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Plans to Vaccinate Children for Coronavirus Disease 2019: A Survey of United States Parents

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In a national survey of 2074 US parents of children ≤ 12 years of age conducted in March 2021, 49.4% reported plans to vaccinate their child for coronavirus disease 2019 when available. Lower income and less education were associated with greater parental vaccine hesitancy/resistance; safety and lack of need were primary reasons for vaccine hesitancy/resistance. (*J Pediatr* 2021;237:292-7).

As of June 2021, more than 4 million US children have been diagnosed with severe acute respiratory syndrome coronavirus 2 and over 300 have died.¹ Although children are less likely to experience severe disease and mortality from coronavirus disease 2019 (COVID-19) infection compared with adults, younger children, those with underlying health conditions and from communities disproportionately affected by the COVID-19 epidemic are vulnerable to severe disease.²⁻⁶ In addition, COVID-19 infection can lead to multi-inflammatory syndrome in children and children may also experience long COVID-19 with ongoing symptoms, including fatigue and pain.⁷⁻⁹ To date, mask wearing and social distancing, including closing or reducing time at school, have been the primary approaches for infection control in children.^{10,11}

Although no COVID-19 vaccines are yet approved for children < 12 years of age (as of June 2021), clinical trials in younger pediatric populations are underway.¹² Once vaccines are available for use in children, parental willingness to vaccinate will be needed to protect children from COVID-19 infection in order to reduce infection risk in schools, increase population immunity levels, and to help end the epidemic.¹³⁻¹⁵ A safe and effective vaccine will allow children to return to normal activities, and help relieve the social isolation and other negative impacts the epidemic has had on children's mental health and well-being.^{16,17}

It is estimated that more than two-thirds of the US population will need to be vaccinated to end sustained transmission of COVID-19.^{18,19} In a survey of US adults conducted in March 2021, more than 60% had either received vaccination or were planning to receive it.²⁰ According to the Centers for Disease Control and Prevention COVID Data Tracker, by the middle of June 2021, more than 175 million or 53% of adults in the US had received at least 1 dose of an approved COVID-19 vaccine.²¹ There is limited evidence on the extent to which parents intend to vaccinate younger children for COVID-19 when a pediatric vaccine is available. We report

findings from a national survey measuring plans among US parents of children ≤ 12 years to vaccinate their children against COVID-19, reasons for parents not wanting to vaccinate children, and the relationship between a parent's own vaccination status and their plans to vaccinate their child.

Methods

We conducted a community-based, nonprobability survey of English and Spanish speaking US parents and caregivers ("parents") of children ≤ 12 years of age using a panel recruited online by Qualtrics, an online platform that sources participants through social media and partner networks. Adults ≥ 18 years of age who identified as primary caregivers of a child ≤ 12 years who had taken a child for ≥ 1 medical visit in the past 2 years were eligible. Data were collected from March 9 through April 2, 2021. The target sample size was 2000 to obtain precise and reliable estimated differences between race/ethnicity groups; the final sample included 2074 eligible US parent/caregivers of children ≤ 12 years. Participants completed surveys using their electronic devices and no incentives were provided. After completing screening questions, eligible participants reported information for the youngest child in the household (to achieve an adequate sample of younger children) and provided sociodemographic data about themselves and their household.

Quota-sampling and survey weighting were based on sex, race, ethnicity, education and region and was designed to provide national estimates of US parents of children ≤ 12 years according to 2019 US Census data.²² We followed the American Association for Public Opinion Research guidelines for reporting opt-in nonprobability panel data, for which

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aPR	Adjusted prevalence ratio
COVID-19	Coronavirus disease 2019
PR	Prevalence ratio

participation rates cannot be estimated as the sampling frame is unknown.²³ Ethics approval was received from the City University of New York Graduate School of Public Health and Health Policy institutional review board.

The outcome was specified as the proportion of parents reporting that they want to vaccinate the youngest child in their household. Participants were asked “when a vaccine to prevent COVID-19 is approved for children, would you want your child to receive the vaccine,” with response options “yes,” “no,” and “unsure” ([Appendix](#)). Those responding “no” or “unsure” were asked “why do you not want your child to receive the COVID-19 vaccine?” and they could choose from multiple options including, “I have concerns about safety and effectiveness of the vaccine for children” and “I believe children are at low risk for infection so they do not need a vaccine.” In addition to reporting demographics and household data, parents reported whether they had received or planned to get the COVID-19 vaccine themselves with response options including already received COVID-19 vaccination, plan to receive when available, unsure, will not get the vaccine, and prefer not to answer.

