus* or papilloma virus*) and (vaccin* or immuni*)).ti,k-w,od.	14306
3	((hpv or papillomavirus* or papilloma virus*) adj3 (vaccin* or immuni*)).ab.	12864
4	or/1-3	21651
5	limit 4 to "qualitative (maximizes specificity)"	481
6	4 and (qualitative research/ or interview/)	590
7	4 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,kw,od.	729
8	or/5-7	1006
9	limit 8 to (conference abstracts or embase)	697

Embase 1974 to 2023 February 10, Elsevier (searched 10 February 2023)

No.	**Query**	**Results**
#12	[22/04/2021]/sd AND (((((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR	519

(Continued)

	papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND 'qualitative research'/de) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND ('qualitative research'/exp OR 'qualitative research' OR 'interview'/exp OR 'interview')) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND (qualitative:ti,ab,kw OR 'group discussion*':ti,ab,kw OR 'focus group*':ti,ab,kw OR themes:ti,ab,kw OR 'mixed method*':ti,ab,kw OR 'qualitative'/exp OR 'group discussion*' OR 'focus group*' OR themes OR 'mixed method*'))) AND [embase]/lim)	
#11	((((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND 'qualitative research'/de) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND ('qualitative research'/exp OR 'qualitative research' OR 'interview'/exp OR 'interview')) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND (qualitative:ti,ab,kw OR 'group discussion*':ti,ab,kw OR 'focus group*':ti,ab,kw OR themes:ti,ab,kw OR 'mixed method*':ti,ab,kw OR 'qualitative'/exp OR 'group discussion*' OR 'focus group*' OR themes OR 'mixed method*'))) AND [embase]/lim	1449
#10	((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND 'qualitative research'/de) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND ('qualitative research'/exp OR 'qualitative research' OR 'interview'/exp OR 'interview')) OR ((('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papillo-	1900

(Continued)

	ma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND (qualitative:ti,ab,kw OR 'group discussion*':ti,ab,kw OR 'focus group*':ti,ab,kw OR themes:ti,ab,kw OR 'mixed method*':ti,ab,kw OR 'qualitative'/exp OR 'group discussion*' OR 'focus group*' OR themes OR 'mixed method*'))	
#9	(('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND (qualitative:ti,ab,kw OR 'group discussion*':ti,ab,kw OR 'focus group*':ti,ab,kw OR themes:ti,ab,kw OR 'mixed method*':ti,ab,kw OR 'qualitative'/exp OR 'group discussion*' OR 'focus group*' OR themes OR 'mixed method*')	1170
#8	qualitative:ti,ab,kw OR 'group discussion*':ti,ab,kw OR 'focus group*':ti,ab,kw OR themes:ti,ab,kw OR 'mixed method*':ti,ab,kw OR 'qualitative'/exp OR 'group discussion*' OR 'focus group*' OR themes OR 'mixed method*'	588024
#7	(('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND ('qualitative research'/exp OR 'qualitative research' OR 'interview'/exp OR 'interview')	1315
#6	'qualitative research'/exp OR 'qualitative research' OR 'interview'/exp OR 'interview'	598045
#5	(('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab) AND 'qualitative research'/de	390
#4	('human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))) OR ((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab	34298
#3	((hpv OR papillomavirus* OR 'papilloma virus*') NEAR/3 (vaccin* OR immuni*)):ab	17070
#2	'human papilloma virus vaccine'/exp OR 'human papilloma virus vaccine' OR ((hpv:ti OR papillomavirus*:ti OR 'papilloma virus*':ti) AND (vaccin*:ti OR immuni*:ti)) OR ((hpv:kw OR papillomavirus*:kw OR 'papilloma virus*':kw) AND (vaccin*:kw OR immuni*:kw)) OR (('hpv'/exp OR papillomavirus* OR 'papilloma virus*') AND (vaccin* OR immuni*))	33434
#1	[22/04/2021]/sd	7454794

CINAHL 1981-present, Ebsco (searched 26 November 2019)

0	Query	Results
S13	S12	254
	Limiters - Exclude MEDLINE records	
S12	S11	669
	Limiters - Published Date: 20060101-20191231	
S11	S9 OR S10	735
S10	S4	297
	Limiters - Clinical Queries: Qualitative - Best Balance	
S9	S4 AND S8	628
S8	S5 OR S6 OR S7	281.948
S7	TI ((qualitative or "group discussion" or "group discussions" or "focus group" or "focus groups" or themes or "mixed method" or "mixed methods")) OR AB ((qualitative or "group discussion" or "group discussions" or "focus group" or "focus groups" or themes or "mixed method" or "mixed methods"))	158.788
S6	(MH "Interviews")	136.996
S5	(MH "Qualitative Studies")	100.616
S4	S1 OR S2 OR S3	12.364
S3	TI ((hpv or papillomavirus* or papilloma virus*) and (vaccin* or immuni* or infect*)) OR AB ((hpv or papillomavirus* or papilloma virus*) and (vaccin* or immuni* or infect*))	7.616
S2	(MH "Papillomavirus Infections")	8.279
S1	(MH "Papillomavirus Vaccine")	4.465

CINAHL 1981-present, Ebsco (searched 23 April 2021)

No.	Search terms	Results
#	Query	Results
S11	S9 OR S10	870
S10	S4	364
	Limiters - Clinical Queries: Qualitative - Best Balance	

(Continued)

S9	S4 AND S8	742
S8	S5 OR S6 OR S7	332.44
S7	TI ((qualitative or "group discussion" or "group discussions" or "focus group" or "focus groups" or themes or "mixed method" or "mixed methods")) OR AB ((qualitative or "group discussion" or "group discussions" or "focus group" or "focus groups" or themes or "mixed method" or "mixed methods"))	197.25
S6	(MH "Interviews")	153.24
S5	(MH "Qualitative Studies")	120.73
S4	S1 OR S2 OR S3	14.54
S3	TI ((hpv or papillomavirus* or papilloma W0 virus*) and (vaccin* or immuni* or infect*)) OR AB ((hpv or papillomavirus* or papilloma W0 virus*) and (vaccin* or immuni* or infect*))	9.041
S2	(MH "Papillomavirus Infections")	9.694
S1	(MH "Papillomavirus Vaccine")	5.225

CINAHL 1981-present, Ebsco (searched 10 February 2023)

No.	Search terms	Results
#	Query	Results
S9	S4 AND S8 Limiters - Published Date: 20210401-20230231	119
S8	S5 OR S6 OR S7	392,397
S7	TI ((qualitative OR "group discussion" OR "group discussions" OR "focus group" OR "focus groups" OR themes OR "mixed method" OR "mixed methods")) OR AB ((qualitative OR "group discussion" OR "group discussions" OR "focus group" OR "focus groups" OR themes OR "mixed method" OR "mixed methods"))	244,985
S6	(MH "Interviews")	168,900
S5	(MH "Qualitative Studies")	143,492
S4	S1 OR S2 OR S3	16,792
S3	TI ((hpv OR papillomavirus* OR papilloma W0 virus*) AND (vaccin* OR immuni* OR infect*)) OR AB ((hpv OR papillomavirus* OR papilloma W0 virus*) AND (vaccin* OR immuni* OR infect*))	10,663
S2	(MH "Papillomavirus Infections")	11,191
S1	(MH "Papillomavirus Vaccine")	5,999

PsycINFO 1806 to November Week 3 2019, Ovid (searched 26 November 2019)

#	Searches	Results
1	human papillomavirus/	1287
2	(hpv or papillomavirus* or papilloma virus*).ti,ab,id.	1838
3	1 or 2	1886
4	immunization/	4444
5	(vaccin* or immuni*).ti,ab,id.	12086
6	4 or 5	12153
7	3 and 6	1231
8	limit 7 to "qualitative (best balance of sensitivity and specificity)"	246
9	7 and (qualitative methods/ or interviews/)	8
10	7 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,id.	180
11	or/8-10	294
12	limit 11 to yr=2006-current	289

APA PsycINFO 1806 to April Week 3 2021, Ovid (searched 23 April 2021)

No.	Search terms	Results
1	human papillomavirus/	1429
2	(hpv or papillomavirus* or papilloma virus*).ti,ab,id.	2046
3	1 or 2	2095
4	immunization/	4882
5	(vaccin* or immuni*).ti,ab,id.	13165
6	4 or 5	13233
7	3 and 6	1377
8	limit 7 to "qualitative (best balance of sensitivity and specificity)"	283
9	7 and (qualitative methods/ or interviews/)	8

(Continued)

10	7 and (qualitative or group discussion? or focus group? or themes or mixed method*).ti,ab,id.	206
11	or/8-10	337

APA PsycInfo, EBSCOhost (searched 09 February 2023)

No.	Search terms	Results
S16	S9 AND S14 Limiters - Published Date: 20210423-20230209	26
S15	S9 AND S14	245
S14	S10 OR S11 OR S12 OR S13	358,370
S13	AB qualitative or group discussion? or focus group? or themes or mixed method*	342,488
S12	TI qualitative or group discussion? or focus group? or themes or mixed method?	48,404
S11	DE interviews	12,463
S10	DE qualitative methods	11,013
S9	S4 AND S8	1,621
S8	S5 OR S6 OR S7	21,227
S7	AB vaccin* or immuni*	14,654
S6	TI vaccin* or immuni*	18,529
S5	DE immunization	6,123
S4	S1 OR S2 OR S3	2,441
S3	AB hpv or papillomavirus* or papilloma virus*	2,440
S2	TI hpv or papillomavirus* or papilloma virus*	2,284
S1	DE human papillomavirus	1,678

Scopus, Elsevier (searched 26 November 2019)

Advanced search: with time limit to publication date between 2006 and 2019	
KEY("papilloma virus" OR papillomavirus OR hpv) AND KEY(vaccine OR vaccines OR vaccination OR immunisation OR immunization) AND KEY(qualitative) OR TITLE-ABS(("papilloma virus" OR pa-	383

(Continued)

pillomavirus OR hpv) W/6 (vaccine OR vaccines OR vaccination OR immunisation OR immunization)) AND TITLE-ABS (qualitative)

Scopus, Elsevier (searched 23 April 2021)

Search terms	Results
Advanced search: with time limit to publication date between 2019 and 2021	57
KEY ("papilloma virus" OR papillomavirus OR hpv) AND KEY (vaccine OR vaccines OR vaccination OR immunisation OR immunization) AND KEY (qualitative) OR TITLE-ABS (("papilloma virus" OR papillomavirus OR hpv) W/6 (vaccine OR vaccines OR vaccination OR immunisation OR immunization)) AND TITLE-ABS (qualitative) AND NOT INDEX (medline)	

Scopus, Elsevier (searched 08 February 2023)

Search terms	Results
Advanced search: with time limit to publication date between 2021 and 2023	346
KEY ("papilloma virus" OR papillomavirus OR hpv) AND KEY (vaccine OR vaccines OR vaccination OR immunisation OR immunization) AND KEY (qualitative) OR TITLE-ABS (("papilloma virus" OR papillomavirus OR hpv) W/6 (vaccine OR vaccines OR vaccination OR immunisation OR immunization)) AND TITLE-ABS (qualitative) AND (LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR, 2021))	

