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Parental attitudes, beliefs, and experiences related to pediatric COVID-19 vaccination

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Keywords

pediatric COVID-19 vaccination; parental vaccination attitudes/beliefs; COVID-19 vaccination

Introduction

Since COVID-19 vaccination was recommended for children and adolescents, coverage has been substantially lower than that of adults, with rates being lowest among the youngest children^{1,2}. The proportion of those 65 years and older who completed the primary series reached 94.4% by the end of the Public Health Emergency (PHE) on May 11, 2023; however, 61.8% of adolescents aged 12–17 years, 32.9% of children aged 5–11 years, 6.1% of children aged 2–4 years, and 4.7% among children aged <2 years had completed primary series by the end of the PHE¹. Low COVID-19 vaccination coverage among the youngest children may result from lower parental demand for vaccination given that severe COVID-19 disease is less common among children than adults, the fact that many children experienced COVID-19 infections prior to pediatric vaccine availability, as well as generally low vaccine confidence³. However, children continue to be hospitalized for COVID-19, with 2022–23 hospitalization rates among children <1 year of age higher at 387.7/100,000 compared to children 5–17 years (20.6/100,000) and adults 19–49 years (91.1/100,000)¹.

Although the burden of COVID-19 continues to be substantial in children and vaccination continues to be recommended for all children 6 months and older, COVID-19 vaccination coverage levels in children have declined since 2021². Monitoring of parental attitudes, beliefs, and experiences related to pediatric COVID-19 vaccination is needed to inform strategies to potentially increase demand for, and uptake of, pediatric COVID-19 vaccination. Assessing any differences in parental attitudes, beliefs, and experiences by sociodemographic factors is also important when considering and implementing

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Conflict of interest statement

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

varied strategies. To assess parental attitudes, beliefs, and experience related to pediatric COVID-19 vaccination, including reasons for not getting their child vaccinated against COVID-19, a survey of parents was conducted and analyzed utilizing an existing internet panel survey.

Methods

Porter Novelli Public Services conducted a national survey via Big Village during August 17–25, 2023, among a sample of 2,005 U.S. parents aged 18 and older with at least one child 17 years of age and under living at home⁴. The survey uses opt-in panel members from the Lucid platform and quota sampling based on gender, region, income, and race/ethnicity to collect a nationwide sample of parents. If the parent had more than one child, the survey randomly selected a reference child.

Questions included 1) attitudes and beliefs about pediatric COVID-19 vaccination, 2) receipt of COVID-19 vaccination recommendation from the child's health care provider (HCP) and method of recommendation, and 3) reasons for not getting the child vaccinated against COVID-19. Questions were drafted by research scientists familiar with pediatric vaccination. Overall results and results stratified by child's age, urbanicity of residence, and child's health insurance type are reported. Using SAS (version 9.4; SAS Institute), statistical comparisons were made using chi-squared tests; a p-value of <0.05 was considered statistically significant. When testing for differences in attitude-related questions that used a Likert scale, "strongly agree" and "somewhat agree" were combined to "agree"; "neither agree nor disagree", "somewhat disagree", and "strongly disagree" were combined to "not agree". A multivariable analysis assessing parents' sociodemographic and other factors (Appendix 1) associated with their child's COVID-19 vaccination status was conducted. Odds ratios were calculated only for the selected factors that were significantly associated with the receipt of the COVID-19 vaccine variable in the final logistic regression model. The project was determined by CDC to be public health surveillance. The activity was reviewed by CDC and conducted consistent with applicable federal law and CDC policy (45 C.F.R. part 46.102(l)(2); 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq).

Results

Characteristics of participating parents and their child

Table 1 summarizes characteristics of participating parents and their child. About 40% of the responding parents were aged 30–39 years, and 17.6% were aged 29 years or younger. About half (47.2%) lived in suburban areas, 31.2% in urban, and 21.6% in rural areas. About 40% of the responding parents said their child had private health insurance that was provided through an employer or union, and 51.7% had Medicaid/Children's Health Insurance Program (CHIP) coverage. Nearly 50% reported their child had received at least one dose of COVID-19 vaccine.