Data Analyses

Descriptive statistics on the total sample population and prevalence estimates are presented according to vaccination plans (yes, no, unsure). Rao-Scott adjusted Pearson χ^2 tests were used to compare parental vaccination plans according to sample characteristics. Poisson regression models with robust SEs were fitted to estimate prevalence ratios (PRs) and their CIs comparing parents planning to vaccinate to those responding “no” or “unsure” (combined) and were adjusted for demographic and household characteristics. Parental vaccination status was examined in 3 groups: (1) parents responding they had already received vaccination and those who planned to receive vaccination; (2) parents responding they were unsure and those who refused to answer; and (3) those who reported they would not get vaccinated. We examined the association between parental vaccine status with reported intentions to vaccinate children using Rao-Scott adjusted Pearson χ^2 tests to compare proportions. All analyses were weighted to provide national estimates. Sample sizes presented in the [Table I](#) were unweighted, but all other estimates (proportions and PRs with their 95% CIs) were weighted. Analyses were conducted in SAS 9.4 (SAS Institute Inc).

Results

Among 2074 US parents surveyed, 49.4% said they intended to vaccinate the youngest child in their household (median child age: 4.8 years; IQR: 1.7-8.3) for COVID-19 when a pediatric vaccine is approved, 25.6% said they would not, and 25.0% said they were unsure ([Table I](#)). Among parents responding that they would not or were unsure whether they would vaccinate their child, 78.2% reported potential safety or effectiveness concerns, 23.0% reported that they

believe children are at low risk of infection and do not need to be vaccinated, and 8.5% and 11.2% reported religious or medical reasons, respectively.

In adjusted models, Asian parents were 38% more likely to report intentions to vaccinate their children compared with non-Hispanic whites (adjusted PR [aPR]: 1.38; 95% CI: 1.19-1.60) ([Table II](#)). Parents less likely to report plans to vaccinate their children were female (aPR: 0.69; 95% CI: 0.62-0.77), had lower educational attainment (high school education or less aPR: 0.73; 95% CI: 0.62-0.86; some college aPR: 0.81; 95% CI: 0.72-0.91), and had household income \$25 000-49 000 (0.75; 95% CI: 0.64-0.88) ([Table II](#)).

Across all parents surveyed, 16.1% reported having received COVID-19 vaccination, 34.2% planned to receive it when available to them, 24.6% were unsure whether they would get vaccinated, 22.4% reported they would not get vaccinated, and 2.6% preferred not to answer. Among parents reporting that they had gotten or would get vaccinated, 85.2% said they would get their child vaccinated for COVID-19, 10.0% said they were unsure, and 4.8% reported they would not vaccinate their child. Parents who were unsure or did not plan to vaccinate themselves were much less likely to report wanting to vaccinate their children: 19.5% of parents who were unsure about getting vaccinated themselves said they would vaccinate their child, 60.4% were unsure about vaccinating a child, and 20.1% said they would not. Only 5.7% of parents who said they would not get vaccinated themselves reported planning to vaccinate their child, 15.6% were unsure, and 78.8% said they would not vaccinate their child ($P < .0001$) ([Figure](#)).

Discussion

As of March 2021, only one-half of US parents reported plans to have their youngest child receive a COVID-19 vaccine when they become available for pediatric populations. The primary concerns reported by parents were safety and effectiveness, as well as perceived lack of need. Female parents, those with less education, and lower income were least likely to report plans to vaccinate their children. We observed a strong association between a parents' own vaccination status or hesitancy with hesitancy to vaccinate their child when a pediatric vaccine is available. These findings have important implications for pediatric vaccine policies and roll-out planning over the coming months.