Appendix 2. Studies eligible for inclusion but not sampled for analysis

Study ID	Aim	Country	WHO region	Income	Participants
Albright 2017	Understand English- and Spanish-speaking parents' reasons for non-initiation or non-completion of the HPV vaccine series for their daughters	USA	AMR	High	Caregivers
Allen 2012	Describe parents' knowledge, attitudes, and decision-making with regards to obtaining the HPV vaccine for their daughters	USA	AMR	High	Caregivers
Allen 2019	Explore facilitators and barriers to cervical cancer screening and HPV vaccination among Somali refugee women and their children	USA	AMR	High	Caregivers

(Continued)

Aragones 2016	Elucidate Latino immigrant parents' barriers to obtaining the HPV vaccine for their children	USA	AMR	High	Caregivers
Audrey 2020	Examine how acceptable the new procedures for HPV vaccination delivery are to young women, parents and carers, school staff and immunisation nurses involved	England	EUR	High	Caregivers and adolescents
Auslander 2017 Auslander 2019	Identify factors influencing the vaccine intention-behaviour relationship	USA	AMR	High	Caregivers
Bairu 2022	Identify and examine caregivers' motivators and barriers towards vaccinating their adolescents against HPV	USA	AMR	High	Caregivers and adolescents
Barnes 2018	Understand how prior experiences influence attitudinal formation, shifts, and decision-making about the HPV vaccine	USA	AMR	High	Caregivers
Batista 2016	Identify the barriers and facilitators to uptake of the HPV vaccine in an ethnically diverse group of young women in the south west of England	England	EUR	High	Adolescents
Bauquier 2022	Investigate adolescents' social representations of HPV vaccination by analysing their iconographic productions of the vaccine	France	EUR	High	Adolescents
Beavis 2022	Assess which strategies vaccine-hesitant parents perceive as most likely to motivate them to vaccinate their children against HPV	USA	AMR	High	Caregivers
Becker 2021	Explore parental HPV vaccination decision-making processes to inform content and feature recommendations for an HPV prevention intervention	USA	AMR	High	Caregivers
Bair 2008	Describe Latina mothers' acceptance of the HPV vaccine for their daughters and explore their knowledge base regarding HPV-related issues.	USA	AMR	High	Caregivers
Blumling 2013	Describe parental perceptions of the HPV vaccine in rural areas and explore a method for engaging in successful nursing research in rural areas	USA	AMR	High	Caregivers
Bond 2016	Understand the factors that affect HPV vaccine decision-making and how they vary across racial and ethnically diverse young women	USA	AMR	High	Adolescents
Boyd 2018	Determine the perceived barriers and facilitators to HPV vaccination among adoles-	USA	AMR	High	Caregivers and adolescents

(Continued)

	cents and their caregivers in rural south Alabama				
Boyte 2014	Review the process of, and lessons learned, from creating and pilot testing a bilingual fotonovela to motivate Latina mothers of preteens to get their children vaccinated against HPV	USA	AMR	High	Caregivers
Brabin 2007	Investigate parents' views on making available HPV vaccination to adolescent minors at sexual health clinics without parental consent	England	EUR	High	Caregivers
Btoush 2019 Btoush 2015	Examine knowledge, attitudes, barriers, and facilitators for HPV vaccination among Latina mothers of HPV vaccine-eligible children in low-income urban areas, as well as useful strategies to improve HPV vaccination	USA	AMR	High	Caregivers
Burns 2021	Explore the impact of knowledge and attitudes on HPV vaccination initiation and completion	Australia	WPR	High	Caregivers and adolescents
Chang 2018	Examine how adolescents and their parents describe decision-making regarding initiation of the HPV vaccine series	USA	AMR	High	Caregivers and adolescents
Chantler 2020	Evaluate the usability and acceptability of an electronic consent pilot intervention for school-based immunisations and assess its impact on consent form returns and HPV vaccine uptake	England	EUR	High	Caregivers and adolescents
Colon-Lopez 2021	Examine the views of parents and guardians with unvaccinated children about the process of implementing the new HPV vaccination school entry policy in Puerto Rico, and identify potential barriers and facilitators related to the implementation of this requirement	Puerto Rico	AMR	High	Caregivers
Cunningham-Erves 2018	Identify intervention targets for culturally-relevant, theory-based interventions to increase HPV vaccination rates in Black women adolescents	USA	AMR	High	Caregivers
Dailey 2017	Explore how Somali immigrant families living in Ohio, USA, make decisions regarding whether to vaccinate their children against HPV	USA	AMR	High	Caregivers
Dal 2020	Identify the perceptions and feelings of young girls regarding HPV vaccination	France	EUR	High	Adolescents
Dang 2020a Dang 2020b	Examine the experiences of clinicians, clinic support staff, and parents regarding HPV vaccine delivery across an integrated primary care network	USA	AMR	High	Caregivers

(Continued)

Davies 2021	Explore parental attitudes, knowledge and decision-making about HPV vaccination for adolescents in the context of a gender-neutral and school-based Australian National Immunisation Program	Australia	WPR	High	Caregivers
Dela Cruz 2017	Identify HPV vaccination barriers, motivators, and brochure preferences among parents of teens in multicultural Hawai	USA	AMR	High	Caregivers
DeLauer 2020	Identify knowledge and beliefs about HPV vaccination among students in a residential academic institution	USA	AMR	High	Adolescents
Dempsey 2009	Compare the reasons why mothers do or do not have their adolescent daughters vaccinated against HPV	USA	AMR	High	Caregivers
Dilley 2018	Develop a comprehensive assessment of HPV vaccination, with the goal of making recommendations for tailored and multilevel interventions	USA	AMR	High	Caregivers
DiStefano 2012	Identify and contextualise factors that shape HIV and HPV risk and prevention among young adults in Chamorro and Tongan communities in Southern California	USA	AMR	High	Caregivers and adolescents
Dube 2019	Understand the determinants of low HPV vaccine uptake and identify strategies to enhance HPV vaccine acceptance using the socio-ecological model	Canada	AMR	High	Caregivers
Fernandez-Pineda 2020	Determine the salient factors among Hispanic parents for vaccinating their children against HPV and for designing a future HPV prevention intervention for Hispanics	USA	AMR	High	Caregivers
Footman 2022	Explore similarities and differences in parents' attitudes towards COVID-19 and HPV vaccines	USA	AMR	High	Caregivers
Fontenot 2015	Explore parents' attitudes and beliefs about the nine-valent HPV vaccine	USA	AMR	High	Caregivers
Forsner 2016	Investigate how 11 to 12-year-old girls narrate their expectations prior to HPV vaccination	Sweden	EUR	High	Adolescents
Forster 2017	Explore the factors that prevent ethnic minority parents from vaccinating, compared to White British nonvaccinating parents and vaccinating ethnic minority parents	England	EUR	High	Caregivers
Ganczak 2022	Identify health system barriers to vaccination, specifically HPV and MMR vaccination, among children in Ukrainian economic migrants	Poland	EUR	High	Adolescents

(Continued)

Gottvall 2013	Explore parents' reasoning around HPV vaccination acceptance for their daughters and their views on HPV-related information	Sweden	EUR	High	Caregivers
González-Cano 2021	Explore amongst adolescents and parents how adolescent sexual behaviour is approached in families, their position regarding HPV vaccination, and how widespread knowledge about HPV is in Andalusia, the region with the lowest vaccination rate in Spain	Spain	EUR	High	Caregivers and adolescents
Grandahl 2014	Explore why parents refuse HPV vaccination for their daughters from the Swedish school-based vaccination programme	Sweden	EUR	High	Caregivers
Greenfield 2015	Identify attitudes and knowledge of adolescent vaccination recommendations for tetanus, diphtheria, and acellular pertussis (Tdap); quadrivalent meningococcal conjugate (MCV4); and human papillomavirus (HPV) vaccines among Hispanic, Somali, and Ethiopian/Eritrean communities in King County, Washington	USA	AMR	High	Caregivers and adolescents
Griffioen 2012 Griffioen 2010	Explore (a) the factors influencing mothers' decisions to vaccinate their daughters against HPV and (b) mothers' and daughters' perspectives about HPV vaccine-related decision-making	USA	AMR	High	Parents/caregivers and adolescents
Haesebaert 2012	Assess mothers' acceptance of HPV vaccination for their daughters and the determinants of that acceptability	France	EUR	High	Caregivers
Hamlish 2012	Identify motivators and barriers to HPV vaccination and culturally-relevant and meaningful opportunities for vaccine promotion among African American mothers and their adolescent daughters	USA	AMR	High	Caregivers and adolescents
Hansen 2016	Understand the reasons why parents may accept or refuse the HPV vaccine for their children	USA	AMR	High	Caregivers
Hansen 2017	Examine acceptability, facilitators, and barriers of HPV vaccination visits from the perspectives of adolescents and parents	USA	AMR	High	Caregivers and adolescents
Henderson 2011	Develop evidence-based core HPV messages, relevant to the new testing and vaccination programmes	England	EUR	High	Caregivers and adolescents
Hilton 2011	Explore adolescent girls' understandings of HPV and its link with cervical cancer, and their experiences of vaccination in the year following the introduction of the HPV vacci-	UK	EUR	High	Adolescents

(Continued)

	nation programme, in order to identify gaps in knowledge				
Hilton 2013	Explore understandings, attitudes and experiences of vaccination and vaccine-preventable diseases	UK	EUR	High	Adolescents
Hirth 2019	Examine the acceptability of a multi-component patient navigator intervention programme designed to decrease barriers to HPV vaccination among caregivers of adolescents	USA	AMR	High	Caregivers
Hofman 2013	Explore HPV vaccination decisional strategies and the factors that could guide HPV vaccination intentions	Netherlands	EUR	High	Caregivers
Hughes 2011	Generate hypotheses to inform interventions to increase receipt of the HPV vaccine	USA	AMR	High	Caregivers and adolescents
Karafillakis 2021	Explore the role of maturity in decision-making around HPV vaccination	France	EUR	High	Caregivers and adolescents
Karafillakis 2022a	Provide an in-depth exploration and comparison of mothers' and adolescent girls' perceptions of the risks and benefits of HPV vaccination	France	EUR	High	Caregivers and adolescents
Karafillakis 2022b	Explore the role of trust in HPV vaccination decision-making among mothers and adolescent girls	France	EUR	High	Caregivers and adolescents
Katz 2016b	Identify and compare barriers to HPV vaccination as perceived by healthcare providers, Black and Latino adolescents, and their caregivers to inform a clinic-based intervention to improve immunisation rates	USA	AMR	High	Caregivers and adolescents
Kemberling 2011	Understand the knowledge, attitudes and perceptions of Alaska Native adolescent girls about cervical cancer, genital warts, HPV and the HPV vaccine	USA	AMR	High	Adolescents
Kennedy 2014	Explore the views of parents, teenage girls and health professionals about three vaccines: the measles, mumps, rubella (MMR), the human papillomavirus (HPV) and the influenza A (H1N1) vaccine	Scotland	EUR	High	Caregivers and adolescents
Kepka 2009 Kepka 2012	Explore the perspectives of Latino parents on a sensitive topic related to adolescent sexual health and use these findings to develop a culturally tailored public health intervention to address parental concerns	USA	AMR	High	Caregivers
Kim 2015a	Determine mothers' awareness of cervical cancer prevention in their adolescent	USA	AMR	High	Caregivers

