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## Parent-Reported Intention to Vaccinate Children Against COVID-19: Influences of COVID-19 and Seasonal Influenza Vaccination

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### Introduction

The coronavirus disease 2019 (COVID-19) pandemic has significantly affected the well-being of children through economic, education,<sup>1</sup> and psychosocial stressors<sup>2</sup> stemming from school closures and reduced access to mental health and social support resources.<sup>3</sup> Pediatric COVID-19 vaccination is necessary to protect children's health and well-being, establish herd immunity in the population, and contribute to safely opening spaces. The recent approval of vaccination and uptake among 12 to 15 year olds is promising. However, research examining parents' intention to vaccinate their children in the United States is limited. Furthermore, assessing parental and child receipt of the seasonal influenza vaccination may be a useful predictor of intention to vaccinate against COVID-19.<sup>4</sup> Therefore, the objectives of this study are to examine parents' intention to vaccinate their children against COVID-19 and factors associated with vaccine intention for children.

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#### Author Contributions

AVH: Contributed to conception and design; contributed to analysis and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

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DRL: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

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#### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

#### Supplemental Material

Supplemental material for this article is available online.

## Methods

### Study Design

This study utilized data from the Family Strengths Survey, a community-partnered, anonymous, repeated cross-sectional survey of parents in Western Pennsylvania regarding their attitudes about COVID-19.<sup>5</sup> Briefly, online and telephone surveys were created to assess participants' thoughts on their child's ability to thrive during the pandemic, their health and social needs, concerns about COVID-19 including testing attempts, vaccination intentions, and the demographic composition of their family.<sup>6</sup> Surveys were administered weekly, beginning April 2, 2020, and were revised to be administered monthly beginning October 2020 to reduce participant burden.

### Participants, Recruitment, and Data Collection

Participants were eligible for the study if they (1) identified as being pregnant, a parent, or caregiver (referred to as parent) to a child under 18 years old; (2) lived in Western PA (including urban, suburban, and rural areas); and (3) could take the survey in English or Spanish. Surveys were advertised through multiple venues including list-servs, local press, social media, and community-based organizations. Surveys were completed online or by phone.

### Measures

**Intention to Receive COVID-19 Vaccine (Parent and Child).**—Parents who had not yet received the COVID-19 vaccine were asked whether they would be willing to vaccinate themselves and their children against COVID-19 if it were available today. The question asked, "If a vaccine to prevent COVID-19 were available today, would you?" with response options including "Definitely NOT get the vaccine," "Probably NOT get the vaccine," "Probably get the vaccine," "Definitely get the vaccine," and "I have already received the vaccine." These items were adapted from the Pew Research Center.<sup>7</sup>

**Seasonal Influenza Vaccine.**—Participants indicated if they, and/or their child(ren), had already received the seasonal 2020–2021 influenza vaccine as of March 2021. Response options included "Yes," "No, but I plan to have myself/my child(ren) get the flu vaccine," and "No, myself/my child(ren) don't get the flu vaccine."

**Demographics.**—Participants provided their age, gender, race, income level, and child's age.

### Data Analysis

Analyses were limited to responses from one survey collected in March 2021 (available to participants between March 1, 2021, and March 31, 2021). Parent COVID-19 vaccine intention and receipt were collapsed into 3 categories, combining probably and definitely not responses, probably and definitely affirmative responses, and receipt of the COVID-19 vaccine as its own category. There were no instances of child COVID-19 vaccinations in this sample, allowing for binary responses of positive and negative parent-reported intention for child COVID-19 vaccinations. Parent and child influenza vaccination receipt were both

separately collapsed into 2 categories, yes and no (where no combined “no, but I plan to get the vaccine” and “no, I don’t get the vaccine”). Data from the Census Bureau<sup>8</sup> and the US Postal Service<sup>9</sup> were utilized to classify urban versus not urban areas based on participant reported zip codes. Specifically, we first converted each participant’s zip code into their city of residence. Next, we labelled participants as residing in an “urban” or “not urban” area based on the population of their city, where cities with >50 000 people were labelled as urban based on Census Bureau definitions. Participants with missing data on child COVID-19 vaccine intention were excluded from the analysis (n = 16).

Descriptive statistics assessed parents’ intentions to vaccinate their children against COVID-19. Three multivariable logistic regression models were examined, adjusting for participant race, income, gender, urban area, and child age, with child COVID-19 vaccine intention as the outcome of interest for all models. The first tested the association of parent-reported COVID-19 vaccine receipt or intention. The second examined associations between parent influenza vaccine and the third tested associations on child receipt of influenza vaccine. Fisher exact tests, selected due to the small sample of missing data, were used to examine differences in vaccine intention between those with and without missing data on the outcome of child COVID-19 vaccine intentions.