Our findings showing that only one-half of US parents report they will vaccinate their children and 26% say they will not, are concerning given the estimated vaccination coverage required to reach herd immunity.^{18,19} There are few data with which to compare our findings regarding intentions among US parents to vaccinate their children for COVID-19. Therefore, our study provides important information with regard to the current state of willingness, as well as the characteristics of parents who are hesitant. We found that, similar to previous studies of other childhood vaccinations, lower parental education was a predictor of vaccine hesitancy.^{24,25} Our findings also suggest that

Table I. Estimated prevalence of parental plans to vaccinate children ≤12 years of age for COVID-19 by parent and child characteristics—US, March 9–April 2, 2021

Characteristics	Sample		When a COVID-19 vaccine available for children, will you want your child to be vaccinated						
	n	%*	Yes		No		Unsure		P value†
			%‡	95% CI	%	95% CI	%	95% CI	
Total sample	2074	100.0	49.4	46.9-52.0	25.6	23.3-27.8	25.0	22.7-27.3	
Child age									
Median y (IQR)	4.7 (1.7-8.3)		5.5 (2.3-9.0)		4.0 (1.0-7.6)		4.1 (1.3-7.6)		<.0001
<2 y	371	18.6	37.2	31.2-43.1	34.1	28.4-39.8	28.7	23.3-34.1	<.0001
2-6 y	831	40.3	48.0	43.9-52.1	25.4	21.8-29.0	26.6	22.8-30.4	
7-12 y	872	41.1	56.5	52.7-60.3	21.8	18.7-25.0	21.7	18.5-24.9	
Child sex									
Male	1022	50.3	50.4	46.8-54.1	26.3	23.0-29.5	23.3	20.2-26.4	.50
Female	1046	49.5	48.6	45.0-52.1	24.7	21.7-27.8	26.7	23.3-30.0	
Missing§	6	0.3	—	—	—	—	—	—	
Child race/ethnicity									
Non-Hispanic Black	200	10.6	41.1	33.6-48.6	30.5	23.4-38.7	28.3	21.3-35.3	<.0001
Asian	99	3.7	77.5	68.1-86.9	4.8	0.7-8.9	17.7	8.8-26.5	
Non-Hispanic White	1099	50.5	52.1	48.6-55.6	24.4	21.4-27.4	23.5	20.3-26.7	
Hispanic	488	25.9	46.2	40.8-51.6	27.5	22.7-32.3	26.3	21.5-31.0	
Non-Hispanic Other	188	9.3	42.3	33.8-50.9	29.3	21.8-36.7	28.4	21.4-35.4	
Parent age									
18-29 y	366	20.3	33.5	27.5-39.5	39.1	32.2-45.0	27.4	22.0-32.7	<.0001
30-44 y	1387	65.1	53.4	50.3-56.5	23.2	20.6-25.9	23.4	20.6-26.2	
45-64 y	321	14.6	54.2	47.8-60.6	17.1	12.1-22.1	28.7	22.9-34.5	