(Continued)

	daughters, with a view to developing strategies for expanding primary cervical cancer prevention for adolescent girls				
Kim 2022	Develop a theory-based, user-centred interface to stimulate and inform parents' decision-making on HPV vaccination	USA	AMR	High	Caregivers
Ko 2019	Examine how HPV vaccine perceptions and uptake are shaped among Somali, Ethiopian, and Eritrean mothers.	USA	AMR	High	Caregivers
Koskan 2021	Explore caregivers' perceptions of the HPV vaccine and their willingness for pharmacist-administered HPV vaccination	USA	AMR	High	Caregivers
Krawczyk 2011 Krawczyk 2015	Examine the reasons given by parents who accepted or refused the HPV vaccine for their daughters in the context of a free provincial school-based vaccination programme	Canada	AMR	High	Caregivers
Lahijani 2021	Identify the views of leaders and members of an African Methodist Episcopal church in metro-Atlanta, Georgia regarding community perceptions of HPV and HPV vaccination	USA	AMR	High	Caregivers and adolescents
Lama 2022	(1) identify the predictors of parents' decisions to get their children vaccinated against HPV, (2) assess parents' evaluation of current HPV vaccination campaign messages, and (3) uncover message strategies or themes parents consider to be efective and motivating to vaccinate their children against HPV	USA	AMR	High	Caregivers
Lawless 2019 Lawless 2020	Identify the influences impacting the attitudes of parents towards the HPV vaccine	Ireland	EUR	High	Caregivers
Lechuga 2020	Investigate the influence of salient sociocultural factors and their role in facilitating or hindering communication about sexuality and vaccination uptake amongst Latinos	USA	AMR	High	Caregivers and adolescents
Lee 2019	Explore cultural influences and barriers affecting HPV vaccination decisions and preferred educational methods to effectively deliver HPV information	USA	AMR	High	Caregivers
Lefevre 2019	Explore the experiences and representations of HPV vaccination by adolescent girls seeing doctors	France	EUR	High	Adolescents
Lindsay 2021	Explore Latinx mothers' acceptance of the human papillomavirus (HPV) vaccine for their adolescent children	USA	AMR	High	Caregivers

(Continued)

Lindsay 2020 Lindsay 2022a	Explore Latinx mothers' suggested strategies to promote vaccine uptake among Latinx parents.	USA	AMR	High	Caregivers
Lindsay 2022b	Explore Latina mothers' perceptions and understanding of HPV infection, HPV-associated cancers, and the HPV vaccination for their adolescent sons and daughters.	USA	AMR	High	Caregivers
Luque 2011 Luque 2012	Understand, from the Vaccines for Children (VFC) programme provider's perspective, issues relating to HPV vaccine access and compliance for Hispanic adolescents in a rural setting	USA	AMR	High	Caregivers
Mansfield 2022	Identify individual-, relationship-, and community-level factors of timely series completion among adolescents initiating the HPV vaccine series in 2017	USA	AMR	High	Caregivers and adolescents
Marshall 2019b	Identify factors that influence adolescent HPV vaccine decisions and intervention functions and strategies likely to be effective in reducing vaccine hesitancy	Ireland	EUR	High	Adolescents
Masserey 2019	(1) describe the vaccination delivery system, particularly for adolescent HBV and HPV vaccinations, (2) examine health professional and community vaccine awareness, priorities and practices; and (3) compare low-vaccination coverage (LVC) and high-vaccination coverage (HVC) cantons	Switzerland	EUR	High	Caregivers and Adolescents
Miller 2014	Explore attitudes and beliefs about HPV vaccination among urban, economically disadvantaged adolescents	USA	AMR	High	Adolescents only
Morales-Campos 2013	Assess Hispanic mothers' and girls' perceptions about cervical cancer, HPV, and the HPV vaccine	USA	AMR	High	Caregivers and adolescents
Morales-Campos 2021	Examine gendered perspectives in knowledge, beliefs, and attitudes about HPV and HPV vaccination of Hispanic parents, women of vaccine eligible age and women eligible for Pap Test screening living in two counties along the Texas-Mexico border	USA	AMR	High	Caregivers and adolescents
Mullins 2013	Explored communication between adolescent girls, mothers, and clinicians regarding HPV vaccines and concordance in reports of maternal and clinician communication	USA	AMR	High	Caregivers and adolescents
Mullins 2014 Mullins 2015	Explore (1) trajectories of knowledge about HPV/HPV vaccines and vaccine-related risk perceptions; (2) whether knowledge and risk perceptions impacted sexual attitudes and sexual experience; (3) whether moth-	USA	AMR	High	Caregivers and adolescents

(Continued)

	ers, clinicians, and media influence girls' risk perceptions, attitudes, and behaviour				
Mupan-dawana 2016	Explore factors influencing African parents' acceptance or decline of the HPV vaccine, whether fathers and mothers share similar views pertaining to HPV vaccination and any interfamily tensions resulting from differing views	England	EUR	High	Caregivers
Niccolai 2014	Explore parents' attitudes and beliefs about STIs and cancer prevention in the context of HPV vaccination	USA	AMR	High	Caregivers
Niccolai 2016	Establish patterns in recalled experiences and subjective meanings to deepen understandings of the barriers to HPV vaccination	USA	AMR	High	Caregivers
Netfa 2021	Explore the knowledge and attitudes of parents from Arabic backgrounds towards HPV vaccination offered to their children in the national school-based vaccination programme	Australia	WPR	High	Caregivers
Noakes 2006	Provide an indication of parents' views on the potential introduction of the HPV vaccination and assess parents' preferences regarding the timing and delivery of the vaccine	England	EUR	High	Caregivers
Nodulman 2015	Investigate the feasibility and acceptance of a school-based HPV programme in New Mexico	USA	AMR	High	Caregivers and adolescents
Occa 2020 Occa 2021	Investigate Italian children's knowledge and perceptions of the HPV vaccine to identify gaps and misperceptions and provide recommendations to develop educational interventions	Italy	EUR	High	Adolescents
Ogunbajo 2016	Understand parental perceptions of the HPV vaccine, in relation to other adolescent vaccines, to help to develop strategies to increase uptake and completion of HPV vaccination	USA	AMR	High	Caregivers
Painter 2019	Explore vaccine-related knowledge, attitudes and decision-making for tetanus, diphtheria, and acellular pertussis (Tdap) vaccine, meningococcal conjugate vaccine (MenACWY), and HPV vaccine among uninsured Latin American immigrant mothers of adolescent daughters	USA	AMR	High	Caregivers
Patty 2017	Explore prevailing perspectives concerning HPV vaccination among girls, boys, and parents to identify potential determinants of HPV vaccination decisions in these groups	Netherlands	EUR	High	Caregivers and adolescents

(Continued)

Pennella 2020	Examine how adolescents think about the HPV vaccine to identify patterns and misconceptions to enhance educational efforts	USA	AMR	High	Adolescents
Perkins 2010a Perkins 2014	Explore parents' opinions of school-entry requirements for HPV vaccination	USA	AMR	High	Caregivers
Perkins 2010b	Explore low-income minority parents' attitudes, intentions, and actions with regard to HPV vaccination for their daughters	USA	AMR	High	Caregivers
Perkins 2014	Identify the rationale by parents and providers for delaying administering HPV vaccination to girls	USA	AMR	High	Caregivers
Perkins 2016	Describe why adolescent women who initiated HPV vaccination completed or did not complete the series	USA	AMR	High	Caregivers
Peterson 2022	Explore factors that influence the acceptability of cervical cancer prevention services among parents and legal guardians of vaccine-eligible girls and assess social influences related to cervical cancer prevention	USA	AMR	High	Caregivers
Pitts 2013	Identify and describe the ways parents or guardians make sense of HPV and the HPV vaccine (within the context of a state mandate) and how they responded to the mandate	USA	AMR	High	Caregivers
Ramanadhan 2020	Explore alternative HPV vaccination delivery mechanisms, specifically delivery of the vaccine in community settings	USA	AMR	High	Caregivers and adolescents
Ramirez 2014	Examine attitudes about HPV vaccination amongst ethnically diverse Hispanic mothers and grandmothers of adolescent girls	USA	AMR	High	Caregivers
Roncancio 2017	Discover the most salient beliefs of Hispanic mothers about their daughters completing the HPV vaccine series	USA	AMR	High	Caregivers
Roncancio 2019	Assess the four Ps (product, price, place and promotion) as they relate to efforts to promote HPV vaccine initiation	USA	AMR	High	Caregivers
Roncancio 2021	Explore Hispanic mothers' experiences during their adolescent child's HPV vaccination visit	USA	AMR	High	Caregivers
Runngren 2022	Describe parents' reasoning in making decisions about vaccinating their daughters against HPV	Sweden	EUR	High	Caregivers

(Continued)

Salad 2015	Explore the perceptions of Somali women living in the Netherlands regarding measures to prevent cervical cancer	Netherlands	EUR	High	Caregivers and adolescents
Sanders 2012	Describe attitudes and social and environmental factors that affect African American parents' intent to vaccinate their daughters against HPV	USA	AMR	High	Caregivers
Schmidt-Grimminger 2013	Assess knowledge, attitudes, and beliefs towards HPV and HPV vaccination during a community-based participatory research project among tribal youth, young adults, parents, and health professionals	USA	AMR	High	Caregivers and adolescents
Schwendener 2022	Provide a detailed characterisation of the HPV vaccine awareness, knowledge and information sources, and decision-making amongst men and women adolescents	Switzerland	EUR	High	Adolescents only
Seale 2012	Document the knowledge and attitudes of parents/guardians of immunosuppressed children and adolescents towards HPV infection and the HPV vaccine	Australia	WPR	High	Caregivers
Sealy 2021	Explore barriers and facilitators that affected the acceptance of the HPV vaccine by mothers of adolescent women	USA	AMR	High	Caregivers
Selvey 2020	Describe the drivers of low HPV vaccination coverage in Western Australian schools and barriers and enablers to improving vaccine coverage	Australia	WPR	High	Caregivers and adolescents
Shafer 2011	Develop HPV vaccine messages for a campaign targeting racially diverse mothers of nonvaccinated adolescents in rural southeastern United States	USA	AMR	High	Caregivers
Racktoo 2009	Explore the knowledge and attitudes regarding HPV and the HPV vaccine among adolescent girls	England	EUR	High	Adolescents
Staras 2022	Develop messages about the HPV vaccine that are acceptable to caregivers of adolescents	USA	AMR	High	Caregivers
Taylor 2022	Explore: (1) mothers' knowledge and attitudes about HPV and HPV vaccination, (2) their knowledge and attitudes about cervical cancer and screening, and (3) whether their daughter's HPV vaccination invitation was an opportunity to nudge mothers to attend screening	England	EUR	High	Caregivers
Theis 2020	Elicit perspectives of parents and providers on the best way to communicate information on HPV vaccine side effects	USA	AMR	High	Caregivers

(Continued)

