Appendix 1. Survey Response Rate Calculation Based on the American Association for Public Research Response Rate Four

Data shown in the following two tables were provided by the survey company GfK:

Random email invitation	Completed survey	Ineligible
2,857	1,233	491

Qualified completes	1,233
Non-qualified completes	491
Individuals who consented but did not complete screener or survey	110
Non-responders	1,027
Total assigned (random email invitation)	2,857

Response Rate 4 calculations:

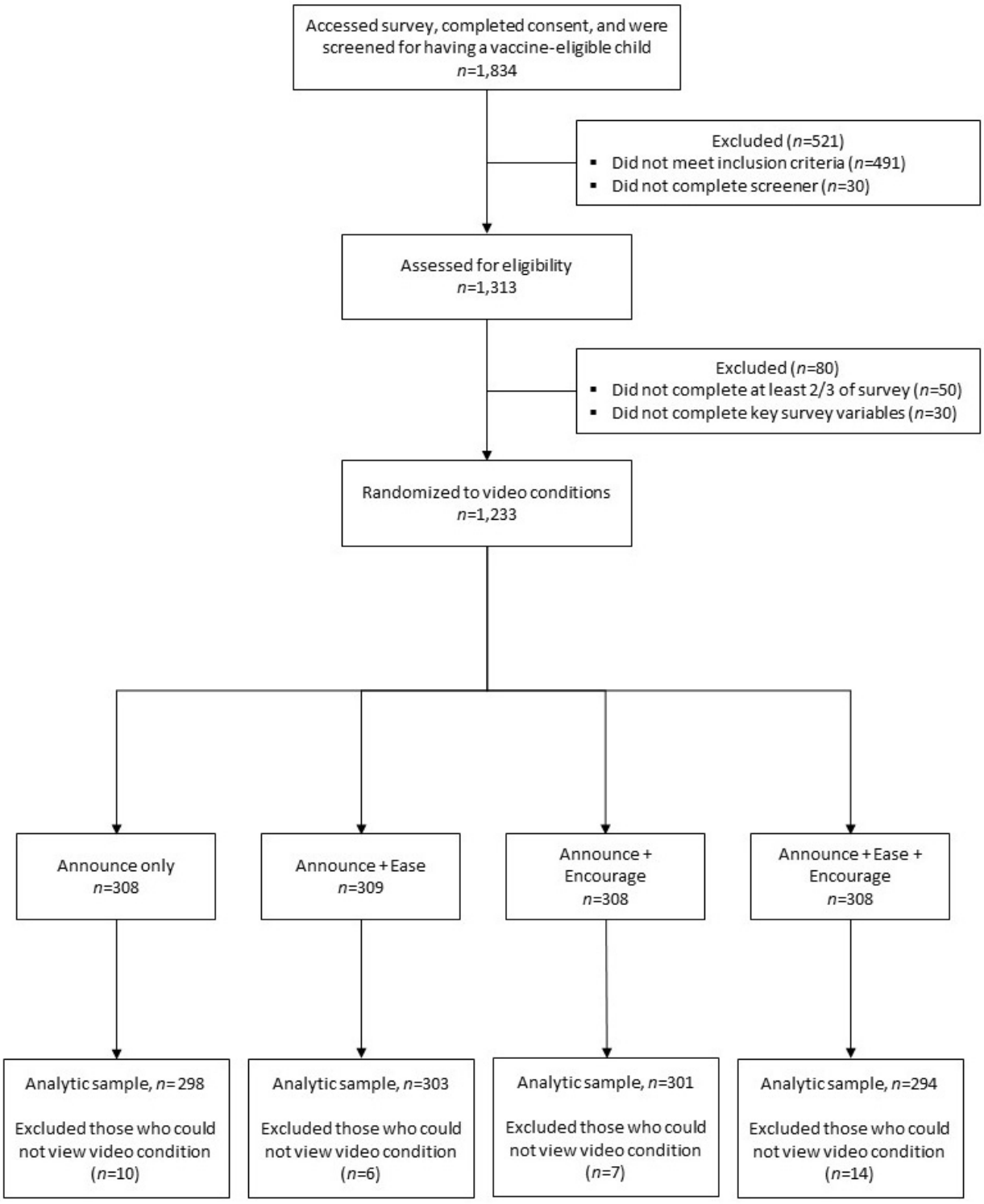
$$\frac{I+P}{(I+P)+(R+NC+O)+e(UH+UO)}$$

$$\frac{(1233+30)}{(1233+30)+(50)+.7278(30+1027)} = 60.65\%$$

Abbreviation	Definition	*n*
I	Complete interview. An eligible case that completed the interview	1,233
P	Partial interview. Any eligible who has answered all applicable questions (until our communication experiment sections in the survey) but not completed.	30
R	Refusal or break-off. An eligible case that refuses to do the interview or breaks off of the interview. Of the 110 individuals that accessed the survey or screener, 30 did not make it past the screener (eligibility unknown) and 30 made it to Sec H (partial interviews). 110 – 30 – 30 = 50	50
NC	Non-contact. An eligible case that was not contacted. We do not know whether cases not contacted were eligible.	N/A
UH	Unknown household. A household not reached whose eligibility is unknown. 1,027 did not respond and 30 did not complete screener (eligibility unknown). 1,027 + 30 = 1,057	1,057
UO	Unknown, other. A case not reached whose eligibility is unknown. In our sample, same as above.	N/A
e	Estimated proportion of cases of unknown eligibility in the sample. In estimating e, one must be guided by the best available scientific information on what share eligible cases make up among the	0.7278

	unknown cases and one must not select a proportion in order to boost the response rate. Total eligible cases: 1,233 (I) + 30 (P) + 50 (R)=1,313 Total households reached: 1,233 (I) + 30 (P) + 50 (R)+ 491 (ineligible)=1,804 1,313/1,804 = 72.78% eligible 1,057 **x** 0.7278 = 769.3 = 769

Appendix 2. Study Participant Flow Diagram



Appendix 3. Scripts for Videos Used in the Experiment

Step 1. Announce video	