Parent sex									
Male	794	39.3	67.9	64.0-71.8	18.0	14.9-21.2	14.1	11.0-17.1	<.0001
Female	1270	60.1	37.4	34.2-40.5	30.4	27.4-33.4	32.2	29.1-35.3	
Transgender/other§	10	0.6	—	—	—	—	—	—	
Parent race/ethnicity									
Non-Hispanic Black	219	11.3	40.5	33.6-47.4	29.7	23.1-36.2	29.8	23.4-36.3	<.0001
Asian	129	4.6	71.9	63.2-80.7	7.8	3.0-12.5	20.3	12.3-28.3	
Non-Hispanic White	1159	53.3	52.1	48.7-55.5	24.3	21.4-27.2	23.6	20.6-26.7	
Hispanic	467	25.4	48.0	42.5-53.6	28.3	23.3-33.3	23.7	19.1-28.4	
Non-Hispanic Other	100	5.4	29.8	19.9-38.6	31.8	21.1-42.5	38.4	26.4-50.3	
Child has health insurance									
Yes	1914	92.0	48.9	46.2-51.5	25.5	23.2-27.8	25.6	23.3-28.0	.26
No	149	7.4	56.0	46.1-66.0	27.4	18.5-36.3	16.6	8.5-24.6	
Don't know§	11	0.6	—	—	—	—	—	—	
Child attending in person school/daycare ≥1 d per wk									
Yes	1098	49.8	56.3	52.9-59.7	23.0	20.1-25.9	20.7	17.9-23.5	<.0001
No	969	50.0	42.6	38.9-46.4	28.2	24.8-31.6	29.1	25.6-32.7	
Don't know§	7	0.2	—	—	—	—	—	—	
Number of children ≤12 y in household									
1	1059	50.8	50.9	47.4-54.4	24.2	21.3-27.2	24.9	21.8-28.0	.02
2	751	34.8	51.9	47.6-56.1	25.4	21.6-29.2	22.7	19.1-26.3	
3 or more	264	14.4	38.6	31.3-45.9	30.7	24.0-37.4	30.7	23.3-38.0	
Parent education (highest completed)									
High school or less	482	30.7	35.3	29.7-40.9	32.2	27.1-37.3	32.5	27.2-37.9	<.0001
Some college	546	31.4	43.1	38.7-47.4	28.5	24.6-32.4	28.4	24.5-32.3	
Completed college or more	1015	36.5	66.0	62.8-69.2	18.5	15.8-21.1	15.6	13.1-18.0	
Missing§	31	1.4	—	—	—	—	—	—	
Household income, US dollar									
<\$25 000	331	20.3	35.3	29.0-41.7	33.3	27.5-39.2	31.4	25.3-37.5	<.0001
\$25 000-\$49 999	472	24.6	37.6	32.4-42.7	31.1	26.3-35.8	31.4	26.5-36.3	
\$50 000-\$99 999	587	27.4	54.2	49.6-58.7	23.8	19.8-27.8	22.0	18.1-25.9	
>\$100 000	617	23.9	72.2	68.0-76.7	15.2	11.7-18.6	12.6	9.7-15.6	
Missing	67	3.8	—	—	—	—	—	—	
US Region									
Northeast	550	15.7	56.6	51.9-61.4	20.6	16.3-24.9	22.8	18.9-26.6	<.0001
South	684	39.0	44.3	40.0-48.6	28.6	24.6-32.5	27.1	23.1-31.1	
Midwest	442	21.0	44.0	38.9-49.0	31.3	26.5-36.2	24.7	20.1-29.3	
West	398	24.3	57.8	52.3-63.4	19.0	14.8-23.2	23.2	18.3-28.0	

