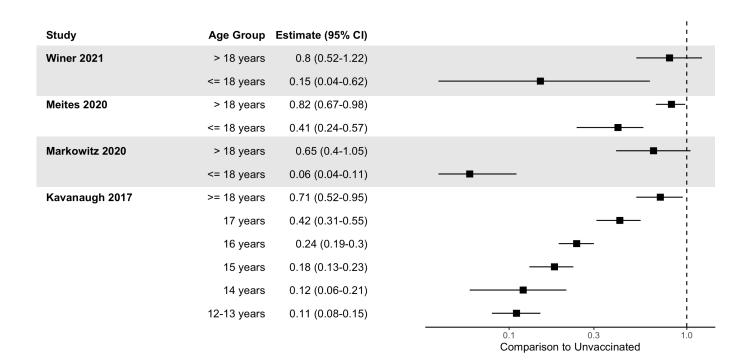
# HPV Vaccine Effectiveness by Age at Vaccination – Systematic Review

Ellingson MK, Sheikha H, Nyhan K, Oliveira CR, Niccolai LM. Under review at Human Vaccines & Immunotherapeutics.

- Conducted a systematic review of HPV vaccine effectiveness studies that included an analysis of HPV vaccine effectiveness by age at vaccine series initiation or completion
- Identified **21 studies** that met the inclusion criteria
- Predominantly retrospective cohort studies using national or regional health registries in high-income countries
- Evaluated numerous HPV-related health outcomes including HPV infection, anogenital warts, cervical abnormalities and cervical cancer

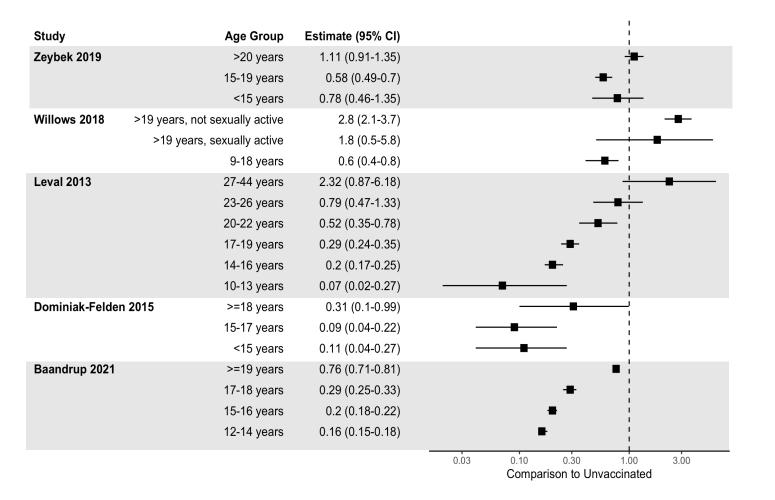
### HPV Vaccine Effectiveness by Age at Vaccination – Vaccine-Type HPV Infection



**Figure 2.** HPV Vaccine Effectiveness against vaccine-type HPV infection by age at vaccine initiation.

Estimates are measures of relative risk. An estimate lower than one (to the left of the dashed line) indicates a protective effect of the vaccine.

## HPV Vaccine Effectiveness by Age at Vaccination – Anogenital Warts



**Figure 3.** HPV Vaccine Effectiveness against anogenital warts by age at vaccine initiation

Estimates are measures of relative risk. An estimate lower than one (to the left of the dashed line) indicates a protective effect of the vaccine.

### HPV Vaccine Effectiveness by Age at Vaccination – Cervical Abnormalities

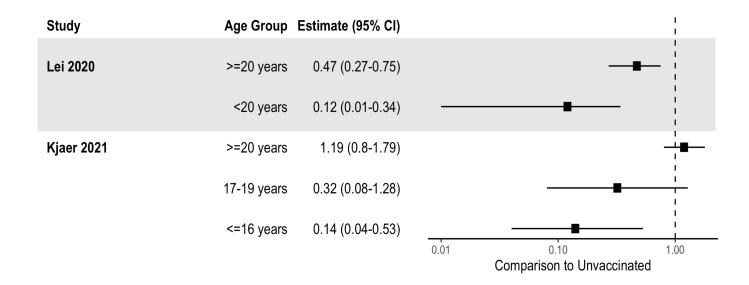
Study	Age Group	Estimate (95% CI)	
Silverberg 2018	>=21 years	0.94 (0.81-1.09)	
	18-20 years	0.72 (0.58-0.9)	
	14-17 years	0.61 (0.46-0.81)	— <b>—</b> —
Rodriguez 2020	>=20 years	0.96 (0.77-1.2)	
	15-19 years	0.66 (0.55-0.8)	
	<15 years	0.71 (0.37-1.38)	
Righolt 2019	>=18 years	1.37 (0.97-1.93)	
	14-17 years	0.88 (0.57-1.37)	<b></b>
Racey 2020	>=15 years	0.68 (0.35-1)	
	9-14 years	0.26 (0.16-0.43)	<b>e</b>
Palmer 2019	>=18 years	0.85 (0.52-1.37)	<b>_</b>
	17 years	0.55 (0.36-0.83)	·
	16 years	0.27 (0.18-0.41)	<b>_</b>
	15 years	0.29 (0.19-0.44)	—— <b>—</b> —
	14 years	0.18 (0.07-0.43)	
	12-13 years	0.14 (0.08-0.25)	<b>_</b>
Innes 2020	>=18 years	0.86 (0.76-0.94)	-#-
	<18 years	0.75 (0.7-0.8)	-
Hofstetter 2016	19-20 years	0.85 (0.68-1.05)	
	17-18 years	0.81 (0.64-1.01)	— <b>—</b> —-;
	15-16 years	0.63 (0.45-0.89)	<b></b>
	11-14 years	0.24 (0.1-0.59)	<b>_</b>
Herweijer 2020	20-29 years	0.75 (0.59-0.95)	<b>#</b>
	17-19 years	0.43 (0.33-0.57)	— <b>—</b>
	<16 years	0.16 (0.08-0.32)	<b>_</b>
Gargano 2021	>=20 years	0.64 (0.55-0.75)	
	<20 years	0.35 (0.3-0.4)	-
Dehlendorff 2018	>=20 years	1.31 (0.97-1.76)	<b>-</b>
	17-19 years	0.65 (0.41-1.03)	<del>-</del>
	<=16 years	0.23 (0.11-0.49)	<b>_</b>
			0.1 0.3 1.0
			Comparison to Unvaccinated

**Figure 4.** HPV Vaccine Effectiveness against cervical abnormalities (high-grade cervical lesion identified via cytology or histology) by age at vaccine initiation

Estimates are measures of relative risk. An estimate lower than one (to the left of the dashed line) indicates a protective effect of the vaccine.

Ellingson et al. Under review at HV&I.

## HPV Vaccine Effectiveness by Age at Vaccination – Cervical Cancer



**Figure 5.** HPV Vaccine Effectiveness against cervical cancer by age at vaccine initiation

Estimates are measures of relative risk. An estimate lower than one (to the left of the dashed line) indicates a protective effect of the vaccine.