Hi. I am Dr. Karen Todd. I'd like you to imagine that you are at your child's check-up, and I'll play the role of your child's doctor. At your child's age, children are due for vaccines against meningitis, HPV cancers and whooping cough. We will give the vaccines that your child is due for at the end of today's visit.	
Step 2. Ease videos	
Diseases prevented by HPV vaccine	1. I hear you. You're wondering about the diseases that the HPV vaccine can prevent. HPV infection can cause cancer in both men and women. The HPV vaccine will protect your child from many of these cancers. 2. I hear you. You're wondering about the diseases that the HPV vaccine can prevent. HPV is so common that almost everyone will get it at some point. Most people will never know they are infected. We can prevent it by starting HPV vaccination today. 3. I hear you. You're wondering about the diseases that the HPV vaccine can prevent. Over 30,000 Americans get cancer from HPV every year. Most could be prevented with the HPV vaccine. 4. I hear you. You're wondering about the diseases that the HPV vaccine can prevent. HPV is a common virus that millions of people get every year. The HPV vaccine will protect your child from some cancers and genital warts.
National recommendations for HPV vaccine	5. I hear you. You're wondering about recommendations for the HPV vaccine. The American Academy of Pediatrics recommends giving the HPV vaccine by age 11 or 12. In our practice, we recommend it too. 6. I hear you. You're wondering about recommendations for the HPV vaccine. Guidelines recommend giving the HPV vaccine before age 13. I've given the HPV vaccine to my children, and I'd want the same protection for yours. 7. I hear you. You're wondering about recommendations for the HPV vaccine. Preventive care is important to me. I keep up to date on HPV vaccine guidelines. They show your child is due for the HPV vaccine today. 8. I hear you. You're wondering about recommendations for the HPV vaccine. Experts at the CDC agree that kids should get the HPV vaccine by age 11 or 12 to prevent several cancers.
The age to start HPV vaccine series	9. I hear you. You're wondering if your kid is too young for the HPV vaccine. But kids respond more strongly to HPV vaccine when they are younger. This may give better protection against some cancers.