Tof-folon-Weiss 2008	Describe Alaska Native parents' knowledge of, and attitudes towards, cervical cancer, HPV and the HPV vaccine	USA	AMR	High	Caregivers
Vamos 2021	Explore the multi-level determinants of HPV vaccination among Hispanic migrant farm-worker families	USA	AMR	High	Caregivers
Walker 2020a Walker 2020b	Examine the relationship between the media and provider HPV recommendations on maternal HPV vaccine hesitancy	USA	AMR	High	Caregivers
Walker 2021	Explore maternal COVID-19 threat perceptions and willingness to accept a COVID-19 vaccine in light of their expressed vaccine hesitancy toward past school required and routinely recommended vaccines and the HPV vaccine for their children	USA	AMR	High	Caregivers
Waller 2006	Investigate responses to information about the HPV vaccine among mothers of adolescent daughters	England	EUR	High	Caregivers
Waters 2021	Describe the views of HPV vaccine-eligible cancer survivors and caregivers of younger eligible survivors	USA	AMR	High	Caregivers and adolescents
Wentzell 2016	Assess and compare the knowledge, beliefs, and practices regarding HPV vaccination among mothers of vaccine-eligible girls in California and Mexico	USA	AMR	High	Caregivers
Westrick 2017 Hohmann 2016	Determine parents' knowledge and attitudes regarding HPV vaccinations for their adolescent children and their perceptions of adolescent vaccinations in community pharmacies	USA	AMR	High	Caregivers
Williams 2011	Explore knowledge and attitudes towards HPV vaccination among girls who were part of the 'catch-up' vaccination programme	England	EUR	High	Adolescents
Wilson 2021a	Understand newcomers' knowledge, attitudes, and beliefs (KAB) on HPV and HPV vaccination and their role in HPV vaccine acceptance	Canada	AMR	High	Caregivers and adolescents
Xiong 2020 Xiong 2022	Learn about barriers, facilitators, and decision-making processes regarding vaccinations generally and the HPV vaccine specifically	USA	AMR	High	Caregivers and adolescents
Zach 2022	Explore the basis of objections to the HPV vaccine amongst members of an ultra-Orthodox Jewish community, to enhance the cultural understanding and ethical addressing of HPV vaccination refusal	Israel	EUR	High	Caregivers

(Continued)

Zeraiq 2015	Explore attitudes and knowledge towards HPV vaccination among Arab mothers and their daughters	Denmark	EUR	High	Caregivers and adolescents

AMR: World Health Organization region The Americas; **EUR:** World Health Organization region Europe; **HBV:** hepatitis B; **HPV:** human papillomavirus; **ID:** identifier; **MMR:** vaccine against measles, mumps, and rubella; **STI:** sexually transmitted infection; **WHO:** World Health Organization; **WPR:** World Health Organization region Western Pacific

Appendix 3. Methodological limitations of sampled studies[a,b]

Study ID	1. Are the setting(s) and context described adequately?	2. Is the sampling strategy described, and is this appropriate?	3. Data collection strategy described & justified?	4. Data analysis described, & appropriate?	5. Are the claims made/findings supported by sufficient evidence?	6. Is there evidence of reflexivity?	7. Demonstrate sensitivity to ethical concerns?	8. Any other concerns?
Adeyanju 2022	No	Yes	Yes	Yes	Yes	No	No	No
Albert 2019	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Alexander 2012	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Ali 2022	Partial	No	Yes	Yes	Yes	Yes	Yes	No
Ambali 2022	No	No	Partial	Partial	Yes	No	Yes	No
Balogun 2018	Yes	No	Yes	Yes	Yes	No	Yes	No
Bartolini 2012	No	Yes	Yes	Yes	Yes	No	Yes	No
Beyen 2022	No	Yes	Yes	Yes	Yes	No	Yes	No
Bowen 2014	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Bunton 2013	No	No	No	Yes	Yes	No	No	No
Burke 2015	No	Yes	Yes	Yes	Yes	No	No	No
Chau 2021	No	Yes	Yes	Yes	Yes	No	Yes	No
Chiang 2015	No	Yes	Yes	Yes	Yes	No	Yes	No
Cooper 2010	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Cordoba-Sanchez 2019	Partial	Yes	Yes	Yes	Yes	No	Yes	Yes
Cordoba-Sanchez 2022	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Cover 2012	No	Yes	Yes	Yes	Yes	No	Yes	No

(Continued)

Craciun 2012	Yes	No	No	Yes	No	No	Yes	No
Creed 2021	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Dalmau 2020	No	Yes	Yes	Yes	Yes	No	Yes	No
De Fouw 2023	Partial	Yes	Yes	Yes	Partial	No	Yes	No
de Oliveira 2019	No	No	Yes	Yes	Yes	No	Yes	No
Elit 2022	No	Yes	Yes	Yes	Yes	No	Yes	No
Evans 2021	No	Yes	Partial	No	Yes	No	No	No
Fielding 2018	No	Yes	Yes	Yes	Yes	No	No	No
Fisher 2020	No	No	Yes	Yes	Yes	No	Yes	No
Francis 2011	No	Yes	Yes	Yes	Yes	No	Yes	No
Friedman 2013	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Galbraith-Gyan 2019	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Getrich 2014	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Gordon 2011	No	Yes	Yes	Yes	Yes	No	Yes	No
Gottvall 2017	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Grandahl 2019	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Gutierrez 2013	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Harries 2009	No	Yes	Yes	Yes	Yes	No	Yes	No
Holroyd 2022	No	Yes	Yes	Yes	Partial	No	Yes	No
Islam 2018	No	Yes	Yes	Yes	Yes	No	Yes	No
Jackson 2016	Yes	Yes	Yes	Yes	Yes	No	Yes	No

(Continued)

Joseph 2015	No	Yes	Yes	Yes	Yes	No	Yes	No
Katahoire 2008	Yes	Yes	Yes	Yes	Yes	No	No	No
Katz 2013	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Kisaakye 2018	Partial	Yes	Yes	Yes	Yes	No	Yes	Yes
Kucheba 2021	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Liebermann 2020a	No	Yes	Yes	Yes	Yes	No	Yes	No
Lismidiati 2019	No	Yes	Yes	Yes	Yes	No	Yes	No
Madhivanan 2009	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Marlow 2009	No	Yes	Yes	Yes	Yes	No	Yes	No
Mitchell 2021	No	Yes	Yes	Yes	Yes	No	Yes	No
Muresianu 2022	No	Partial	Yes	Yes	Yes	No	Yes	No
Njuguna 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Nordtug 2021	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Patrick 2022	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Paul 2014	No	Yes	Yes	Yes	Yes	No	Yes	No
Perez 2015	No	Yes	Yes	Yes	Yes	No	Yes	No
Perkins 2013	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Pop 2015	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Rail 2018	No	Yes	Yes	Yes	Yes	No	No	No
Reich 2010	Yes	Yes	Yes	Yes	Yes	No	No	No
Reiter 2014	Yes	Yes	Yes	Yes	Yes	No	Yes	No

(Continued)

Remes 2012	No	No	Yes	Yes	Yes	No	No	No
Rendle 2017	No	Yes	Yes	Yes	Yes	No	Yes	No
Roncancio 2019	No	Yes	Yes	Yes	Yes	No	Yes	No
Rujumba 2021	No	Yes	Yes	Yes	Yes	No	Yes	No
Siu 2014	No	Yes	No	Yes	Yes	No	Yes	Yes
Stephens 2013	Partial	Yes	Yes	Yes	Yes	No	Yes	No
Turiho 2017	Yes	Yes	Yes	Yes	Yes	No	No	No
Venderbos 2022	No	Yes	Yes	Yes	Yes	No	No	No
Vermandere 2015	No	Yes	Yes	Yes	Yes	No	Yes	No
Wakimizu 2015	No	Yes	Yes	Yes	Yes	No	Yes	No
Ward 2017	No	Yes	Yes	Yes	Yes	No	No	No
Warner 2015	No	Yes	Yes	Yes	Yes	No	Yes	No

[a]Based on a list of criteria used in previous Cochrane reviews and originally based on the Critical Appraisal Skills Programme (CASP) quality assessment tool for qualitative studies (CASP 2018).
[b]Comprises a summarised version, excluding detailed notes for each question.

Appendix 4. Evidence profiles

Finding 1	
Biomedical knowledge about HPV and HPV vaccination was often limited amongst caregivers and adolescents	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in some studies were supported by insufficient evidence. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Albert 2019; Alexander 2012; Ali 2022; Ambali 2022; Balogun 2018; Bowen 2014; Bunton 2013; Burke 2015; Chau 2021; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Craciun 2012; Creed 2021; Dalmau 2020; De Fouw 2023; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Harries 2009; Holroyd 2022; Jackson 2016; Joseph 2015; Katahoire 2008; Katz 2013; Kisaakye 2018; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Marlow 2009; Muresianu 2022; Patrick 2022; Paul 2014; Perez 2015; Perkins 2013; Rail 2018; Reiter 2014; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015; Warner 2015	
Finding 2	
A lack of biomedical knowledge about HPV and HPV vaccination contributed to reducing many caregivers' and adolescents' acceptance of the vaccine, including influencing their decision to delay or decline it, or generating concerns that they had accepted the vaccine or were expected to accept it without being properly informed. Providing caregivers and adolescents with biomedical information about HPV and HPV vaccination could enhance acceptance of it.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in some studies were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. for some caregivers and adolescents a lack of biomedical knowledge had no impact on their HPV vaccination acceptance (see finding 3) or for others it enhanced their HPV vaccination acceptance (see finding 4) (contradictory data).
Relevance	No or very minor concerns

(Continued)

Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Ambali 2022; Bartolini 2012; Beyen 2022; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Craciun 2012; Creed 2021; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Holroyd 2022; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Patrick 2022; Perez 2015; Perkins 2013; Rail 2018; Remes 2012; Roncancio 2019; Turiho 2017; Venderbos 2022; Vermandere 2015; Warner 2015	
Finding 3	
A lack of biomedical knowledge about HPV and HPV vaccination did not impact on many caregivers' and adolescents' acceptance of the vaccine - they accepted it despite having limited biomedical knowledge about it.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. for some caregivers and adolescents a lack of biomedical knowledge descreased their HPV vaccination acceptance (see finding 2) or for others it enhanced their HPV vaccination acceptance (see finding 4) (contradictory data).
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Ambali 2022; Balogun 2018; Chiang 2015; Dalmau 2020; Friedman 2013; Getrich 2014; Harries 2009; Joseph 2015; Katahoire 2008; Madhivanan 2009; Paul 2014; Rail 2018; Reiter 2014; Remes 2012; Stephens 2013; Turiho 2017	
Finding 4	
A lack of biomedical knowledge about HPV and HPV vaccination contributed to enhancing some caregivers' and adolescents' acceptance of the vaccine. These individuals held beliefs that did not align with biomedical understandings yet served as strong motivators to receive the vaccine.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in many of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. for some caregivers and adolescents a lack of biomedical knowledge had no impact on their HPV vaccina-