## Results

Participants with complete data on child COVID-19 vaccine intentions (N = 299, 95%) were primarily ages 30 to 44 years (62%), female (87%), non-Hispanic White (86%), with a household income >\$99,999 (55%), and had children ages 6 to 12 years (50%; Table 1). Participants were evenly distributed between urban (50.7%) and not urban areas (49.3%). Participants with missing data were less likely to identify as non-Hispanic white, less likely to be older, and less likely to have a higher income.

Thirty-five percent of parents had already been vaccinated. The majority of parents indicated they would definitely (46%) or probably (27%) give their child the COVID-19 vaccine. Parents who reported receiving the COVID-19 vaccine had higher odds of reporting vaccine intention for their children (adjusted odds ratio [aOR] = 62.8, 95% confidence interval [CI] = 15.4–255.8). Among parents who had not yet been vaccinated, parent-reported vaccine intention significantly increased the odds of vaccine intention for children (aOR = 72.1, 95% CI = 18.1–287.5).

Parent-reported receipt of the seasonal influenza vaccine significantly increased the odds that they would give their child the COVID-19 vaccine (aOR = 4.8, 95% CI = 2.30–9.90). The same pattern emerged for parents reporting their child had received the influenza vaccine (aOR = 5.48, 95% CI = 2.50–12.0; Table 2).

## Discussion

In this sample from Southwestern Pennsylvania, parents had similar intentions about vaccinating themselves and their children; vaccinated parents or parents who indicated interest in receiving the COVID-19 vaccine also indicated vaccine intention for children. A strength of this study is that it provides recent data (from March 2021), which is

critical as vaccine practices and policies are changing rapidly. Multiple national-, state-, and community-level messaging campaigns are ongoing to address vaccine intention in the United States and it is encouraging to see that interest in COVID-19 vaccines is increasing. The results of this study suggest that these campaigns may also benefit from addressing parental intention toward vaccinating children.

Additionally, parents in this study who got themselves and their children vaccinated against influenza during the 2020–2021 season were more likely to report wanting to get their child vaccinated against COVID-19. Our more recent US-based findings are consistent with those from an international study from May 2020 that reported caregiver receipt of influenza vaccination significantly predicted caregiver COVID-19 vaccination intent for children.<sup>10</sup> Combining messaging strategies for both influenza and COVID-19 might improve general understanding and increased uptake, dismantle myths, and address barriers to vaccination. Addressing the known reasons for parental hesitancy for pediatric influenza vaccination,<sup>11</sup> which are also noted as reasons for COVID-19 vaccine hesitancy (eg, vaccine safety, lower perceived risk of disease), may increase uptake of both vaccines.<sup>12</sup>

Some limitations to this study must be noted. Data were collected from cross-sectional, anonymous, self-reported surveys impeding causal inference and may introduce bias. Participants were from one geographic region with limited non-White respondents. Bivariate estimates examining the influence of adult COVID-19 vaccine intention on pediatric COVID-19 vaccine intention were large and had wide uncertainty in intervals due to near complete separation between responses. There was a small amount of missing data on the primary outcome of vaccine intention (n = 16); however, we recognized some significant differences between participants with and without missing data (Appendix A). This study is strengthened by the inclusion of data on vaccination status and intention from the most recent month of survey responses to capture COVID-19 vaccine rollout (March 2021). Future investigations into parental vaccine hesitancy and intention should include a more robust and representative sample.

## Clinical Pediatric Implications

It is critical that public health campaigns address parents' concerns about the COVID-19 vaccine. Increasing parents' understanding of the COVID-19 vaccine may also improve vaccine hesitancy among adults. Additionally, integrating messaging about both influenza and COVID-19 vaccinations may be one actionable step toward improving COVID-19 vaccine intention for children and adults. Public health efforts must simultaneously address vaccine hesitance while also increasing widespread access to the COVID-19 vaccine.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1.** Demographic Characteristics and Pediatric COVID Vaccine Intention of Family Strengths Survey Participants (March 1–31, 2021).