	10. I hear you. You're wondering if your kid is too young for the HPV vaccine. But your kid's immune system is super powerful at this age. So they will get great protection if we start the HPV vaccine series today. 11. I hear you. You're wondering if your kid is too young for the HPV vaccine. But it is very important to give the HPV vaccine well before exposure to the virus. 12. I hear you. You're wondering if your kid is too young for the HPV vaccine. But the younger the better. If we start HPV vaccination at 11 or 12, your kid only needs two doses, not three.
Vaccination for children not sexually active	13. I hear you, your child's not yet sexually active. The thing is this virus is so common that almost everyone is exposed at some point. We are giving the HPV vaccine today so your child will have the best possible protection. 14. I hear you, your child's not yet sexually active. That's perfect many kids this age are not yet sexually active. Now let's get your child the HPV vaccine well before any exposure ever takes place. 15. I hear you, your child's not yet sexually active. The thing is we vaccinate kids well before they are exposed to an infection, as with all vaccines. 16. I hear you, your child's not yet sexually active. The thing is this really isn't about sexual activity. The HPV vaccine is about preventing cancer.
Vaccination for boys and girls	17. I hear you. You're wondering why we recommend the HPV vaccine for boys. HPV is a very common virus that infects boys and girls. We can protect your child from the cancers caused by the virus by vaccinating today. 18. I hear you. You're wondering why we recommend the HPV vaccine for boys It's true that only females can get cervical cancer. But the HPV vaccine protects boys and girls from some other cancers, as well as genital warts. 19. I hear you. You're wondering why we recommend the HPV vaccine for boys. Men who have HPV probably don't know it. When boys get the HPV vaccine, they can protect themselves and future partners. 20. I hear you. You're wondering why we recommend the HPV vaccine for boys. HPV infections don't care if you're a boy or girl. The virus can cause cancer and many other diseases.
School requirements for vaccination	21. I hear you. You're wondering if the HPV vaccine is necessary because it's not required for school. But we can't wait for schools to know what's best for your child's health. 22. I hear you. You're wondering if the HPV vaccine is necessary because it's not required for school. But school mandates are always incomplete. The HPV vaccine is a very important vaccine that can prevent many cancers.

	23. I hear you. You're wondering if the HPV vaccine is necessary because it's not required for school. But my job is to keep your child healthy. And medically, the HPV vaccine is very important. 24. I hear you. You're wondering if the HPV vaccine is necessary because it's not required for school. But school requirements don't always keep up with medical science. The HPV vaccine is necessary to protect your child's health.
Safety and side effects	25. I hear you. You're wondering about the safety or side effects of the HPV vaccine. It might help to know all vaccines can cause minor things like a sore arm. But I wouldn't expect to see anything serious. 26. I hear you. You're wondering about the safety or side effects of the HPV vaccine. It might help to know we have given over 80 million doses of the HPV vaccine in the US since 2006. It's as safe as the other vaccines I'm recommending today. 27. I hear you. You're wondering about the safety or side effects of the HPV vaccine. It might help to know my clinic has given thousands of doses of the HPV vaccine, and I'm confident it's very safe. 28. I hear you. You're wondering about the safety or side effects of the HPV vaccine. It might help to know this vaccine is one of the most studied medications on the market. The HPV vaccine is safe, just like the other vaccines we give at this age.
Step 3. Encourage video	
I strongly believe in the importance of this cancer-preventing vaccine for your child. I recommend your child get the HPV vaccine today.	

Appendix 4. Exploratory Analysis Evaluating Three-Way Interactions Among Index Child's HPV Vaccination Status, Parents' Vaccination Attitudes, and Parents' Trait Reactance With Experimental Factors