(Continued)

	tion acceptance (see finding 3) or for others it decreased their HPV vaccination acceptance (see finding 2) (contradictory data).
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Alexander 2012; De Fouw 2023; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Harries 2009; Katz 2013; Turiho 2017; Vermandere 2015; Wakimizu 2015	
Finding 5	
Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its many short-term side effects, including discomfort, pain, swelling or cracked skin at the injection site, dizziness, headache, fever and fainting. The number of vaccine doses required for different vaccination schedules contributed to increasing concerns about side effects for some whilst decreasing concerns for others.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in some studies were supported by insufficient evidence. There was also no evidence of reflexivity in many of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Ali 2022; Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Gutierrez 2013; Harries 2009; Islam 2018; Jackson 2016; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Perkins 2013; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Turiho 2017; Wakimizu 2015; Warner 2015	
Finding 6	
Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about what they perceived as its various serious and long-term adverse effects. Negative reproductive health effects for women, including infertility, were a particularly prominent concern.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in some studies

(Continued)

	were supported by insufficient evidence. There was also no evidence of reflexivity in many of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Balogun 2018; Bartolini 2012; Beyen 2022; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Elit 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Gutierrez 2013; Harries 2009; Islam 2018; Jackson 2016; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Perkins 2013; Remes 2012; Roncancio 2019; Rujumba 2021; Siu 2014; Turiho 2017; Wakimizu 2015; Warner 2015	
Finding 7	
Many caregivers and adolescents were less accepting of HPV vaccination due to their uncertainty about the effectiveness of the vaccine.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some of the studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Adeyanju 2022; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Islam 2018; Jackson 2016; Joseph 2015; Kucheba 2021; Mitchell 2021; Njuguna 2021; Perkins 2013; Rendle 2017; Siu 2014; Turiho 2017; Wakimizu 2015; Ward 2017	
Finding 8	
Many caregivers and adolescents were less accepting of HPV vaccination due to their concerns about the relative 'newness' of the vaccine, which contributed to uncertainty regarding its safety and effectiveness. Some caregivers wished to delay HPV vaccination for their adolescent until they felt sufficient evidence had accumulated about its risks and benefits.	
Assessment for each GRADE-CERQual component	

(Continued)

Methodological limitations	Minor concerns due to poor or partial reporting of the setting in many studies and the sampling approach and data collection in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Bartolini 2012; Bowen 2014; Burke 2015; Cooper 2010; Cover 2012; Craciun 2012; Dalmau 2020; Elit 2022; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Gordon 2011; Joseph 2015; Katahoire 2008; Kucheba 2021; Liebermann 2020a; Njuguna 2021; Perkins 2013; Rail 2018; Rendle 2017; Siu 2014; Turiho 2017; Venderbos 2022; Vermandere 2015; Wakimizu 2015; Ward 2017

Finding 9

Many adolescents were less accepting of HPV vaccination due to their fear or dislike of needles.

Assessment for each GRADE-CERQual component

Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Alexander 2012; Balogun 2018; Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Jackson 2016; Katahoire 2008; Njuguna 2021; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Wakimizu 2015

Finding 10

Many caregivers were less accepting of HPV vaccination due to their concern that it would promote what they perceived as 'inappropriate' sexual practices, including the initiation of sex, promiscuity or unsafe sexual practices.

Assessment for each GRADE-CERQual component

Methodological limitations	Minor concerns due to poor or partial reporting of the setting in many studies and the sampling approach, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies.
Coherence	No or very minor concerns

(Continued)

Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Albert 2019; Alexander 2012; Ambali 2022; Balogun 2018; Bartolini 2012; Cooper 2010; de Oliveira 2019; Evans 2021; Fielding 2018; Fisher 2020; Francis 2011; Kucheba 2021; Perkins 2013; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Warner 2015	
Finding 11	
Many caregivers and adolescents perceived cervical cancer to be a frequent and serious illness that causes immense pain, suffering and financial cost. This contributed to increasing their HPV vaccination acceptance, particularly amongst those with personal experiences of cervical cancer and those from resource-limited settings.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting in most studies and the sampling approach, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies.
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some caregivers perceived cervical cancer to be an illness that is not easily transmitted and increasingly preventable, detectable and treatable (see finding 12) (contradictory data).
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Albert 2019; Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Cover 2012; Creed 2021; Dalmau 2020; De Fouw 2023; de Oliveira 2019; Elit 2022; Fielding 2018; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Harries 2009; Jackson 2016; Joseph 2015; Kucheba 2021; Liebermann 2020a; Madhivanan 2009; Mitchell 2021; Njuguna 2021; Patrick 2022; Remes 2012; Turiho 2017; Vermandere 2015; Wakimizu 2015; Ward 2017	
Finding 12	
Some caregivers perceived cervical cancer and other HPV-related cancers to be illnesses that are not easily transmitted and increasingly preventable, detectable and treatable. This contributed to reducing their acceptance of HPV vaccination as the prevention of cancer, including cervical cancer, was not seen as a significant benefit of vaccination.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns

(Continued)

Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some caregivers perceived cervical cancer to be a frequent and serious illness that causes immense pain, suffering and financial cost (see finding 11) (contradictory data).
Relevance	Moderate concerns about relevance because all of the studies came high-income settings (partial relevance).
Adequacy	Minor concerns because relatively fewer studies contributed to this finding, however, the contributing data were sufficiently rich.
Overall GRADE-CERQual assessment and explanation	
Low confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about both coherence (contradictory data) and adequacy.
Contributing studies	
Albert 2019; Bowen 2014; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Ward 2017	
Finding 13	
Some caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other cancers besides cervical cancer, which in turn contributed to increasing their acceptance of it. This was a particularly common motivator of HPV vaccination for adolescent men.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by the lack of reflexivity among the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Alexander 2012; Cover 2012; Creed 2021; Galbraith-Gyan 2019; Grandahl 2019; Joseph 2015; Patrick 2022; Perkins 2013; Venderbos 2022; Wakimizu 2015	
Finding 14	
Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against HPV infection, which in turn contributed to increasing their acceptance of it. This was a particularly common motivator of HPV vaccination for adolescent men.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by the lack

(Continued)

	of reflexivity amongst the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Alexander 2012; Ambali 2022; Cordoba-Sanchez 2019; Galbraith-Gyan 2019; Getrich 2014; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Njuguna 2021; Paul 2014; Perkins 2013; Roncancio 2019; Venderbos 2022; Vermandere 2015

Finding 15

Many caregivers and adolescents perceived HPV vaccination as beneficial due to the protection it was seen to provide against various other STIs besides HPV, including genital herpes, gonorrhoea and HIV/AIDS. This in turn contributed to increasing their HPV vaccination acceptance. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings in which endemic sexual and gender-based violence was perceived to make women particularly vulnerable to STIs.

Assessment for each GRADE-CERQual component

Methodological limitations	Minor concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by the lack of reflexivity amongst the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Alexander 2012; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2019; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Grandahl 2019; Harries 2009; Joseph 2015; Katz 2013; Perkins 2013; Turiho 2017

Finding 16

Many caregivers and adolescents perceived HPV vaccination as beneficial for health promotion and disease prevention generally, which contributed to increasing their acceptance of it. This was a particularly strong motivator amongst caregivers from socio-economically disadvantaged settings, where preventing illness and associated financial burden were frequently viewed as very important.

Assessment for each GRADE-CERQual component

Methodological limitations	Moderate concerns due to poor or partial reporting of the setting in most studies and the sampling approach, data collection and data analysis in some studies supporting this finding. There was also

(Continued)

	no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies. There are also concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by the lack of reflexivity amongst the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about methodological limitations
Contributing studies	
Albert 2019; Alexander 2012; Ambali 2022; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cordoba-Sanchez 2022; Cover 2012; Creed 2021; de Oliveira 2019; Elit 2022; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Joseph 2015; Katz 2013; Madhivanan 2009; Patrick 2022; Paul 2014; Roncancio 2019; Turiho 2017	
Finding 17	
Some caregivers perceived HPV vaccination as beneficial only for the individual who receives it and therefore thought herd immunity was not an advantage. This contributed to reducing these caregivers' HPV vaccination acceptance due to their sense of collective responsibility as a driver for vaccination.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	Serious concerns about relevance because the studies came from a small range of geographical, high-income settings and both studies were conducted amongst a particular subgroup of parents (those from the Jewish community in London and white parents from high socio-economic groups in Colorado) (partial relevance).
Adequacy	Serious concerns regarding adequacy because this is an explanatory finding that is based on only 2 studies and thin data
Overall GRADE-CERQual assessment and explanation	
Very low confidence	Finding downgraded because of serious concerns about both adequacy and relevance (partial relevance)
Contributing studies	
Gordon 2011; Reich 2010	
Finding 18	
Many adolescents and caregivers perceived HPV vaccination to be beneficial and necessary only for people who are, or are about to become, sexually active. Numerous adolescents indicated that they were not yet sexually active, and many caregivers thought their adolescent was not yet having sex nor would be in the foreseeable future. This in turn contributed to reducing HPV vaccination acceptance for these adolescents and caregivers.	

(Continued)

Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some adolescents and caregivers perceived HPV vaccination to be beneficial and necessary only for people who have not yet engaged in sexual activities (see finding 19), some parents thought their adolescent was sexually active (contradictory data).
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Alexander 2012; Bowen 2014; Chau 2021; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Lismidiati 2019; Madhivanan 2009; Perkins 2013; Reich 2010; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Wakimizu 2015	
Finding 19	
Some caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who have not yet engaged in sexual activities. This contributed to reducing acceptance of HPV vaccination amongst adolescents who were already sexually active or caregivers who suspected their adolescent was already sexually active.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some adolescents and caregivers perceived HPV vaccination to be beneficial and necessary only for people who are sexually active (see finding 18) (contradictory data)
Relevance	Moderate concerns about relevance because the studies came from only 2 settings and focused only on HPV vaccination for women (partial relevance).
Adequacy	Serious concerns regarding adequacy because this is an explanatory finding that is based on only 2 studies and thin data
Overall GRADE-CERQual assessment and explanation	
Very low confidence	Finding downgraded because of serious concerns about adequacy, moderate concerns about relevance (partial relevance) and minor concerns about coherence (contradictory data)
Contributing studies	
Cooper 2010; Turiho 2017	
Finding 20	
Many caregivers and adolescents perceived HPV vaccination to be beneficial and necessary only for people who engage in what was seen as ‘inappropriate’ sexual practices, including promiscuity, having multiple sexual partners or premarital sex. Numerous adoles-	

(Continued)

cents and caregivers characterised themselves or their adolescent as practising monogamy, sexual restraint or abstinence until marriage, which contributed to reducing their acceptance of HPV vaccination.
Assessment for each GRADE-CERQual component
Methodological limitations — Minor concerns due to poor or partial reporting of the setting in most studies and the sampling approach and data collection in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical issues in some of these studies
Coherence — Minor concerns because although generally the case, the data were a bit more varied e.g. some parents characterised their own adolescent as promiscuous, having multiple sexual partners or engaging in premarital sex which in turn contributed to increasing their acceptance HPV vaccination (see finding 34) (contradictory data)
Relevance — No or very minor concerns
Adequacy — No or very minor concerns
Overall GRADE-CERQual assessment and explanation
Moderate confidence — Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies
Albert 2019; Balogun 2018; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Harries 2009; Jackson 2016; Joseph 2015; Katahoire 2008; Liebermann 2020a; Madhivanan 2009; Paul 2014; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015
Finding 21
Some adolescents' and caregivers' views and practices around HPV vaccination formed part of a routine response to vaccines and vaccination more generally. This contributed to both increasing and decreasing HPV vaccination acceptance, depending on their routine response.
Assessment for each GRADE-CERQual component
Methodological limitations — No or very minor concerns
Coherence — No or very minor concerns
Relevance — No or very minor concerns
Adequacy — No or very minor concerns
Overall GRADE-CERQual assessment and explanation
High confidence
Contributing studies
Bowen 2014; Bunton 2013; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Jackson 2016; Marlow 2009; Perkins 2013; Rail 2018; Roncancio 2019; Venderbos 2022; Ward 2017
Finding 22

(Continued)

Some caregivers' and adolescents' views and practices around HPV vaccination were influenced by their views and experiences of other vaccines or vaccination programmes. A belief that vaccination is generally beneficial, witnessing the benefits of other vaccines, or having positive personal experiences receiving other vaccines contributed to increasing HPV vaccination acceptance amongst various caregivers and adolescents. In contrast, witnessing adverse effects of other vaccines or having negative personal experiences receiving other vaccines contributed to decreasing HPV vaccination acceptance amongst various caregivers and adolescents.

Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Bartolini 2012; Burke 2015; Chau 2021; Chiang 2015; Cover 2012; Creed 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Katahoire 2008; Kucheba 2021; Madhivanan 2009; Mitchell 2021; Patrick 2022; Paul 2014; Reich 2010; Remes 2012; Turiho 2017; Vermandere 2015; Ward 2017

Finding 23

Sometimes the decision around HPV vaccination was perceived to be made by the caregiver(s), with limited or no involvement of the adolescent. Some adolescents were supportive of this parental decision-making authority, whereas others resented not being consulted, particularly when they held contrasting HPV vaccination views to their caregiver(s). In both cases, HPV vaccination could be received, delayed or declined, depending on the caregivers' views.

Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. the studies revealed various other nuclear familial decision-making dynamics, including where the adolescent is (or perceived as should be) the decision-maker or there is a shared decision-making process amongst caregiver(s) and adolescents (see findings 24-26) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Alexander 2012; Bowen 2014; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Elit 2022; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Warner 2015

Finding 24

(Continued)

Sometimes the decision around HPV vaccination was perceived to be made by the adolescent. This was potentially more common amongst older adolescent men and men who have sex with men (MSM); in households where primary caregiver(s) were absent; or when adolescents held contrasting HPV vaccination views to their caregiver(s). In all cases, HPV vaccination could be received, delayed or declined, depending on the adolescent's views.

Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in some studies were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. the studies revealed various other nuclear familial decision-making dynamics, including where the caregiver was the decision-maker (see finding 23) or there is a shared decision-making process amongst caregiver(s) and adolescents (see findings 26) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Alexander 2012; Bowen 2014; Cooper 2010; Craciun 2012; Fisher 2020; Grandahl 2019; Gutierrez 2013; Joseph 2015; Katz 2013; Pop 2015	

Finding 25	
Various caregivers held a view that the decision around HPV vaccination should be made by adolescents because it is the adolescent's body and sexuality. Some of these caregivers therefore delayed HPV vaccination until their adolescent was older and thought to be more equipped to make the decision themselves .	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. the studies revealed various other nuclear familial decision-making dynamics, including where the caregiver is the decision-maker (see finding 23) or there is a shared decision-making process amongst caregiver(s) and adolescents (see findings 26) (contradictory data)
Relevance	Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy	Moderate concerns because this explanatory finding was based on relatively few studies and thin data
Overall GRADE-CERQual assessment and explanation	

(Continued)

Low confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data) and moderate concerns about both relevance (partial relevance) and adequacy

Contributing studies

Alexander 2012; Bowen 2014; Craciun 2012; Joseph 2015; Pop 2015

Finding 26

Sometimes the decision around HPV vaccination was perceived to be a consultative process and made jointly between the caregiver(s) and adolescent. When views differed, the ultimate decision was perceived to reside with the caregiver(s) in some instances and the adolescent in others. In both cases, HPV vaccination could be received, delayed or declined, depending on the views of the final decision-maker.

Assessment for each GRADE-CERQual component

Methodological limitations	No or very minor concerns
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. the studies revealed various other nuclear familial decision-making dynamics, including where the adolescent is (or perceived as should be) the decision-maker (see findings 24 and 25) or the caregiver is the decision-maker (see findings 23) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

Overall GRADE-CERQual assessment and explanation

High confidence

Contributing studies

Alexander 2012; Bartolini 2012; Bowen 2014; Cooper 2010; Cordoba-Sanchez 2019; de Oliveira 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Wakimizu 2015

Finding 27

Often HPV vaccination decision-making comprised either paternal or maternal caregiver involvement, rather than both. Which caregiver was involved was frequently influenced by who was primarily responsible for making decisions about the household or child-rearing. In all cases, HPV vaccination could be received, delayed or declined, depending on the views of the caregiver involved.

Assessment for each GRADE-CERQual component

Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, and the data collection and analysis in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical concerns in some studies
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. the studies revealed various other nuclear familial decision-making dynamics, including where no caregiver was (or thought should be) involved (see findings 24 and 25) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns

(Continued)

Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Adeyanju 2022; Ali 2022; Ambali 2022; Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; De Fouw 2023; Elit 2022; Fielding 2018; Francis 2011; Gordon 2011; Jackson 2016; Madhivanan 2009; Muresianu 2022; Njuguna 2021; Roncancio 2019	
Finding 28	
Various caregivers' and adolescents' views and practices around HPV vaccination were influenced by the HPV vaccination views and practices of their extended family members. This contributed to both increasing or decreasing HPV vaccination acceptance, depending on family members' views and practices.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Ali 2022; Bartolini 2012; Cooper 2010; Cover 2012; Fielding 2018; Francis 2011; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Grandahl 2019; Gutierrez 2013; Holroyd 2022; Jackson 2016	
Finding 29	
Adolescents' peers played an important role in shaping their HPV vaccination views and practices. When peers provided misinformation, discouraged vaccination, ridiculed those receiving the vaccine, or had negative reactions when they received the vaccine, this contributed to reducing HPV vaccination acceptance for many adolescents. In contrast, when vaccination rates amongst peer groups were high or when peers were witnessed receiving the vaccine without experiencing side effects, this contributed to enhancing HPV vaccination acceptance for many adolescents.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some adolescents appeared not to necessarily be influenced by their peers (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	

(Continued)

Contributing studies
Beyen 2022; Cooper 2010; Fielding 2018; Friedman 2013; Getrich 2014; Katz 2013; Kucheba 2021; Patrick 2022; Roncancio 2019; Rujumba 2021; Wakimizu 2015

Finding 30	
Caregivers' peers played an important role in shaping their HPV vaccination views and practices. When their peers expressed concerns about the vaccine or declined it for their own adolescent, this contributed to reducing HPV vaccination acceptance amongst many caregivers. In contrast, when their peers accepted the vaccine for their own adolescent or when their peers' adolescent received the vaccine without experiencing negative effects, this contributed to enhancing HPV vaccination acceptance amongst many caregivers.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical concerns in some of the studies
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some caregivers appeared not to necessarily be influenced by their peers (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Chiang 2015; Craciun 2012; Fielding 2018; Galbraith-Gyan 2019; Getrich 2014; Mitchell 2021; Njuguna 2021; Roncancio 2019; Turiho 2017; Venderbos 2022	

Finding 31	
Some caregivers' HPV vaccination views and practices were influenced by the HPV vaccination views and practices of traditional or religious leaders. This contributed to both increasing or decreasing acceptance of HPV vaccination, depending on the views and practices of traditional or religious leaders.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	Minor concerns: The underlying data was relatively thin and came from few studies. However, we assessed this finding as simple and descriptive and therefore with fewer demands on data richness and data quantity
Overall GRADE-CERQual assessment and explanation	

(Continued)

High confidence
Contributing studies
Balogun 2018; Galbraith-Gyan 2019; Liebermann 2020a; Turiho 2017
Finding 32
Many caregivers' and adolescents' views and practices around HPV vaccination were influenced by the information they received about the vaccine from the media. Negative media messages about HPV vaccination contributed to increasing fears and doubts, or a decision to delay or decline it. In contrast, positive media messages about HPV vaccination contributed to enhancing confidence in it or a decision to receive it.
Assessment for each GRADE-CERQual component

Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of the studies
Coherence	Moderate concerns because the finding does not reflect the complexity and variation of the data E.g. various studies found that the role of the media in influencing HPV vaccination views and practices may be more complex than a straightforward positive or negative influence- for some caregivers the media was less about shaping their vaccination views and practices and more about being used to justify or provide reassurance for vaccination decisions; other caregivers and adolescents were found to be distrustful of media sources, and therefore did not act upon the information they receive from the media or responded to it with caution (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about coherence (contradictory data) and minor concerns about methodological limitations
Contributing studies	
Bartolini 2012; Cooper 2010; Cordoba-Sanchez 2019; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Gordon 2011; Grandahl 2019; Jackson 2016; Kucheba 2021; Liebermann 2020a; Nordtug 2021; Siu 2014; Wakimizu 2015; Ward 2017	
Finding 33	
Several caregivers viewed adolescence, particularly amongst women, as a time of 'sexual innocence' and 'purity'. HPV vaccination appeared to threaten this view, by obliging caregivers to think of their adolescent as a sexual being or to initiate conversations about sex with them. This in turn contributed to decreasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for women.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting in many studies and the sampling approach in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	Moderate concerns because the data were a bit more varied e.g. some parents saw adolescence as a time of 'curiosity' and 'experimentation' (see finding 34) (contradictory data). Moreover, some of

(Continued)

	the links and associations in this finding were less supported by the underlying data or it was hard to tell the level of support from the underlying data because the issue was mentioned in passing and not explored in detail by many of the studies (e.g. HPV vaccination associated with a disruption of adolescent innocence/purity; conversations about sexual matters with their adolescents linked to disruption of adolescent innocence/purity)- there is therefore a degree of inference embedded in this interpretive finding (ambiguous data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about coherence (contradictory and ambiguous data) and minor concerns about methodological limitations
Contributing studies	
Alexander 2012; Balogun 2018; Bowen 2014; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Creed 2021; de Oliveira 2019; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Jackson 2016; Joseph 2015; Katz 2013; Kucheba 2021; Lismidiati 2019; Madhivanan 2009; Muresianu 2022; Paul 2014; Perkins 2013; Pop 2015; Rail 2018; Reich 2010; Reiter 2014; Remes 2012; Rendle 2017; Siu 2014; Stephens 2013; Venderbos 2022; Warner 2015	
Finding 34	
Several caregivers viewed adolescence, and particularly in men, as a time of ‘sexual curiosity’ and ‘experimentation’ that is largely outside of parental control. This in turn contributed to increasing HPV vaccination acceptance amongst many of these caregivers, particularly their acceptance of HPV vaccination for men.	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	Moderate concerns because the data were a bit more varied e.g. some parents saw adolescence as a time of 'purity' or 'innocence' (see finding 33) (contradictory data). Moreover, some of the links and associations in this finding were less supported by the underlying data or it was hard to tell the level of support from the underlying data because the issue was mentioned in passing and not explored in detail by many of the studies (e.g. link between sexual curiosity/ experimentation and in turn HPV vaccination acceptance; the gendered association)- there is therefore a degree of inference embedded in this interpretive finding (ambiguous data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about coherence (contradictory data)
Contributing studies	
Albert 2019; Alexander 2012; Balogun 2018; Chiang 2015; Gordon 2011; Gutierrez 2013; Harries 2009; Katz 2013; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Rendle 2017	
Finding 35	
Several caregivers and adolescents associated HPV infection and its sequelae with what they perceived as ‘bad’ and ‘inappropriate’ sexual practices that ‘others’ engage in, including promiscuity, multiple sexual partners or sex before marriage. This in turn con-	

(Continued)

tributed to decreasing acceptance of HPV vaccination, particularly for women, amongst many of these caregivers and adolescents, as they considered it personally unnecessary or potentially stigmatising to receive.

Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in many of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	Minor concerns because although generally the case, the data were a bit more varied e.g. some parents characterised their own adolescent as promiscuous, having multiple sexual partners or engaging in premarital sex which in turn contributed to increasing their acceptance HPV vaccination (see finding 34) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)

Contributing studies

Balogun 2018; Chiang 2015; Cooper 2010; De Fouw 2023; Fielding 2018; Fisher 2020; Francis 2011; Friedman 2013; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Harries 2009; Jackson 2016; Joseph 2015; Katahoire 2008; Liebermann 2020a; Njuguna 2021; Paul 2014; Perkins 2013; Rail 2018; Reich 2010; Reiter 2014; Rendle 2017; Siu 2014; Stephens 2013; Turiho 2017; Venderbos 2022; Vermandere 2015

Finding 36

Many caregivers associated ‘good’ parenting with taking personal responsibility for the promotion and protection of adolescent sexual health, and perceived HPV vaccination as a means to facilitate this responsibility. Some of them perceived HPV vaccination as providing an opportunity to educate their adolescent, whilst others perceived it as enabling them to avoid blame if negative health outcomes ensued despite receipt of the vaccine. In both cases these perceptions contributed to enhancing acceptance of HPV vaccination for many caregivers.

Assessment for each GRADE-CERQual component	
Methodological limitations	Moderate concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies. There are also concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by the lack of reflexivity amongst the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	Moderate concerns because the data were a bit more varied e.g. some parents saw HPV vaccination as sabotaging their responsibility to promote/protect their adolescent's sexual health (see finding 37) (contradictory data). Moreover, some of the links and associations in this finding were less supported by the underlying data or it was hard to tell the level of support from the underlying data because the issue was mentioned in passing and not explored in detail by many of the studies (e.g. the mechanisms underpinning HPV vaccination facilitating parental responsibility)- there is therefore a degree of inference embedded in this interpretive finding (ambiguous data).

(Continued)

Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Low confidence	Finding downgraded because of moderate concerns about both methodological limitations and coherence (contradictory and ambiguous data)
Contributing studies	
Burke 2015; Chiang 2015; Craciun 2012; de Oliveira 2019; Jackson 2016; Joseph 2015; Katz 2013; Madhivanan 2009; Nordtug 2021; Perkins 2013; Roncancio 2019	
Finding 37	
Many caregivers associated 'good' parenting with taking personal responsibility for the promotion and protection of adolescent sexual health and perceived HPV vaccination as sabotaging this responsibility. Some of these caregivers saw HPV vaccination as a 'passive' method of sexual health promotion and therefore less effective than, or undermining of, more 'active' methods. Others saw HPV vaccination as a form of state intrusion on their parental rights. In both cases these perceptions contributed to reducing acceptance of HPV vaccination for many of these caregivers.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting and data collection in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	Moderate concerns because the data were a bit more varied e.g. some parents saw HPV vaccination as facilitating their responsibility to promote/protect their adolescent's sexual health (see finding 36) (contradictory data). Moreover, some of the links and associations in this finding were less supported by the underlying data or it was hard to tell the level of support from the underlying data because the issue was mentioned in passing and not explored in detail by many of the studies (e.g. the mechanisms underpinning HPV vaccination sabotaging parental responsibility)- there is therefore a degree of inference embedded in this interpretive finding (ambiguous data).
Relevance	Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Low confidence	Finding downgraded because of moderate concerns about both coherence (contradictory and ambiguous data) and relevance (partial relevance) and minor concerns about methodological limitations
Contributing studies	
Albert 2019; Bowen 2014; Galbraith-Gyan 2019; Pop 2015; Rail 2018; Reich 2010; Siu 2014; Venderbos 2022; Ward 2017	
Finding 38	
Some caregivers and adolescents were less accepting of HPV vaccination due to the religious beliefs they held, and the view that health and illness are governed by God and divine providence. They in turn perceived HPV vaccination as unnecessary or interfering with God's will.	

(Continued)

Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	Minor concerns because there was contradictory data that did not fit the interpretation in this finding (various studies found that religious beliefs did not reduce HPV vaccination acceptance for many caregivers and adolescent) (contradictory data)
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of minor concerns about both methodological limitations and coherence (contradictory data)
Contributing studies	
Cordoba-Sanchez 2019; Evans 2021; Friedman 2013; Galbraith-Gyan 2019; Gordon 2011; Kucheba 2021; Madhivanan 2009; Perkins 2013; Pop 2015; Vermandere 2015; Warner 2015	
Finding 39	
Trust in teachers and the school contributed to both enhancing and reducing various caregivers' acceptance of HPV vaccination. When HPV vaccination was provided at their adolescent's school, some caregivers were more inclined to consider it or to have confidence in it. When teachers communicated hesitancy or negative attitudes about HPV vaccination, this contributed to reducing HPV vaccination acceptance for some caregivers.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Bartolini 2012; Bunton 2013; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Elit 2022; Grandahl 2019; Rail 2018	
Finding 40	
Some caregivers and adolescents were less accepting of HPV vaccination due to their distrust of the pharmaceutical industry and its perceived profit motive, which they perceived to be corrupting vaccine development, testing and marketing.	
Assessment for each GRADE-CERQual component	

(Continued)

Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	No or very minor concerns
Relevance	Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about methodological limitations
Contributing studies	
Bowen 2014; Bunton 2013; Craciun 2012; Nordtug 2021; Perez 2015; Pop 2015; Reich 2010; Ward 2017	
Finding 41	
Trust in government and government-run programmes was associated with both enhancing and reducing caregivers' acceptance of HPV vaccination. Many caregivers expressed strong sentiments of trust in government, which in turn meant that their acceptance of HPV vaccination depended on it being formally approved or endorsed by government. When this occurred, it contributed to enhancing confidence in, and acceptance of, HPV vaccination for many caregivers. When this was absent, it contributed to reducing confidence in, and acceptance of, HPV vaccination for many caregivers.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Ambali 2022; Bunton 2013; Chau 2021; Chiang 2015; Cooper 2010; Cover 2012; Dalmau 2020; Fielding 2018; Friedman 2013; Katahoire 2008; Madhivanan 2009; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Rail 2018; Remes 2012; Siu 2014; Ward 2017	
Finding 42	
Distrust of government and government-run programmes contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. These individuals questioned the motives of government and what it promotes, and by extension, were therefore sceptical of the benefits and safety of HPV vaccination.	
Assessment for each GRADE-CERQual component	

(Continued)

Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Bartolini 2012; Cooper 2010; Craciun 2012; Creed 2021; Elit 2022; Evans 2021; Friedman 2013; Kucheba 2021; Nordtug 2021; Patrick 2022; Pop 2015; Ward 2017	
Finding 43	
Some caregivers and adolescents' views and practices around HPV vaccination were shaped by their trust or distrust of science and biomedicine. Faith in the benefits and safety of scientific progress contributed to enhancing some caregivers' and adolescents' confidence in the benefits and safety of HPV vaccination and in turn enhanced their acceptance of it. Other caregivers' and adolescents' distrust of science and biomedicine contributed to reducing their confidence in the benefits and safety of HPV vaccination, and in turn reduced their acceptance of it.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, data collection and data analysis in some studies supporting this finding. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Bowen 2014; Chiang 2015; Cover 2012; Evans 2021; Friedman 2013; Islam 2018; Mitchell 2021; Rendle 2017; Stephens 2013; Ward 2017	
Finding 44	
Trust in healthcare professionals (HCPs) was associated with both enhancing and reducing acceptance of HPV vaccination for numerous caregivers and adolescents. Many caregivers and adolescents held strong sentiments of trust in HCPs for various reasons, including as a routine response, the perceived training and expertise of HCPs, experiences of good-quality relationships with them, or because HCPs came from the same ethnic group as them. Consequently, many caregivers and adolescents followed the HPV vaccination recommendations of their HCPs, or turned to them for advice, answers to their questions, help with making sense of information or reassurance. This contributed to both enhancing or reducing acceptance of HPV vaccination, depending on the views and practices of HCPs.	

(Continued)

Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study was supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Alexander 2012; Bartolini 2012; Bowen 2014; Burke 2015; Chiang 2015; Cooper 2010; Cordoba-Sanchez 2022; Cover 2012; Craciun 2012; Creed 2021; Dalmau 2020; de Oliveira 2019; Elit 2022; Fielding 2018; Fisher 2020; Galbraith-Gyan 2019; Getrich 2014; Gordon 2011; Gutierrez 2013; Islam 2018; Jackson 2016; Joseph 2015; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Liebermann 2020a; Lismidiati 2019; Mitchell 2021; Nordtug 2021; Patrick 2022; Paul 2014; Perkins 2013; Rendle 2017; Roncancio 2019; Siu 2014; Stephens 2013; Ward 2017; Warner 2015	
Finding 45	
Distrust of healthcare professionals (HCPs) contributed to reducing some caregivers' and adolescents' acceptance of HPV vaccination. This distrust emerged from a generalised distrust of medicine; the perceived simplistic, unbalanced and contradictory vaccine information provided by HCPs; or the perceived commercial interests or racism of HCPs. Some caregivers and adolescents in turn questioned the motives of HCPs and what they promoted, including HPV vaccination.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
Moderate confidence	Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about methodological limitations
Contributing studies	
Bowen 2014; Craciun 2012; Evans 2021; Gordon 2011; Nordtug 2021; Pop 2015; Rail 2018; Stephens 2013; Ward 2017	
Finding 46	

(Continued)