Parental attitudes and beliefs about COVID-19 vaccine and COVID-19 vaccination

About a quarter (23.6%) of all parents strongly agreed and 22.5% somewhat agreed with the statement “I believe COVID-19 vaccine is generally safe for children” (Figure 1). A similar proportion of parents agreed with the statements, “I believe the benefits of COVID-19 vaccination for my child outweigh the possible risks and side effects of the vaccine and potential inconveniences to my child/family” and “I feel comfortable with my child receiving COVID-19 vaccine and one or more other vaccines in one visit.” Agreement with all three statements was higher among parents of 12–17-year-olds vs. 0–4-year-olds, children with private vs. Medicaid/CHIP health insurance, and those living in urban vs. rural areas.

COVID-19 vaccination recommendation by the child's HCP and method of recommendation

Approximately 60% of parents reported that their child's HCP recommended COVID-19 vaccination for their child (Table 2) (24.9% reported that their child's HCP never mentioned COVID-19 vaccination, 6.4% reported that their child's HCP recommended against COVID-19 vaccination, and 7.6% said that they don't know or can't recall). A higher proportion of parents of 12–17-year-olds (73.1%) and those living in urban areas (67.3%) reported receiving COVID-19 vaccination recommendation for their child compared to parents of 0–4-year-olds (43.1%) and those living in rural areas (51.6%) (p -values<0.0001). A lower proportion of parents of children with Medicaid/CHIP health insurance (58.2%) reported that they received a recommendation compared to parents of children with private health insurance (65.6%) (p -value=0.0013). A higher proportion of parents living in rural areas (10.3%) reported that their child's HCP recommended against COVID-19 vaccination compared to those living in urban areas (5.4%) (p -value=0.0041).

The most common way that parents received COVID-19 vaccination recommendation from their child's HCP was through a conversation during a well-child or sick visit (80.1%). A larger proportion of parents living in suburban areas (82.0%) reported that they received COVID-19 vaccination recommendation during child's well-child or sick visit compared to those living in urban areas (76.5%) (p -value=0.0343), and a smaller proportion of parents of children insured by Medicaid/CHIP health insurance (77.1%) had received a recommendation during child's well-child or sick visit compared to parents of privately insured children (83.1%) (p -value=0.0127). A little over half (54.9%) of parents who received COVID-19 vaccination recommendation for their child during child's well-child or sick visit reported that child's HCP answered their questions and concerns about the COVID-19 vaccine.

Factors associated with child's COVID-19 vaccine receipt

There was a significant difference in the proportion of children who had received at least one dose of COVID-19 vaccine (48.6%) by child's age – 27.4% among 0–4-year-olds, 48.2% among 5–11-year-olds, and 63.8% among 12–17-year-olds (Table 3). The multivariable analysis (variables included are listed in Appendix 1) assessing parents' sociodemographic and other factors associated with their child's COVID-19 vaccination status showed that parents living in rural areas (OR=0.4 [0.2, 0.7]) and those with younger children (child's age 0–4 years: OR=0.3 [0.1, 0.4]; child's age 5–11 years: OR=0.6 [0.4, 0.9]) were less likely to

vaccinate their child than those in urban areas and with children aged 12–17 years. Parents who had received COVID-19 vaccine themselves were more likely to vaccinate their child against COVID-19 than those who had not been vaccinated (received bivalent vaccine dose: OR=25.8 [15.9, 41.7]; received at least one dose, but not bivalent vaccine dose: OR=11.1 [6.8, 18.2]).

Reasons for not vaccinating their child against COVID-19

Among 1,004 parents who had not vaccinated their child against COVID-19, the most frequently reported reason was worry about serious or unknown long-term health problems from COVID-19 vaccination (52.8%), followed by a belief that COVID-19 vaccination is not effective at preventing COVID-19 (36.3%) and that their child or family has already had COVID-19 (19.3%) (Table 4). A higher proportion of parents of 12–17-year-olds (57.3%) vs. 0–4-year-olds (48.3%) were worried about serious/unknown long-term health problems from the vaccine (p-value=0.0288). A higher proportion of parents of 0–4-year-olds (10.9%) reported that their child's HCP did not have COVID-19 vaccines compared to parents of 12–17-year-olds (4.0%) (p-value=0.0028). A higher proportion of parents living in rural areas (44.0%) reported that they do not believe COVID-19 vaccination is effective at preventing COVID-19 compared to parents living in urban areas (29.9%) (p-value=0.0005). A larger proportion of parents of children with Medicaid/CHIP (5.3%) vs. private health insurance (2.5%) reported that it is logistically challenging to get their child a COVID-19 vaccination (i.e., no appointment at a convenient time, difficulty in taking time off) (p-value=0.0480). A larger proportion of parents of children with Medicaid/CHIP (5.6%) vs. private health insurance (2.8%) said that they are against all vaccinations for their child (p-value=0.0498).