Characteristic	Total, n (%)	Negative child vaccine responses (definitely NOT, probably NOT vaccinate), n (%)	Positive child vaccine response (definitely, probably vaccinate), n (%)
Age			
18–29 years	10 (3.23%)	4 (40%)	6 (60%)
30–44 years	191 (61.6%)	38 (20.7%)	146 (79.3%)
45–65 years	109 (35.2%)	25 (23.8%)	80 (76.2%)
Gender			
Male or other <sup>a</sup>	41 (13.2%)	8 (20%)	32 (80%)
Female	269 (86.8%)	59 (22.8%)	200 (77.2%)
Race			
White, non-Hispanic	270 (85.7%)	56 (21.5%)	205 (78.5%)
Black, indigenous, persons of color	45 (14.3%)	11 (28.9%)	27 (71.1%)
Income			
<15 000–49 999	51 (16.8%)	21 (44.7%)	26 (55.3%)
50000–99999	86 (28.3%)	22 (27.2%)	59 (72.8%)
>99 999	167 (54.9%)	21 (12.7%)	144 (87.3%)
Age of children			
Currently pregnant	18 (5.7%)	5 (29.4%)	12 (70.6%)
No		62 (22%)	220 (78%)
Infant/toddler (0–2 years)	81 (25.7%)	19 (23.5%)	62 (76.5%)
No		48 (22%)	170 (78%)
Preschool (3–5 years)	101 (32.1%)	18 (18.8%)	78 (81.3%)
No		49 (24.1%)	154 (75.9%)
School age (6–12 years)	158 (50.1%)	35 (23%)	117 (77%)
No		32 (21.8%)	115 (78.2%)
Adolescent/teenager (13–17 years old)	108 (34.3%)	27 (25.7%)	78 (74.3%)
No		40 (20.6%)	154 (79.4%)
Young adult (18–26 years)	36 (11.4%)	5 (14.3%)	30 (85.7%)
No		62 (23.5%)	202 (76.5%)

Characteristic	Total, n (%)	Negative child vaccine responses (definitely NOT, probably NOT vaccinate), n (%)	Positive child vaccine response (definitely, probably vaccinate), n (%)
Urban/not urban			
Not urban	147 (49.3%)	46 (31.3%)	101 (68.7%)
Urban	151 (50.7%)	21 (13.9%)	130 (86.1%)

<sup>a</sup>Male or other category includes male, nonbinary and other gender identities. All response categories were collapsed for binary response. No answers and missing responses to child vaccination intention questions not reported in right 2 columns.

**Table 2.** Frequency of COVID and Seasonal Flu Vaccine Intentions and Odds of Pediatric Vaccine Intention by Adult Vaccine Intention.<sup>a</sup>

	If a vaccine to prevent COVID-19 were available today, would you:		Adult COVID-19 vaccination intention, n (%)	Child COVID-19 vaccination intention, n (%)
Definitely get the vaccine	124 (39.4%)	146 (46.4%)		
Probably get the vaccine	29 (9.2%)	86 (27.3%)		
Probably not get the vaccine	20 (6.4%)	39 (12.4%)		
Definitely not get the vaccine	21 (6.7%)	28 (8.9%)		
No answer	7 (2.2%)	11 (3.5%)		
I have already received the vaccine	109 (34.6%)	—		
Missing	5 (1.6%)	5 (1.6%)		
Have you received a flu vaccine this year since September 2020?	Adult flu vaccine intention, n (%)	Child flu vaccine intention, n (%)		
Yes	244 (77.5%)	263 (83.5%)		
No, but I/my child(ren) plan to get the vaccine	8 (2.5%)	9 (2.9%)		
No, I/my child(ren) don't get the flu vaccine	57 (18.1%)	37 (11.8%)		
Missing	6 (1.9%)	6 (1.9%)		
Pediatric COVID-19 vaccine intention				
Covariate <sup>b</sup>	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Adult COVID vaccine intention—No	Ref	—	Ref	—
Adult COVID vaccine intention—Yes	<b>96.5 (26.82–347.14)</b>	<b>.000</b>	<b>127.3 (24.4–663.9)</b>	<b>.000</b>
Adult received flu vaccine since September 2020—No	Ref	—	Ref	—
Adult received flu vaccine since September 2020—Yes	<b>5.36 (2.91–9.84)</b>	<b>.000</b>	<b>4.8 (2.30–9.90)</b>	<b>.000</b>
Child received flu vaccine since September 2020—No	Ref	—	Ref	—
Child received flu vaccine since September 2020—Yes	<b>7.11 (3.6–14)</b>	<b>.000</b>	<b>5.48 (2.5–12.03)</b>	<b>.000</b>

Abbreviations: COVID-19, coronavirus disease 2019; OR, odds ratio; CI, confidence interval.

<sup>a</sup> Bold values indicate significance at the .05 level.

<sup>b</sup> Adjusted model covariates include race/ethnicity, gender, age, income, and age of child.