Some caregivers' and adolescents' distrust in the institutions, systems or experts associated with vaccination was grounded in their experiences of structural discrimination or exploitation. For many, such experiences contributed to reducing their confidence in the motives and actions of those in power, and in turn their acceptance of what they promote, including HPV vaccination.
Assessment for each GRADE-CERQual component
Methodological limitations — Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence — No or very minor concerns
Relevance — Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy — Minor concerns because this explanatory finding was based on relatively few studies but those studies contributed sufficient data
Overall GRADE-CERQual assessment and explanation
Moderate confidence — Finding downgraded because of moderate concerns about relevance (partial relevance) and minor concerns about both methodological limitations and adequacy
Contributing studies
Bowen 2014; Craciun 2012; Evans 2021; Pop 2015; Stephens 2013
Finding 47
Many caregivers' and adolescents' views and practices regarding HPV vaccination were influenced by the convenience, or inconvenience, they experienced in accessing it. Access barriers such as having to miss work and associated lost wages; lack of time and competing priorities; transportation challenges and costs; difficulties fitting in with vaccination schedules; vaccine stock-outs or limited availability; or a general lack of access to quality healthcare services contributed to reducing acceptance of HPV vaccination for many caregivers and adolescents.
Assessment for each GRADE-CERQual component
Methodological limitations — Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection in some studies supporting this finding. There was also no evidence of reflexivity in most of these studies and limited sensitivity to ethical concerns in some of these studies
Coherence — No or very minor concerns.
Relevance — No or very minor concerns
Adequacy — No or very minor concerns
Overall GRADE-CERQual assessment and explanation
High confidence
Contributing studies
Adeyanju 2022; Ali 2022; Bunton 2013; Chiang 2015; Cooper 2010; Elit 2022; Friedman 2013; Galbraith-Gyan 2019; Grandahl 2019; Islam 2018; Jackson 2016; Katahoire 2008; Kisaakye 2018; Kucheba 2021; Mitchell 2021; Patrick 2022; Paul 2014; Reiter 2014; Roncancio 2019; Rujumba 2021; Turiho 2017; Vermandere 2015; Wakimizu 2015

(Continued)

Finding 48	
Many caregivers' and adolescents' views and practices regarding HPV vaccination were influenced by the cost of the HPV vaccine. Having to pay for the vaccine contributed to reducing acceptance of it for many, whereas providing it for free or at a low cost contributed to increasing acceptance for many because it was perceived to be affordable or important. However, providing the HPV vaccine for free or at a low cost contributed to reducing some caregivers' and adolescents' acceptance of it because they equated low cost with low or inferior quality.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach, data collection and data analysis in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Ambali 2022; Balogun 2018; Bartolini 2012; Bunton 2013; Chau 2021; Cover 2012; Craciun 2012; de Oliveira 2019; Elit 2022; Fielding 2018; Francis 2011; Grandahl 2019; Harries 2009; Liebermann 2020a; Lismidiati 2019; Madhivanan 2009; Paul 2014; Reiter 2014; Roncancio 2019; Siu 2014; Vermandere 2015; Wakimizu 2015; Warner 2015	
Finding 49	
Various caregivers and adolescents from ethnic minority groups faced language barriers in accessing healthcare services and health information, including in relation to HPV vaccination. This contributed to reducing acceptance of HPV vaccination due to misunderstanding of information about it, or decreasing willingness to seek vaccination services or confidence to engage in conversations with healthcare professionals (HCPs).	
Assessment for each GRADE-CERQual component	
Methodological limitations	No or very minor concerns
Coherence	No or very minor concerns
Relevance	Moderate concerns about relevance because all the studies came from high-income settings (partial relevance)
Adequacy	Moderate concerns because this explanatory finding was based on relatively few studies and thin data
Overall GRADE-CERQual assessment and explanation	
Low confidence	Finding downgraded because of moderate concerns about both relevance (partial relevance) and adequacy
Contributing studies	

(Continued)

Burke 2015; Jackson 2016; Stephens 2013; Warner 2015

Finding 50	
Women-targeted HPV vaccination programmes in various settings contributed to reducing acceptance of HPV vaccination for many adolescents and caregivers. For some, it perpetuated the view that the HPV vaccine is a 'female' vaccine and therefore unnecessary or emasculating and embarrassing for men to receive. Others were suspicious of the motives behind targeting women, which in turn reduced their acceptance of HPV vaccination for women. Some resented what they saw as the patriarchal norms of sexual and reproductive health being a woman's responsibility reinforced by women-targeted vaccination programmes. Others resented what they perceived as discrimination against men. Many of these caregivers and adolescents reported being more accepting of HPV vaccination for men and women when it was (or would be) gender-neutral, due to what they perceived as the promotion of equal responsibility and opportunity for sexual health.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns due to poor or partial reporting of the setting, sampling approach and data collection in some studies supporting this finding and the claims made in one study were supported by insufficient evidence. There was also no evidence of reflexivity in all of these studies and limited sensitivity to ethical concerns in some of these studies.
Coherence	No or very minor concerns
Relevance	No or very minor concerns
Adequacy	No or very minor concerns
Overall GRADE-CERQual assessment and explanation	
High confidence	
Contributing studies	
Adeyanju 2022; Bartolini 2012; Beyen 2022; Chau 2021; Chiang 2015; Cooper 2010; Craciun 2012; Friedman 2013; Gottvall 2017; Grandahl 2019; Gutierrez 2013; Joseph 2015; Perkins 2013; Rail 2018; Reiter 2014; Remes 2012; Siu 2014; Venderbos 2022; Warner 2015	
Finding 51	
Some adolescents' acceptance of HPV vaccination was enhanced when certain school-based delivery strategies were implemented, including using privacy screens and distraction techniques, reducing the numbers of adolescents waiting together for vaccination, and providing vaccination early in the day. These strategies helped to reduce fears and the impact of peers' negative reactions to vaccine administration amongst some adolescents, and in turn contributed to increasing their HPV vaccination acceptance.	
Assessment for each GRADE-CERQual component	
Methodological limitations	Minor concerns about the possibility of social desirability bias as many of the authors were from public health institutes and appeared pro-vaccine. This was potentially compounded by a lack of reflexivity amongst the research authors as it was unclear how their own roles and perspectives could have influenced their collection and interpretation of the data.
Coherence	No or very minor concerns
Relevance	Serious concerns about relevance because the studies came from only 1 high-income country and focused only on HPV vaccination for women (partial relevance)
Adequacy	Serious concerns because only 1 study with thin data contributed to this finding

(Continued)

Overall GRADE-CERQual assessment and explanation	
Very low confidence	Finding downgraded because of serious concerns about both relevance (partial relevance) and adequacy and minor concerns about methodological limitations
Contributing studies	
Cooper 2010	

GRADE-CERQual: Confidence in the Evidence from Reviews of Qualitative research; **HPV:** human papillomavirus; **STI:** sexually transmitted infection

HISTORY

Protocol first published: Issue 9, 2019

CONTRIBUTIONS OF AUTHORS

SC and CSW conceived the review topic. SC designed the review and led the review process and write-up.

SC, B-MS, NAJ, JR, NL, EM conducted title/abstract and full-text screening.

SC and NAJ conducted the data management, analysis, and synthesis processes, with discussion, input and verification from all review authors (B-MS, JR, NL, EM, RB, ACT, CSW) in the later stages of the analysis.

SC and NAJ conducted the assessment of the methodological limitations of the sampled studies and SC, B-MS and ACT developed the implications for practice.

SC, B-MS and NAJ led the GRADE-CERQual assessments of findings with input and verification from all the other authors (NAJ, JR, NL, EM, RB, ACT, CSW).

SC wrote the manuscript, with input and revisions from all review authors (BS, NAJ, JR, NL, EM, RB, ACT, CSW).

DECLARATIONS OF INTEREST

Sara Cooper has declared the following competing interest: staff member at Cochrane South Africa. SC was not involved in the editorial process for this review.

Bey-Marrié Schmidt: none known

Ngcwalisa A Jama: none known

Jill Ryan: none known

Natalie Leon: none known

Edison Mavundza: none known

Rose Burnett: none known

Asahngwa Constantine Tanywe: none known

Charles S Wiysonge has declared the following competing interests: honorary staff member at Cochrane South Africa; and Editor of Cochrane Evidence Synthesis and Methods. CSW was not involved in the editorial process for this review.

SOURCES OF SUPPORT

Internal sources

- South African Medical Research Council (SAMRC), South Africa

  Provided support to SC, BMS, JR, NL, EM, and CSW

External sources

- Norwegian Institute of Public Health (NIPH), Norway

  Provided funding for gold open access publication of this review

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Ngcwalisa Jama (NAJ) was not a co-author on the protocol but is a co-author on the review. She joined the review team after the protocol had been published.

We have removed 'parents' throughout and replaced with 'caregivers'. Whilst doing the review we realised that our definition of 'caregivers' includes parents and therefore, it is unnecessary to refer to 'parents and caregivers'. "By ‘caregiver’ we meant anyone who is directly involved in caring for the adolescent, the decision to vaccinate the adolescent, or the responsibility to take the adolescent for vaccination or provide consent for their vaccination (Ames 2017)"

Once all eligible studies had been identified, and we were more familiar with the evidence, it became clear that vaccination views and practices exist along a continuum. This was a similar finding to a related review on the views and practices regarding routine childhood vaccination (Cooper 2021). As such, we found that focusing on categorical terms such as ‘acceptance’, ‘hesitancy’ or ‘nonacceptance’, and the factors that influenced them, was unhelpful and misleading, and focusing on vaccination views and practices more broadly, and the factors that may ‘enhance’ or ‘reduce’ acceptance of vaccination was more aligned with the emerging evidence. To reflect this, we therefore slightly amended our review title, topic of interest, and objectives.

- Title
  - The protocol title was: ‘Factors that influence acceptance of human papillomavirus (HPV) vaccination for adolescents: a qualitative evidence synthesis’.
  - The title of our review is: ‘Factors that influence caregivers’ and adolescents’ views and practices regarding human papillomavirus (HPV) vaccination for adolescents: a qualitative evidence synthesis’
- Objectives
  - The objectives listed in the protocol were:
    - Identify, appraise, and synthesise qualitative studies exploring: parents’, caregivers’, or adolescents’ views, experiences, or decision-making regarding HPV vaccination; or the factors influencing the acceptance of HPV vaccination arising from parents’, caregivers’, and adolescents’ accounts.
    - Identify the factors influencing parents’, caregivers’ and adolescents’ acceptance of HPV vaccination.
    - Explore how the findings of this review can enhance our understanding of the related intervention review (Abdullahi 2015).
  - The objectives listed in the review are:
    - Identify, appraise, and synthesise qualitative studies exploring: caregivers’ or adolescents’ views, experiences, practices, intentions, decision-making, acceptance, hesitancy, or nonacceptance regarding HPV vaccination.
    - Gain an understanding of the factors that influence caregiver and adolescent views and practices regarding HPV vaccination for adolescents.
    - Explore how the findings of this review can enhance our understanding of the related intervention review Abdullahi 2020.
- Topic of interest
  - The topic of interest in the protocol was: the factors that influence acceptance of HPV vaccination from the perspective of parents, caregivers, and adolescents.
  - The topic of interest for the review is: the factors that influence caregiver and adolescent views and practices regarding HPV vaccination from the perspective of parents, informal caregivers and adolescents.

INDEX TERMS

Medical Subject Headings (MeSH)

*Caregivers [psychology]; *Health Knowledge, Attitudes, Practice; Human Papillomavirus Viruses; *Papillomavirus Infections [prevention & control]; *Papillomavirus Vaccines [administration & dosage]; *Patient Acceptance of Health Care [psychology]; Qualitative Research; Randomized Controlled Trials as Topic; Uterine Cervical Neoplasms [prevention & control]; *Vaccination [psychology] [statistics & numerical data]; *Vaccination Hesitancy [psychology]

MeSH check words

Adolescent; Female; Humans; Male