Discussion

Parental demand for COVID-19 vaccination for their child has decreased since the introduction of the first pediatric COVID-19 vaccines⁵. The August 2023 survey results reported here indicate low parental confidence in the safety of pediatric COVID-19 vaccines, with only about a quarter of responding parents strongly agreeing that COVID-19 vaccine is generally safe for children and its benefits outweigh possible risks and side effects. Although overall parental confidence in COVID-19 vaccine safety was lowest among those with young children, it is interesting to note that, among responding parents who had not vaccinated their child against COVID-19, a higher proportion with children aged 12–17 years vs. 0–4 years reported concern about serious/unknown long-term health problems from COVID-19 vaccination as a reason for not getting their child vaccinated. This may reflect parental concern about the rare risk of myocarditis, especially among males 12–39 years of age⁶. COVID-19 vaccine safety data and clinician resources for speaking to patients about COVID-19 vaccines are available^{7,8,9}.

The proportion of parents who reported receiving a COVID-19 vaccination recommendation from their child's HCP was about 60%. HCP recommendation is a strong predictor of vaccination and associated with vaccine confidence more generally and for COVID-19 vaccination specifically^{10,11}. Lower COVID-19 vaccination recommendation by child's HCP during well-child or sick visit in rural areas and among children covered by Medicaid/

CHIP may be contributing factor in the lower COVID-19 vaccination coverage among these groups of children². Offering a vaccination recommendation during a HCP visit is important to avoid missing an opportunity to vaccinate^{12,13}. Office visits can also serve as an opportunity to answer parents' questions and concerns.

Multivariable results indicated that the child's age, urbanicity of residence, and the parent's COVID-19 vaccination status were associated with the receipt of pediatric COVID-19 vaccine. Parents with younger children and those living in rural areas were less likely to vaccinate their child. The strongest predictor of the child receiving at least one dose of COVID-19 vaccine was the responding parent's COVID-19 vaccine receipt. Consistent with previous reports,^{10,14} among responding parents residing in rural vs. urban areas, lower confidence in COVID-19 vaccine safety and fewer recommendations for COVID-19 vaccination by HCPs could explain lower COVID-19 vaccination coverage estimates among rural children.

Limitations

This survey was an opt-in internet panel survey, and the population may not be representative of the U.S. population of parents with children under 18 years of age. Compared to U.S. Census Bureau estimates of parents living with children under 18 years living in the household, surveyed parents were similar in terms of participation in labor force and number of children under 18 years of age; however, surveyed parents were slightly younger and had higher educational attainment¹⁵. Also, a higher proportion of children captured in the survey vs. the U.S. was reported to have Medicaid health insurance. In addition, the survey was conducted in August 2023, prior to the recommendation for the 2023–24 updated COVID-19 vaccines and COVID-19 vaccine commercialization. Lastly, vaccination status of children or parents was not validated.

Conclusions

Low parental confidence in COVID-19 vaccine safety and concerns around serious/unknown long-term health problems related to the vaccine were observed. In addition, a significant proportion of parents reported not having received a COVID-19 vaccination recommendation from their child's HCP. Clinicians remain the most trusted sources of information for patients and clinician recommendations for COVID-19 vaccination are critical, as is offering an opportunity to address parent concerns about vaccine safety and providing a rationale for continuing to recommend updated doses of COVID-19 vaccine. Offering a recommendation and an opportunity for addressing parent questions may be particularly important in rural areas. Clinician messaging around safety, including side effects and potential long-term health issues from COVID-19 vaccination, is critical^{8,9,16,17}.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