*Survey weights applied to sample to represent US population by race, ethnicity, sex, education, and region.

†Weighted percents are prevalence estimates of US parents reporting they were plan to vaccinate their youngest child, were not willing, or were unsure.

‡Values from Rao adjusted Pearson χ^2 tests to compare expected to observed frequencies among groups by characteristic for parent's willingness to vaccinate their youngest child (ie, whether willing to vaccinate youngest child differed by sex of the child, etc).

§Categories are not presented in the table as they yielded unreliable SE estimates.

Table II. Characteristics associated with parental plans to vaccinate children ≤12 years of age for COVID-19 reported as PRs and aPRs*—US, March 9–April 2, 2021

	PR	95% CI	P value	aPR	95% CI	P value
Child's age (Ref: <2 y)						
2-6 y	1.52	1.28-1.81	<.0001	1.15	0.96-1.36	.13
7-12 y	1.29	1.07-1.55	<.01	1.19	0.99-1.42	.06
Child's sex (Ref: male)						
Female	0.96	0.87-1.07	.48	1.01	0.92-1.11	.86
Child's race/ethnicity (Ref: Non-Hispanic white) [†]						
Non-Hispanic Black	0.79	0.65-0.96	.02			
Asian	1.49	1.29-1.71	<.0001			
Hispanic	0.89	0.77-1.01	.08			
Non-Hispanic Other	0.81	0.66-1.00	.05			
Parent age (Ref: 45-64 y)						
18-29 y	0.62	0.50-0.77	<.0001	0.86	0.68-1.08	.17
30-44 y	0.98	0.86-1.12	.82	0.99	0.87-1.13	.86
Parent's sex (Ref: male) [‡]						
Female	0.55	0.50-0.61	<.0001	0.69	0.62-0.77	<.0001
Parent's race/ethnicity (Ref: Non-Hispanic white)						
Non-Hispanic Black	0.78	0.65-0.93	<.01	0.89	0.75-1.07	.23
Asian	1.38	1.20-1.59	<.0001	1.38	1.19-1.61	<.0001
Hispanic	0.92	0.81-1.05	.23	1.07	0.94-1.22	.32
Non-Hispanic Other	0.57	0.41-0.80	.001	0.72	0.52-1.00	.05
Child has insurance (Ref: no/don't know)						
Yes	0.86	0.72-1.03	.11	0.93	0.79-1.10	.36
Child attending in person school/daycare ≥1 d per wk (Ref: No/Don't know)						
Yes	1.32	1.19-1.47	<.0001	1.07	0.97-1.19	.19
Number children in household <12 y (Ref: 1)						
2	1.02	0.92-1.13	.73	0.97	0.88-1.08	.57
3 or more	0.76	0.62-0.93	<.01	0.86	0.71-1.05	.14
Parental education level (Ref: college or more)						
High school or less	0.53	0.45-0.63	<.0001	0.73	0.62-0.86	<.001
Some college	1.12	0.89-1.40	.35	0.81	0.72-0.91	<.001
Household income (Ref: ≥\$100 000)						
<\$25 000	0.49	0.41-0.59	<.0001	0.83	0.68-1.02	.08
\$25 000-\$49 999	0.52	0.45-0.60	<.0001	0.75	0.64-0.88	<.001
\$50 000-\$99 999	0.75	0.68-0.83	.0001	0.91	0.82-1.01	.07
US Region (Ref: Northeast)						
South	0.78	0.69-0.89	<.001	0.91	0.81-1.02	.10
Midwest	0.78	0.67-0.89	<.001	0.92	0.80-1.04	.18
West	1.02	0.90-1.16	.75	1.07	0.95-1.21	.28

*Adjusted models included all variables shown in table excluding child's race (see note below).

†Child's race/ethnicity excluded from adjusted models because of collinearity with parent's race/ethnicity.

‡Parents identifying as transgender were grouped with same gender parents and gender nonbinary with female subjects.

although Asian parents were more likely to report wanting to vaccinate their children against COVID-19 compared with other groups, there was higher vaccine hesitancy among female parents compared with males.²⁶ These data provide information that can be used to inform the development of targeted strategies to increase uptake of COVID-19 vaccination for children.

The majority of parents surveyed who reported that they will not or are unsure whether they will vaccinate their child cited safety and effectiveness as the primary reason (78%) and almost one-quarter reported that children are at low risk for COVID-19 infection and do not need to be vaccinated. Our findings are consistent with previous reports of vaccine hesitancy in relation to routine childhood immunizations and for influenza, in which safety and lack of perceived need for vaccination were important reasons for delaying or not accepting immunizations.²⁷ Our findings suggest that providing evidence of the safety of COVID-19 vaccines will be important for increasing uptake, as well as educating parents about the risks to

children from COVID-19 infection and the importance of vaccination.

Approximately 50% of US parents in our survey reported that they already had or planned to get vaccinated for COVID-19 as of March 2021. This was somewhat lower than a poll conducted among all US adults conducted by the Kaiser News Network around the same time as our survey (March 2021), which included more older adults compared with our sample.²⁰ Studies in US adults have shown more vaccine hesitancy among female individuals, which is consistent with our findings that female parents were less likely to report wanting to vaccinate their children.²⁶ We also found a strong correlation between parental vaccination status/hesitancy and plans for vaccinating a child. These findings could suggest that an additional benefit of increasing adult vaccination coverage may be increased uptake for children; however, this requires further study.

There are several limitations to our analysis. Our survey focused on children 12 years of age and under to collect