	Hesitancy to get HPV vaccine			Vaccine confidence			Perceived recommendation strength		
Factors	**df**	**F**	***p***	**df**	**F**	***p***	**df**	**F**	***p***
HPV vaccination status & experimental factors		*n*=1,195			*n*=1,195			*n*=1,183	
Ease step	1	5.00	0.03	1	2.18	0.14	1	8.81	0.003
Encourage step	1	0.43	0.51	1	0.05	0.82	1	51.19	<0.001
Ease **X** Encourage	1	0.96	0.33	1	0.00	0.95	1	6.98	0.008
HPV vaccination status	1	175.52	<0.001	1	68.07	<0.001	1	4.83	0.03
HPV vax status **X** Ease	1	1.08	0.29	1	1.48	0.22	1	4.67	0.03
HPV vax status **X** Encourage	1	1.51	0.22	1	0.49	0.48	1	5.01	0.03
HPV vax status **X** Ease **X** Encourage	1	0.20	0.66	1	0.00	0.97	1	0.04	0.85
Vaccine attitudes & experimental factors		*n*=1,184			*n*=1,184			*n*=1,173	
Ease step	1	0.03	0.87	1	0.02	0.88	1	0.55	0.46
Encourage step	1	0.09	0.77	1	0.33	0.57	1	5.47	0.02
Ease **X** Encourage	1	0.03	0.86	1	0.05	0.83	1	2.16	0.14
Vaccine attitudes	1	228.98	<0.001	1	359.48	<0.001	1	11.50	0.001
Vaccine attitudes **X** Ease	1	1.15	0.28	1	0.30	0.58	1	3.28	0.07
Vaccine attitudes **X** Encourage	1	0.41	0.52	1	0.40	0.52	1	0.09	0.77
Vaccine attitudes **X** Ease **X** Encourage	1	0.00	0.96	1	0.04	0.84	1	0.62	0.43
Trait reactance & experimental factors		*n*=1,76			*n*=1,176			*n*=1,166	
Ease step	1	0.07	0.79	1	0.24	0.63	1	0.02	0.88
Encourage step	1	0.55	0.46	1	0.45	0.50	1	6.55	0.01
Ease **X** Encourage	1	2.72	0.10	1	0.00	0.98	1	0.04	0.84
Trait reactance	1	40.37	<0.001	1	31.80	<0.001	1	0.17	0.68
Trait reactance **X** Ease	1	1.34	0.25	1	1.31	0.25	1	1.42	0.23
Trait reactance **X** Encourage	1	0.19	0.67	1	0.42	0.51	1	0.24	0.62
Trait reactance **X** Ease **X** Encourage	1	1.91	0.17	1	0.00	0.95	1	0.29	0.59

Notes. All conditions received the Announce video message.

HPV, human papillomavirus; df, degrees of freedom; F, F test statistic.

Tukey–Kramer Pairwise Comparisons for Perceived Recommendation Strength

	Ease video condition		
HPV vaccination status	**No Ease**	**Ease**	***Q*-statistic**
0 doses	3.37	3.69	6.82
1 dose	3.66	3.70	0.52
Q-statistic	4.51	0.09	

	Encourage video condition		
HPV vaccination status	**No Encourage**	**Encourage**	***Q*-statistic**
0 doses	3.23	3.84	12.53
1 dose	3.54	3.83	3.89
Q-statistic	4.79	0.05	

Note: Tables report means of perceived recommendation strength. Studentized ranged statistics (*Q*) larger than a critical value of 2.77 are statistically significant.

HPV, human papillomavirus.

Appendix 5. Unstandardized and Standardized Estimates From Structural Equal Model

	Unstandardized beta coefficients (bias corrected 95% CI)		Standardized beta coefficients (bias 95% CI)	
	Mediator	Outcome	Mediator	Outcome
Predictor	HPV vaccine confidence	HPV vaccine hesitancy	HPV vaccine confidence	HPV vaccine hesitancy
Ease step	0.178 [0.048, 0.310]	–0.119 [–0.219, –0.021]	0.077 [0.021, 0.133]	–0.047 [–0.085, –0.008]
Encourage step	0.011 [–0.121, 0.148]	–0.093 [–0.196, 0.003]	0.005 [–0.052, .064]	–0.037 [–0.076, 0.001]
HPV vaccine confidence	—	–0.811 [–0.852, –0.767]	—	–0.740 [–0.774, –0.703]

HPV, human papillomavirus.

Unstandardized indirect (mediated) effects	Product pathway (bias corrected 95% CI)
Ease step via …	
HPV vaccine confidence → HPV vaccine hesitancy	–0.146 [–0.252, –0.039]
Encourage step …	
HPV vaccine confidence → HPV vaccine hesitancy	–0.009 [–0.120, 0.098]
Standardized indirect (mediated) effects	
Ease step via …	
HPV vaccine confidence → HPV vaccine hesitancy	–0.057 [–0.098, –0.015]
Encourage step via…	
HPV vaccine confidence → HPV vaccine hesitancy	–0.004 [–0.047, 0.038]