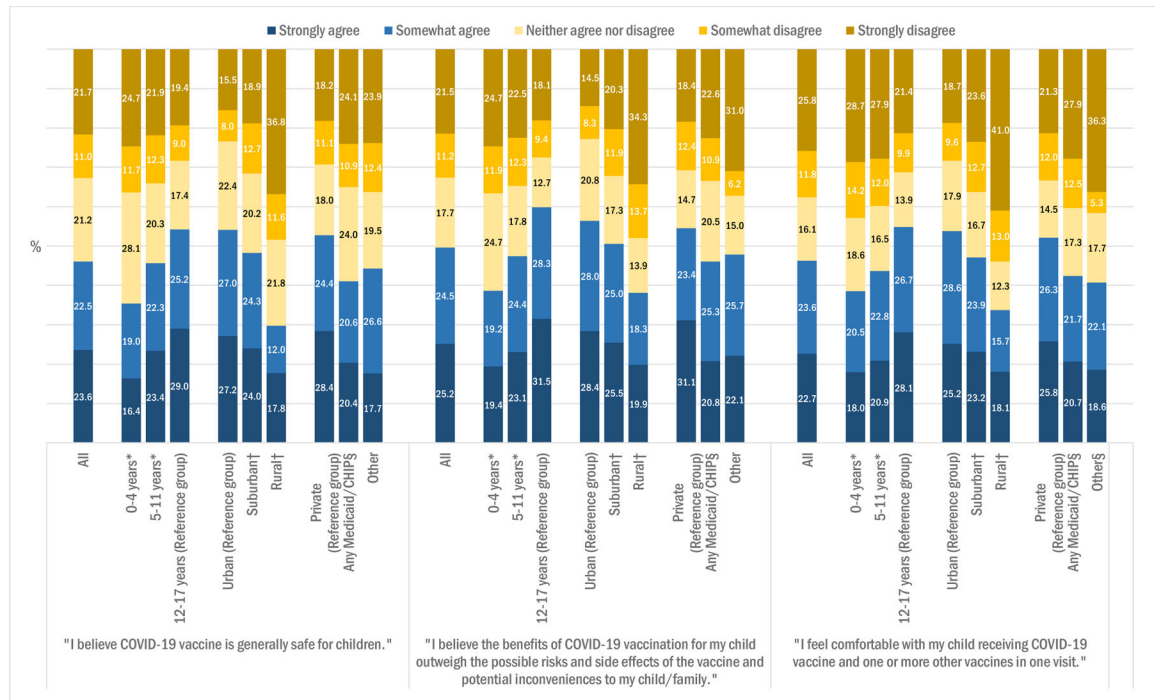
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**Figure 1.**

Parental attitudes and beliefs about COVID-19 vaccine and COVID-19 vaccination, Porter Novelli View Parents survey, August 2023

* Proportion of parents agreeing (strongly and somewhat agree) to the statement statistically significantly different from 12–17 years age group at $p < 0.05$.

† Proportion of parents agreeing (strongly and somewhat agree) to the statement statistically significantly different from urban group at $p < 0.05$.

§ Proportion of parents agreeing (strongly and somewhat agree) to the statement statistically significantly different from private health insurance group at $p < 0.05$.

Table 1. Characteristics of survey respondents (parents) and their reference * child, Porter Novelli View Parents survey, August 2023

	n (%)
Total	2,005 (100.0%)
Urbanicity	
Urban	626 (31.2%)
Suburban	947 (47.2%)
Rural	432 (21.6%)
Parent's age	
≤29	353 (17.6%)
30–39	771 (38.5%)
40–49	606 (30.2%)
50 and older	275 (13.7%)
Parent's highest level of formal education completed	
High school graduate or the equivalent (i.e., GED) or some schooling, but not high school diploma	591 (29.5%)
Associate degree/Technical school or some college credit, but no degree	696 (34.7%)
Bachelor's degree	453 (22.6%)
Master's degree or Professional/Doctorate degree	265 (13.2%)
Parent's current employment status	
Work full-time	1,242 (62.0%)
Homemaker	177 (8.8%)
Work part-time	166 (8.3%)
Self-employed	158 (7.9%)
Unemployed and seeking work	111 (5.5%)
Unable to work because of a disability	60 (3.0%)
Retired	51 (2.5%)
Other	40 (2.0%)
Total 2022 household income before taxes	
Less than \$40,000	590 (29.4%)
\$40,000-\$74,999	556 (27.7%)