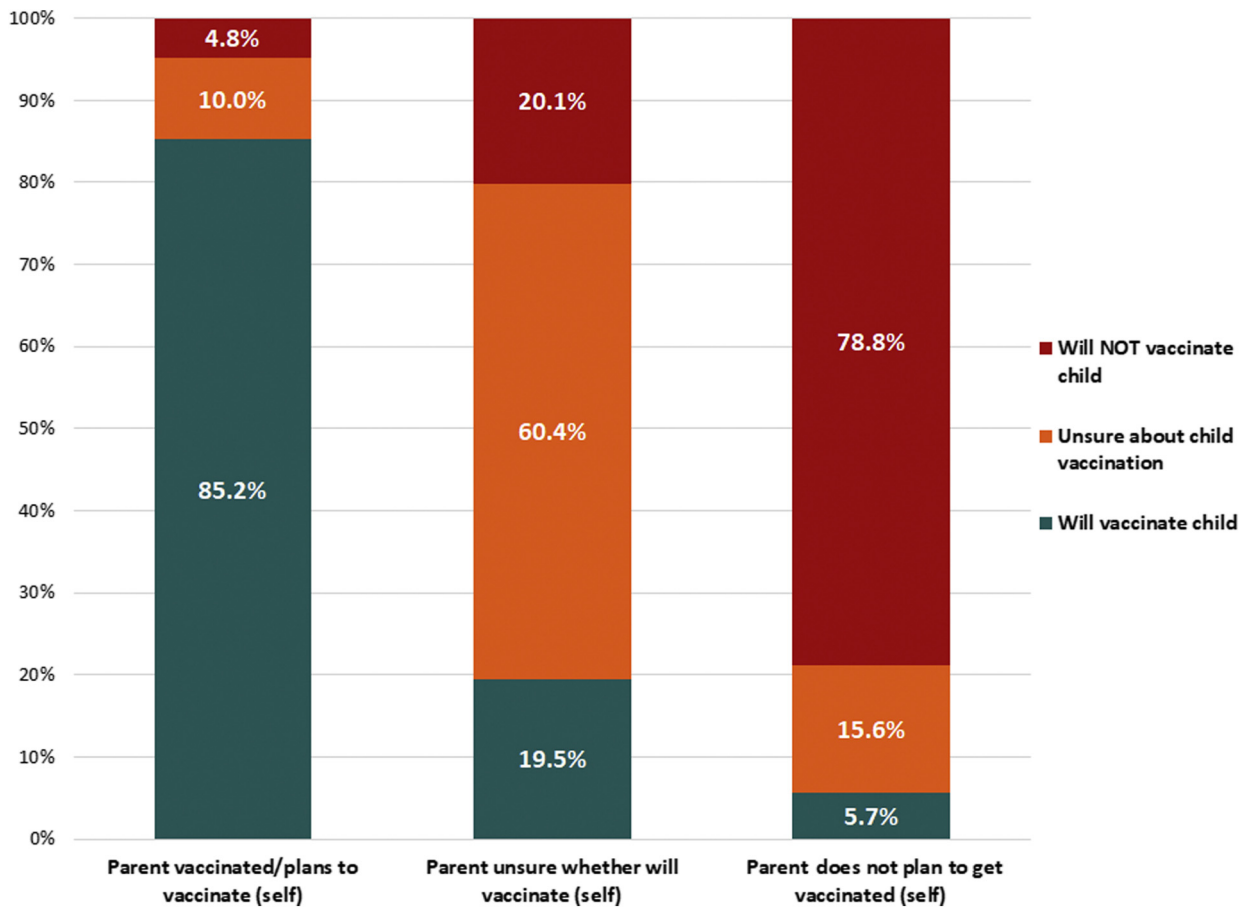


Figure. Parental intentions to vaccinate children against COVID-19 according to parents' own vaccination status—US, March 9–April 2, 2021.

information about younger children, therefore we do not have data on adolescents. The survey data are self-reported, and thus, subject to recall, response, and social desirability bias. In addition, although our survey used quota-based sampling and was weighted to reflect the US population of parents based on 2019 census estimates, it was conducted online and recruited through panels. Parents without access to the internet were not able to participate and thus, our findings may not fully reflect the US parent population. Nevertheless, our survey followed best practices for recruitment and representation of nonprobability online samples using validated approaches.²⁸ Finally, our survey was conducted prior to the pause of the Johnson and Johnson vaccine distribution in April 2021 because of safety concerns, which may have contributed to increased vaccine hesitancy.²⁹

Overall, the findings from our survey suggest that targeted efforts will be needed to ensure high coverage of COVID-19 vaccination in US children.¹⁴ They also show that providing evidence of the safety of vaccines and educating parents about the importance of vaccinating children may help increase acceptability and uptake of COVID-19 vaccination. ■

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Data Statement

Data sharing statement available at www.jpeds.com.

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