	n (%)
\$75,000-\$124,999	470 (23.4%)
\$125,000 or more	389 (19.4%)
Number of children 17 years of age and under living at respondent's home	
1	921 (45.9%)
2	713 (35.6%)
3	255 (12.7%)
4 or more	116 (5.8%)
Parent's COVID-19 vaccination status	
Received updated (bivalent) vaccine dose	853 (42.5%)
Received at least one dose, but not updated (bivalent) vaccine dose	491 (24.5%)
Not vaccinated	621 (31.0%)
Not sure	40 (2.0%)
Reference * child's age	
0-4	494 (24.6%)
5-11	800 (39.9%)
12-17	711 (35.5%)
Reference * child's health insurance	
Private health insurance provided through an employer or union	832 (41.5%)
Any Medicaid or Children's Health Insurance Program (CHIP)	1,036 (51.7%)
Other	113 (5.6%)
My child is not covered by any health insurance	24 (1.2%)
Reference * child has a primary HCP who provides regular check-ups/preventive care	
Yes	1,949 (97.2%)
No	56 (2.8%)
Reference * child's COVID-19 vaccination status	
Received at least one dose	951 (47.4%)
Not vaccinated	1,004 (50.1%)
Not sure	50 (2.5%)

* If the parent had more than one child, the survey randomly selected a reference child.

Receipt of COVID-19 vaccination recommendation from child's HCP and method of recommendation, Porter Novelli View Parents survey, August 2023

Table 2.

	All parents (n=1,949)	Child's age			Urbanicity			Child's health insurance ^a			
		0-4 years (n=487)	5-11 years (n=775)	12-17 years (n=687; Reference group)	Urban (n=606; Reference group)	Suburban (n=926)	Rural (n=417)	Private (n=819; Reference group)	Any Medicaid/ CHIP (n=1,012)	Other (n=109)	
Receipt of COVID-19 vaccination recommendation from child's HCP											
Yes	1,190 (61.1%)	210 (43.1%) [*]	478 (61.7%) [*]	502 (73.1%)	408 (67.3%)	567 (61.2%) [†]	215 (51.6%) [†]	537 (65.6%)	589 (58.2%) [§]	61 (56.0%)	
No, my child's HCP never mentioned OR recommended against COVID-19 vaccination OR don't know/can't recall	759 (38.9%)	277 (56.9%)	297 (38.3%)	185 (26.9%)	198 (32.7%)	359 (38.8%)	202 (48.4%)	282 (34.4%)	423 (41.8%)	48 (44.0%)	
How parents received COVID-19 vaccination recommendation from child's HCP among parents that received recommendation (n=1,190)											
Conversation with the HCP during a well-child or sick visit	953 (80.1%)	160 (76.2%)	383 (80.1%)	410 (81.7%)	312 (76.5%)	465 (82.0%) [†]	176 (81.9%)	446 (83.1%)	454 (77.1%) [§]	51 (83.6%)	
Email	214 (18.0%)	39 (18.6%)	98 (20.5%) [*]	77 (15.3%)	90 (22.1%)	102 (18.0%)	22 (10.2%) [†]	95 (17.7%)	114 (19.4%)	4 (6.6%) [§]	
Phone message	160 (13.5%)	28 (13.3%)	73 (15.3%)	59 (11.8%)	74 (18.1%)	66 (11.6%) [†]	20 (9.3%) [†]	56 (10.4%)	97 (16.5%) [§]	5 (8.2%)	
Text message	160 (13.5%)	32 (15.2%)	67 (14.0%)	61 (12.2%)	68 (16.7%)	72 (12.7%)	20 (9.3%) [†]	57 (10.6%)	92 (15.6%) [§]	10 (16.4%)	
Poster/brochure or written materials in the office	107 (9.0%)	13 (6.2%)	54 (11.3%)	40 (8.0%)	40 (9.8%)	49 (8.6%)	18 (8.4%)	46 (8.6%)	58 (9.9%)	3 (4.9%)	
Letter or postcard	93 (7.8%)	20 (9.5%)	39 (8.2%)	34 (6.8%)	36 (8.8%)	48 (8.5%)	9 (4.2%) [†]	38 (7.1%)	49 (8.3%)	6 (9.8%)	
Recorded message played when parent called the office	61 (5.1%)	12 (5.7%)	25 (5.2%)	24 (4.8%)	18 (4.4%)	34 (6.0%)	9 (4.2%)	27 (5.0%)	29 (4.9%)	5 (8.2%)	
Don't know/Can't recall	26 (2.2%)	6 (2.9%)	7 (1.5%)	13 (2.6%)	7 (1.7%)	12 (2.1%)	7 (3.3%)	12 (2.2%)	14 (2.4%)	0 (0%)	
Other	4 (0.3%)	0 (0%)	3 (0.6%)	1 (0.2%)	2 (0.5%)	2 (0.4%)	0 (0%)	4 (0.7%)	0 (0%)	0 (0%)	
HCP action around making a COVID-19 vaccination recommendation for child during a well-child or sick visit among parents that received recommendation during a well-child or sick visit (n=953)											
Answered parent's questions and concerns about the COVID-19 vaccine	523 (54.9%)	83 (51.9%)	205 (53.5%)	235 (57.3%)	174 (55.8%)	257 (55.3%)	92 (52.3%)	261 (58.5%)	228 (50.2%) [§]	32 (62.8%)	

	All parents (n=1,949)	Child's age			Urbanicity			Child's health insurance ^a		
		0–4 years (n=487)	5–11 years (n=775)	12–17 years (n=687; Reference group)	Urban (n=606; Reference group)	Suburban (n=926)	Rural (n=417)	Private (n=819; Reference group)	Any Medicaid/ CHIP (n=1,012)	Other (n=109)
Reminded parent that the COVID-19 vaccine protects their child	511 (53.6%)	68 (42.5%)*	211 (55.1%)	232 (56.6%)	157 (50.3%)	262 (56.3%)	92 (52.3%)	250 (56.1%)	232 (51.1%)	27 (52.9%)
Told parent that the COVID-19 vaccine is especially important for their child because of their age or health conditions that child might have	383 (40.2%)	63 (39.4%)	165 (43.1%)	155 (37.8%)	129 (41.4%)	177 (38.1%)	77 (43.8%)	172 (38.6%)	189 (41.6%)	21 (41.2%)
Explained the possible negative effects of getting COVID-19, such as serious health effects, missing school/daycare, or financial costs	340 (35.7%)	53 (33.1%)	153 (40.0%)*	134 (32.7%)	118 (37.8%)	154 (33.1%)	68 (38.6%)	164 (36.8%)	160 (35.2%)	15 (29.4%)
Told parent that they themselves or other patients in the practice have had good experience with the COVID-19 vaccine	304 (31.9%)	38 (23.8%)	137 (35.8%)	129 (31.5%)	104 (33.3%)	149 (32.0%)	51 (29.0%)	149 (33.4%)	145 (31.9%)	9 (17.7%)§
None of the above	38 (4.0%)	8 (5.0%)	10 (2.6%)	20 (4.9%)	7 (2.2%)	21 (4.5%)	10 (5.7%)	20 (4.5%)	17 (3.7%)	1 (2.0%)
Don't know/Can't recall	34 (3.6%)	11 (6.9%)*	14 (3.7%)	9 (2.2%)	9 (2.9%)	21 (4.5%)	4 (2.3%)	16 (3.6%)	16 (3.5%)	2 (3.9%)

^a Excluded responses from 9 parents who reported their child is not covered by health insurance.

* Statistically significantly different from 12–17 years age group at p<0.05.

[†] Statistically significantly different from urban group at p<0.05.

[§] Statistically significantly different from private health insurance group at p<0.05.

Table 3. Factors associated with reference * child's COVID-19 vaccine receipt, Porter Novelli View Parents survey, August 2023

	n (%)	% that received at least one dose	Odds ratio *** [95% CI]
Total**	1,955 (100.0%)	951 (48.6%)	-
Urbanicity			
Urban	613 (31.4%)	335 (54.7%)	Reference group
Suburban	923 (47.2%)	481 (52.1%)	0.9 [0.6, 1.4]
Rural	419 (21.4%)	135 (32.2%)	0.4 [0.2, 0.7]
Parent's age			
29 and younger	342 (17.5%)	121 (35.4%)	Reference group
30–39	753 (38.5%)	317 (42.1%)	0.6 [0.3, 1.1]
40–49	591 (30.2%)	345 (58.4%)	0.9 [0.5, 1.7]
50 and older	269 (13.8%)	168 (62.5%)	1.7 [0.7, 3.8]
Parent's highest level of formal education completed			
High school graduate or the equivalent (i.e., GED) or some schooling, but not high school diploma	570 (29.2%)	208 (36.5%)	-
Associate degree/Technical school or some college credit, but no degree	678 (34.7%)	288 (42.5%)	-
Bachelor's degree	445 (22.8%)	277 (62.3%)	-
Master's degree or Professional/Doctorate degree	262 (13.4%)	178 (67.9%)	-
Parent's current employment status			
Work full-time	1,223 (62.6%)	688 (56.3%)	Reference group
Homemaker	170 (8.7%)	42 (24.7%)	0.5 [0.2, 1.0]
Work part-time	163 (8.3%)	79 (48.5%)	2.0 [1.0, 4.1]
Self-employed	148 (7.6%)	54 (36.5%)	0.7 [0.3, 1.3]
Unemployed and seeking work	104 (5.3%)	27 (26.0%)	0.5 [0.2, 1.1]
Unable to work because of a disability	58 (3.0%)	21 (36.2%)	0.3 [0.1, 0.8]
Retired	51 (2.6%)	26 (51.0%)	0.7 [0.2, 2.0]
Other	38 (1.9%)	14 (36.8%)	0.8 [0.1, 4.2]
Total 2022 household income before taxes			
Less than \$40,000	570 (29.2%)	214 (37.5%)	-
\$40,000-\$74,999	539 (27.6%)	239 (44.3%)	-

	n (%)	% that received at least one dose	Odds ratio *** [95% CI]
\$75,000-\$124,999	463 (23.7%)	265 (57.2%)	-
\$125,000 or more	383 (19.6%)	233 (60.8%)	-
Number of children 17 years of age and under living at respondent's home			
1	895 (45.8%)	476 (53.2%)	-
2	698 (35.7%)	353 (50.6%)	-
3	248 (12.7%)	89 (35.9%)	-
4 or more	114 (5.8%)	33 (29.0%)	-
Parent's COVID-19 vaccination status			
Received updated (bivalent) vaccine dose	849 (43.4%)	624 (73.5%)	25.8 [15.9, 41.7]
Received at least one dose, but not updated (bivalent) vaccine dose	480 (24.6%)	264 (55.0%)	11.1 [6.8, 18.2]
Not vaccinated	610 (31.2%)	59 (9.7%)	Reference group
Not sure	16 (0.8%)	4 (25.0%)	<0.001 [<0.001, >999.999]
Reference * child's age			
0-4	479 (24.5%)	131 (27.4%)	0.3 [0.1, 0.4]
5-11	778 (39.8%)	375 (48.2%)	0.6 [0.4, 0.9]
12-17	698 (35.7%)	445 (63.8%)	Reference group
Reference * child's health insurance			
Private health insurance provided through an employer or union	814 (41.6%)	458 (56.3%)	-
Any Medicaid or Children's Health Insurance Program (CHIP)	1,008 (51.6%)	439 (43.6%)	-
Other	111 (5.7%)	46 (41.4%)	-
My child is not covered by any health insurance	22 (1.1%)	8 (36.4%)	-
Reference * child has a primary HCP who provides regular check-ups/preventive care			
Yes	1,902 (97.3%)	933 (49.1%)	-
No	53 (2.7%)	18 (34.0%)	-
Receipt of COVID-19 vaccination recommendation from child's HCP			
Yes	1,176 (61.8%)	809 (68.8%)	-
No	726 (38.2%)	124 (17.1%)	-
How parents received COVID-19 vaccination recommendation from child's HCP among parents that received recommendation			
Conversation with the HCP during a well-child or sick visit	939 (79.9%)	641 (68.3%)	-

	n (%)	% that received at least one dose	Odds ratio *** [95% CI]
Email	213 (18.1%)	171 (80.3%)	-
Phone message	159 (13.5%)	125 (78.6%)	-
Text message	160 (13.6%)	130 (81.3%)	2.7 [1.3, 5.7]
Poster/brochure or written materials in the office	106 (9.0%)	85 (80.2%)	-
Letter or postcard	93 (7.9%)	70 (75.3%)	-
Recorded message played when parent called the office	60 (5.1%)	51 (85.0%)	-
Don't know/Can't recall	26 (2.2%)	13 (50.0%)	-
Other	4 (0.3%)	4 (100.0%)	-
HCP action around making a COVID-19 vaccination recommendation for child during a well-child or sick visit among parents that received recommendation during a well-child or sick visit			
Answered parent's questions and concerns about the COVID-19 vaccine	515 (54.9%)	392 (76.1%)	1.5 [1.0, 2.1]
Reminded parent that the COVID-19 vaccine protects their child	509 (54.2%)	364 (71.5%)	-
Told parent that the COVID-19 vaccine is especially important for their child because of their age or health conditions that child might have	379 (40.4%)	286 (75.5%)	-
Explained the possible negative effects of getting COVID-19, such as serious health effects, missing school/daycare, or financial costs	338 (36.0%)	254 (75.2%)	-
Told parent that they themselves or other patients in the practice have had good experience with the COVID-19 vaccine	301 (32.1%)	233 (77.4%)	-
None of the above	37 (3.9%)	13 (35.1%)	0.3 [0.1, 0.8]
Don't know/Can't recall	31 (3.3%)	12 (38.7%)	-

* If the parent had more than one child, the survey randomly selected a reference child.

** Excluding parents who answered 'Not sure' to the question 'What is the COVID-19 vaccination status of your child aged [X]?'.

*** Odds ratios were calculated only for the selected factors that were significantly associated with the receipt of the COVID-19 vaccine variable in the final logistic regression model.

Table 4. Reasons parents have not vaccinated their child against COVID-19, Porter Novelli View Parents survey, August 2023

	All parents (n=1,004)	Child's age			Urbanicity			Child's health insurance ^a			
		0-4 years (n=348)	5-11 years (n=403)	12-17 years (n=253; Reference group)	Urban (n=278; Reference group)	Suburban (n=442)	Rural (n=284)	Private (n=356; Reference group)	Any Medicaid/ CHIP (n=569)	Other (n=65)	
I am worried about my child getting serious/unknown long-term health problems from COVID-19 vaccination	530 (52.8%)	168 (48.3%)*	217 (53.9%)	145 (57.3%)	143 (51.4%)	230 (52.0%)	157 (55.3%)	195 (54.8%)	300 (52.7%)	27 (41.5%)	
I don't believe COVID-19 vaccination is effective at preventing COVID-19	364 (36.3%)	96 (27.6%)*	160 (39.7%)	108 (42.7%)	83 (29.9%)	156 (35.3%)	125 (44.0%) [†]	133 (37.4%)	205 (36.0%)	23 (35.4%)	
My child or my family has already had COVID-19	194 (19.3%)	62 (17.8%)	77 (19.1%)	55 (21.7%)	46 (16.6%)	95 (21.5%)	53 (18.7%)	76 (21.4%)	102 (17.9%)	15 (23.1%)	
I don't believe my child will get very sick from COVID-19	142 (14.1%)	53 (15.2%)	58 (14.4%)	31 (12.3%)	46 (16.6%)	66 (14.9%)	30 (10.6%) [†]	72 (20.2%)	66 (11.6%) [§]	4 (6.2%) [§]	
Side effects from the COVID-19 vaccination are annoying to deal with (e.g., my child may have to miss school)	137 (13.7%)	41 (11.8%)	68 (16.9%)*	28 (11.1%)	46 (16.6%)	57 (12.9%)	34 (12.0%)	43 (12.1%)	87 (15.3%)	6 (9.2%)	
Other	100 (10.0%)	43 (12.4%)	29 (7.2%)	28 (11.1%)	25 (9.0%)	46 (10.4%)	29 (10.2%)	40 (11.2%)	48 (8.4%)	12 (18.5%)	
My child's regular health care provider did not have COVID-19 vaccines	65 (6.5%)	38 (10.9%)*	17 (4.2%)	10 (4.0%)	28 (10.1%)	19 (4.3%) [†]	18 (6.3%)	23 (6.5%)	35 (6.2%)	6 (9.2%)	
My friends, other families are not getting their children COVID-19 vaccine	64 (6.4%)	23 (6.6%)	30 (7.4%)	11 (4.4%)	23 (8.3%)	25 (5.7%)	16 (5.6%)	22 (6.2%)	36 (6.3%)	6 (9.2%)	
I am against all vaccinations for my child	51 (5.1%)	22 (6.3%)	20 (5.0%)	9 (3.6%)	19 (6.8%)	18 (4.1%)	14 (4.9%)	10 (2.8%)	32 (5.6%) [§]	6 (9.2%)	
It is logistically challenging to get my child a COVID-19 vaccination (i.e., no appointment at a convenient time, difficulty in taking time off)	41 (4.1%)	13 (3.7%)	18 (4.5%)	10 (4.0%)	13 (4.7%)	17 (3.9%)	11 (3.9%)	9 (2.5%)	30 (5.3%) [§]	2 (3.1%)	

^a Excluded responses from 14 parents who reported their child is not covered by health insurance.

* Statistically significantly different from 12-17 years age group at p<0.05.

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Statistically significantly different from urban group at $p<0.05$.
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§ Statistically significantly different from private health insurance group at $p<0.05$.